

## **Appendix A – Summary of NTSB Recommendations Regarding Medical Conditions, Medications and Fitness-for-Duty**

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### **A.1 Medical Conditions and Fitness-for-Duty**

#### **To the Federal Railroad Administration:**

R-88-028 - Amend 49 C.F.R. § 219 to require periodic medical examinations (return-to-work, return-from-furlough, and others as appropriate) for all railroad employees in safety-sensitive positions, and to require that alcohol and drug screening be made a part of those examinations.

R-88-030 - Require a federal medical certificate for all railroad employees in safety-sensitive positions. In developing a medical certificate program, establish medical standards similar to programs already used by the federal aviation administration and the federal highway administration.

R-91-024 - Establish uniform medical requirements for train crewmembers that are based on reasonable standards consistent with current medical practices, and require carriers to provide their train crewmembers with periodic medical examinations based on these standards.

#### **To the United States Coast Guard:**

M97-42 - Review, in consultation with experts in occupational health, your medical standards, guidelines and examination forms to ensure that they require the disclosure and appropriate evaluation of the history or presence of any medical conditions, symptoms, or medication use that would affect an individual's fitness to pilot a vehicle.

#### **To the Federal Transit Administration:**

R-01-25 – Authorize and encourage rail transit systems to require their employees in safety-sensitive positions to inform the rail transit system about their use of prescription and over-the-counter medications so that the rail transit systems can have qualified medical personnel determine the medication's potential effect on employee performance.

R-01-27 – Ensure that your fatigue educational awareness programs includes the risks posed by sleeping disorders, the indicators and symptoms of such disorders and the available means for detecting and treating them.

#### **To the Federal Highway Administration/Federal Motor Carrier Safety Administration:**

H-88-24 - Revise Part 391 of the Federal Motor Carrier Safety Regulations to require a motor carrier to verify the authenticity of a medical examiner's certificate if the certificate has been prepared by a physician who has not been selected by the motor carrier to perform the examination. Information concerning the fact that verification was made should be retained as part of the driver's qualification file.

H-89-031 - Revise section 49 C.F.R. § 391.43 of the federal motor carrier safety regulations to: incorporate a provision that will prohibit the omission of medical information in connection with a medical certification physical examination; require that when commercial drivers are examined, they sign a statement certifying that the medical history they have provided is both

complete and accurate and that the motor carrier has the authority to obtain information on the bus drivers' medical history from their personal health care providers; and require that the medical history form elicit more complete information on drivers, using commonly understandable terminology.

H-90-024 - Amend 49 C.F.R. § 391.43 to require more extensive and frequent state of the art cardiac screening tests and examinations of older commercial truck drivers (age 40 and above) and for all commercial drivers with cardiac conditions. Commercial drivers with a cardiac history or condition should be disqualified until cleared by a competent medical authority.

H-90-025 - Develop a clear set of medical standards for cardiac risk assessment and require physicians to use them in qualifying older commercial truck drivers and for commercial drivers with cardiac conditions. Medical certification should include medical state of the art cardiac risk factors.

H-90-026 - Provide for criminal penalties for physicians who deliberately qualify commercial truck drivers with serious medical conditions in spite of contradictory medical evidence and for physicians, commercial drivers, and others who falsify the medical examiner's certificate.

H-90-027 - Improve the medical examination form in 49 C.F.R. § 391.43 to ensure that the examining physician is aware of truck operation risk factors and of the physical and other stress producing requirements of commercial truck operation. Provide for a means for physicians to acknowledge that they understand the rigors of commercial truck operation and that the driver being examined is qualified for such commercial truck operations. The physician should also certify that he understands the penalties for deliberate and/or false statements on the medical certificate and for medical certificate falsification.

The National Transportation Safety Board has investigated several highway accidents where medical conditions were felt to possibly be related to or a probable cause of the accident. Recommendations from many of these were issued in conjunction with the report of the May 9, 1999 Motorcoach Run off the Road Accident which occurred near New Orleans, LA. The NTSB recommended that the Federal Motor Carrier Safety Administration develop a comprehensive medical oversight program for interstate commercial drivers that contains the following program [elements]:

H-01-17 - Individuals performing medical examinations for drivers are qualified to do so and are educated about occupational issues for drivers.

H-01-18 - A tracking mechanism is established that ensures that every prior application by an individual for medical certification is recorded and reviewed.

H-01-19 - Medical certification regulations are updated periodically to permit trained examiners to clearly determine whether drivers with common medical conditions should be issued a medical certificate.

H-01-20 - Individuals performing examinations have specific guidance and a readily identifiable source of information for questions on such examinations.

H-01-21 - The review process prevents, or identifies and corrects, the inappropriate issuance of medical certification.

H-01-22 - Enforcement authorities can identify invalid medical certification during safety inspections and routine stops.

H-01-23 - Enforcement authorities can prevent an uncertified driver from driving until an appropriate medical examination takes place.

H-01-24 - Mechanisms for reporting medical conditions to the medical certification and reviewing authority and for evaluating these conditions between medical certification exams are in place; individuals, health care providers, and employers are aware of these mechanisms.

H-01-25 - Develop a system that records all positive drug and alcohol test results and refusal determinations that are conducted under the U.S. Department of Transportation testing requirements, require prospective employers to query the system before making a hiring decision, and require certifying authorities to query the system before making a certification decision.

## **A.2 Medication Use**

### **To the Federal Railroad Administration:**

R-00-1 - Establish, with assistance from experts on the effects of pharmacological agents on human performance and alertness, procedures or criteria by which train operating crewmembers who medically require substances not on the U.S. Department of Transportation's list of approved medications may be allowed, when appropriate, to use those medications when performing their duties.

R-00-2 - Develop, then periodically publish, an easy-to-understand source of information for train operating crewmembers on the hazards of using specific medications when performing their duties.

R-00-3 - Establish and implement an educational program targeting train operating crewmembers that, at a minimum, ensures that all crewmembers are aware of the source of information described in Safety Recommendation R-00-2 regarding the hazards of using specific medications when performing their duties.

R-00-4 - Establish, in coordination with the U.S. Department of Transportation, the Federal Motor Carrier Safety Administration, the Federal Transit Administration, and the U.S. Coast Guard, comprehensive toxicological testing requirements for an appropriate sample of fatal highway, railroad, transit, and marine accidents to ensure the identification of the role played by common prescription and over-the counter medications. Review and analyze the results of such testing at intervals not to exceed every 5 years.

### **To the U.S. Department of Transportation:**

I-00-1 - Establish, in coordination with the Federal Motor Carrier Safety Administration, the Federal Railroad Administration, the Federal Transit Administration, and the U.S. Coast Guard, comprehensive toxicological testing requirements for an appropriate sample of fatal highway, railroad, transit, and marine accidents to ensure the identification of the role played by common prescription and over-the counter medications. Review and analyze the results of such testing at intervals not to exceed every 5 years.

I-00-2 - Develop, with assistance from experts on the effects of pharmacological agents on human performance and alertness, a list of approved medications and/or classes of medications that may be used safely when operating a vehicle.

I-00-3 - Expressly prohibit the use of any medication not on the U.S. Department of Transportation's list of approved medications (described in Safety Recommendation I-00-2) for twice the recommended dosing interval before or during vehicle operation, except as specifically allowed, when appropriate, by procedures or criteria established by the applicable modal administration (the Federal Aviation Administration, the Federal Motor Carrier Safety Administration, the Federal Railroad Administration, the Federal Transit Administration, or the U.S. Coast Guard).

I-00-4 - Evaluate the applicability of the restrictions (for vehicle operators) described in Safety Recommendations I-00-2 and -3 to transportation employees in all safety-sensitive positions. If appropriate, implement such restrictions within 2 years of their implementation for vehicle operators.

**To the Federal Aviation Administration:**

A-00-4 - Establish, with assistance from experts on the effects of pharmacological agents on human performance and alertness, procedures or criteria by which pilots who medically require substances not on the U.S. Department of Transportation's list of approved medications may be allowed, when appropriate, to use those medications when flying.

A-00-5 - Develop, then periodically publish, an easy-to-understand source of information for pilots on the hazards of using specific medications when flying.

A-00-6 - Establish and implement an educational program targeting pilots that, at a minimum, ensures that all pilots are aware of the source of information described in Safety Recommendation A-00-5 regarding the hazards of using specific medications when flying.

**To the Federal Motor Carrier Safety Administration:**

H-00-12 - Establish, with assistance from experts on the effects of pharmacological agents on human performance and alertness, procedures or criteria by which highway vehicle operators who medically require substances not on the U.S. Department of Transportation's list of approved medications may be allowed, when appropriate, to use those medications when driving.

H-00-13 - Develop, then periodically publish, an easy-to-understand source of information for highway vehicle operators on the hazards of using specific medications when driving.

H-00-14 - Establish and implement an educational program targeting highway vehicle operators that, at a minimum, ensures that all operators are aware of the source of information described in Safety Recommendation H-00-13 regarding the hazards of using specific medications when driving.

H-00-15 - Establish, in coordination with the U.S. Department of Transportation, the Federal Railroad Administration, the Federal Transit Administration, and the U.S. Coast Guard, comprehensive toxicological testing requirements for an appropriate sample of fatal highway, railroad, transit, and marine accidents to ensure the identification of the role played by common prescription and over-the-counter medications. Review and analyze the results of such testing at intervals not to exceed every 5 years.

**To the Federal Transit Administration:**

R-00-5 - Establish, with assistance from experts on the effects of pharmacological agents on human performance and alertness, procedures or criteria by which transit vehicle operators who medically require substances not on the U.S. Department of Transportation's list of approved medications may be allowed, when appropriate, to use those medications when operating transit vehicles.

R-00-6 - Develop, then periodically publish, an easy-to-understand source of information for transit vehicle operators on the hazards of using specific medications when operating transit vehicles.

R-00-7 - Establish and implement an educational program targeting transit vehicle operators that, at a minimum, ensures that all operators are aware of the source of information described in Safety Recommendation R-00-6 regarding the hazards of using specific medications when operating transit vehicles.

R-00-8 - Establish, in coordination with the U.S. Department of Transportation, the Federal Motor Carrier Safety Administration, the Federal Railroad Administration, and the U.S. Coast Guard, comprehensive toxicological testing requirements for an appropriate sample of fatal highway, railroad, transit, and marine accidents to ensure the identification of the role played by common prescription and over-the-counter medications. Review and analyze the results of such testing at intervals not to exceed every 5 years.

**To the United States Coast Guard:**

M-00-1 - Establish, with assistance from experts on the effects of pharmacological agents on human performance and alertness, procedures or criteria by which vessel operating personnel who medically require substances not on the U.S. Department of Transportation's list of approved medications may be allowed, when appropriate, to use those medications when performing their duties.

M-00-2- Develop, then periodically publish, an easy-to-understand source of information for vessel operating personnel on the hazards of using specific medications when performing their duties.

M-00-3 - Establish and implement an educational program targeting vessel operating personnel that, at a minimum, ensures that all operating personnel are aware of the source of information described in Safety Recommendation M-00-2 regarding the hazards of using specific medications when performing their duties.

M-00-4 - Establish, in coordination with the U.S. Department of Transportation, the Federal Motor Carrier Safety Administration, the Federal Railroad Administration, and the Federal Transit Administration, comprehensive toxicological testing requirements for an appropriate sample of fatal highway, railroad, transit, and marine accidents to ensure the identification of the role played by common prescription and over-the-counter medications. Review and analyze the results of such testing at intervals not to exceed every 5 years.

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## **Appendix B – FMCSA Handling of Vision and Diabetes Waivers**

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This appendix describes the procedure that the FMCSA has developed for handling applications for vision and diabetes waivers. These procedures became necessary because the FMCSA regulations prohibit the issuance of a medical certificate to individuals with these conditions but current standards of medical practice make it feasible for some individuals with these conditions to operate a commercial.

### **B.1 Vision waiver/exemption and Commercial Drivers**

As a result of the Americans with Disabilities Act (ADA), the Congress directed the Federal Highway Administration (FHWA) to perform a thorough review of the physical qualifications. An announcement that a study was proposed to consider the feasibility of relaxing the vision standard was published in the *Federal Register* in 1992 [1]. Some commercial drivers with at least a 3-year safe driving record and at least 20/40 vision corrected or uncorrected in the better eye would be eligible for the vision-waiver program.

A suit filed by the Advocates for Highway and Auto Safety [3] requested a review of the issuance of waivers to individuals who otherwise did not meet the federal standard. In 1994, the U.S. Court of Appeals for the D.C. Circuit found that the “agency’s determination that the waiver program(s) will not adversely affect the safe operation of CMVs is devoid of empirical support” [2]. New applications for these waiver programs are not currently being accepted, but those drivers currently holding waivers were grandfathered to continue to operate in interstate commerce provided they continue to meet requirements [4, 5].

A 1996 Eighth Circuit Court decision, in *Rauenhorst v. United States Department of Transportation*, required the agency to consider granting a waiver to a driver who met the criteria for a waiver prior to the program being closed [6]. Since this decision, a number of drivers, initially only in the area covered by the jurisdiction of the Eighth Circuit Court and now expanded, have been granted waivers and more recently exemptions. In 1998, the FHWA described formal procedures for waivers, exemptions, and pilot programs [7]. The term waiver had been used to describe a variance from either the orthopedic, vision or diabetes standards and was valid for up to 2 years. In the new procedure, waiver and exemptions may provide temporary relief from one or more of the Federal Motor Carrier Safety Regulations. The waivers are valid for up to three months, while exemptions may be valid for up to 2 years and are renewable. Exemptions would be granted for variances from the medical standards. Before an exemption would be approved, information on the applicant must be published in the *Federal Register* and a public comment period provided.

In 1996, Jeffrey Parker applied for a vision waiver and was denied because in addition to the visual impairment, he was missing his left arm. Drivers were considered to only be eligible for a waiver if they met the other medical criteria. A petition was filed with the U.S. Court of Appeals for the sixth Circuit and the agency’s decision was found to be arbitrary and capricious and a violation of the Rehabilitation Act [8, 9]. The agency is now considering exemption applications from drivers with multiple impairments.

Another petition to the Court was submitted by John Anderson. His application for a vision waiver was denied as he had less than 3 years experience driving a commercial motor vehicle

with his vision deficit. The Court of Appeals, held that the decision by the FHWA to require 3 years of driving experience with monocular vision as prerequisite to granting vision waiver to driver who had lost sight in one of his eyes, was not arbitrary or capricious, an abuse of discretion, or contrary to law [10].

As of January 1, 2004, there have been 3533 applications for vision exemptions. A total of 851 exemptions have been granted and 1274 have been rejected. The remainder are under review.

### *References*

1. Qualification of drivers: Waiver applications—Vision. Fed Reg 1992;57(March 25):10295–10297.
2. Qualification of drivers: Vision deficiencies—Waivers. Fed Reg 1994;59(Nov. 17):39386–39390.
3. Advocates for Highway and Auto Safety v. FHWA, 28 F.3d 1288 (1994).
4. Qualification of drivers: Vision and diabetes—Limited exemptions. Fed Reg 1996;61(Jan. 8):606–611.
5. Qualification of drivers: Vision and diabetes—Limited exemptions. Fed Reg 1996;61(March 26):13338–13347.
6. Qualification of drivers: Waiver application—Vision. Fed Reg 1998;63(Jan. 8):1524–1537.
7. Federal Motor Carrier Safety Regulations: Waivers, exemptions, and pilot programs—Rules and procedures. Fed Reg 1998;63(Dec. 8):67600–67612.
8. Parker v. U.S. DOT, 207 F.3d 359 (2000).
9. Application for exemption from driver physical qualification standards from Jeffrey Parker. Fed Reg August 22, 2002;67(163):54525-54527.
10. Anderson v. U.S. DOT, FHWA, 213 F.3d 422 (2000).

## **B.2 Commercial Motor Vehicle Operators and Diabetes**

Since the final rule on medical standards for commercial drivers became effective in 1970, the use of insulin for control of diabetes has been considered disqualifying [1]. The standard requires that the driver “(b)(3) Has no established medical history or clinical diagnosis of diabetes mellitus currently requiring insulin for control.”

As a result of the Americans with Disabilities Act (ADA), the Congress directed the Federal Highway Administration (FHWA) to perform a thorough review of the physical qualifications. An announcement that studies were proposed to consider the feasibility of relaxing the diabetes standard was published in the *Federal Register* in 1993 [2]. The diabetes waiver program would permit some drivers with at least a 3-year record of safe commercial vehicle driving to drive a CMV in interstate commerce. Several other conditions were set, including blood sugar monitoring and the reporting of any accident, whether or not it normally would have been reportable. Some commercial drivers with at least a 3-year safe driving record were eligible for the diabetes waiver program.

A suit filed by the Advocates for Highway and Auto Safety requested a review of the issuance of waivers to individuals who otherwise did not meet the federal standard. In 1994, the U.S. Court of Appeals for the D.C. Circuit found that the “agency’s determination that the waiver program will not adversely affect the safe operation of commercial motor vehicles is devoid of empirical support.” FHWA no longer accepted new applications for the diabetes waiver programs at that point but those drivers currently holding waivers were grandfathered to continue to operate in interstate commerce provided they continue to meet requirements [3, 4].

A 2000 report to Congress on the feasibility of qualifying individuals with Insulin treated diabetes reviewed the issue and offered suggestions on how to permit some drivers on Insulin to operate commercial vehicles in interstate commerce [5]. A Request for Comments was published in the July 31, 2001 *Federal Register* on the possibility of issuing exemptions to those commercial drivers requiring insulin for control of their diabetes [6].

On September 3, 2003 the FMCSA announced that they will be accepting applications for exemptions from some commercial drivers operating in interstate commerce who are taking insulin for control of their diabetes. Only applicants who meet specific criteria and agree to comply with the requirements of the program will be considered. The exemption is valid for up to 2 years (although the driver must have a medical certification examination annually) and it can be renewed [7].

The process for applying for the exemption is described in the C.F.R. FHWA Waivers Exemptions and Pilot Programs (1999) [8]. The applicant must explain how a level of safety could be achieved that is equivalent to, or greater than, the level of safety that would be obtained by complying with the regulation. Prior to an exemption being granted, information on the application must be published in the *Federal Register*. It is anticipated that it may take up to 180 days from submission of a complete application for the agency (now FMCSA) to make a final determination.

Drivers must have operated a commercial motor vehicle while their diabetes is controlled with insulin for a three year period immediately preceding application and have no other disqualifying conditions including diabetic complications. They must not have had any:

- recurrent (two or more) hypoglycemic episodes with loss of consciousness or seizure within past 5 years;
- recurrent episodes requiring assistance within 5 years or;
- recurrent episodes with cognitive impairment without warning within 5 years.

If they had one episode of any of the above, there must be at least a one year period of stability before consideration. The driving record will be reviewed and the driver will not be considered if certain incidents have occurred.

The application must include the results of a comprehensive examination by a board certified or eligible endocrinologist and a report which includes the following:

- date insulin use began;
- diabetes diagnosis and disease history;
- hospitalization records;

- consultation notes for diagnostic examinations;
- special studies;
- reports of any hypoglycemic episodes within the past 5 years;
- two measures of HbA1C, the first 90 days before the last and most current measure; and
- insulin dosages, types, and diet.

The examination must indicate that the presence or absence of peripheral neuropathy or circulatory insufficiency of the extremities was addressed. The report must state that the endocrinologist is familiar with the individual's medical history for the past 5 years, either directly or through consultation with prior providers. The report must also indicate that the applicant has been using insulin for the 3 years prior to the date of the application, has been educated in diabetes and its management, and has the ability and has demonstrated willingness to monitor and manage his diabetes appropriately.

A signed statement from an ophthalmologist or optometrist indicating that there is no diabetic retinopathy must be submitted. If diabetic retinopathy is present the note must indicate whether there is unstable proliferative diabetic retinopathy. The statement must also indicate that the applicant meets the vision standards of C.F.R. FMCSA Physical Qualifications for Drivers (1998) [9] or has been issued valid medical exemption.

Once an exemption has been granted, the individual must agree to comply with monitoring and management criteria. While driving, the applicant must carry a glucose monitor with memory and a source of rapidly absorbable glucose, and must have food available.

The driver must do the following while working:

- Must check sugar prior to driving
  - If <100 mg/dl, eat or take sugar and recheck in 30 minutes
  - Do not drive if < 100 mg/dl
- Check every 2-4 hours and keep between 100 and 400 mg/dl
  - If <100 mg/dl, eat or take sugar and recheck in 30 minutes.
  - Do not drive if < 100 mg/dl.
  - If glucose is greater than 400 mg/dl, stop driving until glucose returns to the 100 to 400 mg/dl range.
  - If more than two hours after last insulin injection and eating, take additional insulin.
  - Recheck glucose in 30 minutes.
  - Do not resume driving until glucose < 400 mg/dl.

The endocrinologist must submit a quarterly written confirmation to FMCSA that glucose measurements and glycosylated hemoglobin are in an adequate range based on daily glucose measurements taken with the glucose monitoring device and correlated with the daily records of driving time. A current glycosolated hemoglobin must also be submitted. An annual

comprehensive evaluation by the endocrinologist and ophthalmologist or optometrist is also required.

Once granted an exemption, the individual must report all episodes of severe hypoglycemia, significant complications, or inability to manage diabetes. They must also report any involvement in an accident or any other adverse event whether or not they are related to an episode of hypoglycemia.

The medical certification examination for those who have been granted an exemption has two parts. First the endocrinologist must evaluate the individual and indicate that the driver is free of insulin reactions as defined in the application process. The endocrinologist must signify that the driver is able to and has demonstrated willingness to properly monitor and manage his/her diabetes,

The second part of the examination must be conducted by a medical examiner who attests that the individual is physically qualified under C.F.R. FMCSA Physical Qualifications for Drivers (2002), [10] or holds a valid exemption. The examination must be performed annually and the individual must provide the glucose records to both the endocrinologist and examiner. A copy of the reports from the endocrinologist and the ophthalmologist or optometrist report must be provided to the examiner at the time of the annual recertification examination.

The complete *Federal Register* announcements can be found in PDF or html version respectively at; [http://www.fmcsa.dot.gov/rulesregs/fmcsr/final/Diabetes\\_Notice\\_09-03-2003.pdf](http://www.fmcsa.dot.gov/rulesregs/fmcsr/final/Diabetes_Notice_09-03-2003.pdf), .or [http://www.fmcsa.dot.gov/rulesregs/fmcsr/final/Diabetes\\_Notice\\_09-03-2003.htm](http://www.fmcsa.dot.gov/rulesregs/fmcsr/final/Diabetes_Notice_09-03-2003.htm).

To date the FMCSA has not approved any exemptions from the diabetes standards.

### *References*

1. Qualification of drivers of commercial motor vehicles. Fed Reg 1970;35(April 22):6458–6467.
2. Qualification of drivers: Waivers—Diabetes. Fed Reg 1993;58(July 29):40690–40697.
3. Qualification of drivers: Vision and diabetes—Limited exemptions. Fed Reg 1996;61(Jan. 8):606–611.
4. Qualification of drivers: Vision and diabetes—Limited exemptions. Fed Reg 1996;61(March 26):13338–13347.
5. A Report to Congress on the Feasibility of a Program to Qualify Individuals with Insulin Treated Diabetes Mellitus to Operate Commercial Motor Vehicles in Interstate Commerce as Directed by the Transportation Equity Act for the 21st Century - July 2000
6. Notice of intent to issue exemptions and request for comments; Qualification of Drivers; Exemption Applications; Diabetes; Fed Reg 2001;66(July 31):39548-39553.
7. Qualification of Drivers: Exemption Applications: Diabetes. Notice of Final Disposition. Fed Reg. September 3, 2003; 52441-52.
8. FHWA Waivers Exemptions and Pilot Programs 49 C.F.R. § 381.300 – 330 (1999).
9. FMCSA Physical Qualifications for Drivers 49 C.F.R. § 391.41(b)10 (1998).
10. FMCSA Physical Qualifications for Drivers 49 C.F.R. § 391.41 (2002).

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## **Appendix C – Medical Literature Abstracts**

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This appendix contains abstracts for the articles that are summarized in section 6. The last subsection contains definitions for the medical terminology used in the abstracts.

### **C.1 Blood Pressure**

Chobanian AV, Bakris GL, Black HR. The 7<sup>th</sup> Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. *JAMA*. 2003;289:2560-2572.

Hypertension affects approximately 50 million individuals in the U.S. and approximately 1 billion people worldwide. The relationship between blood pressure and the risk of cardiovascular disease is consistent and independent of other risk factors.

The blood pressure levels are: Normal - less than 120/80, pre-hypertension - 120-139 or 80-89, Stage I - 140-159 or 90-99, Stage II – diastolic greater than or equal to 160 or systolic greater than or equal to 100. The risk of cardiovascular disease, beginning at 115/75, doubles with each increment of 20/10. In clinical trials, anti-hypertensive therapy has been associated with a 35 percent - 40 percent mean reduction in stroke incidences, a 20 to 25 percent decrease in myocardial infarction and more than a 50 percent reduction in heart failure.

Miura K, Daviglius ML, Dyer AR, et al. The Relationship of Blood Pressure 25-Year Mortality Due to Coronary Heart Disease, Cardiovascular Disease and all Causes in Young Adult Men. The Chicago Heart Association Detection Project in Industry. *Archives of Internal Medicine*. 2001;161:1501-08.

This cohort included 10,874 men aged 18-39 years at baseline between 1967 and 1973, not receiving anti-hypertensive drugs and without coronary heart disease (CHD) or diabetes. The relationship of baseline blood pressure, and 25-year CHD, cardiovascular disease (CVD) and all-cause mortality was assessed. The age-adjusted association of systolic blood pressure to CHD mortality was continuous and graded. Multi-variant adjusted CHD hazard rates show for one standard deviation higher systolic blood pressure (15mmHg) and diastolic blood pressure (10mmHg) were 1.26 and 1.17 respectively. In young adult men blood pressure above normal is significantly related to increased long-term CHD, CVD and all cause mortality. Compared with the Joint National Committee (JNC) sixth report, the stratum with high normal blood pressure and Stage I hypertension had 25-year absolute risks of death of 63 and 72 per 1,000 respectively; absolute excess risk of 10 and 20 per 1,000 respectively; and accounted for 59.8 percent of all CHD, CVD and all course mortality.

### **C.2 Diabetes**

American Diabetes Association. Position Statement. Hypoglycemia and Employment/Licensure. *Diabetes Care*. 2003;26:S141-S142.

People with diabetes should be individually considered for employment based on the requirements of a specific job. Factors to be weighed in this decision include the individual medical condition, treatment regime, and medical history particularly in regard to the occurrence of incapacitating hypoglycemic episodes. This position statement indicates that the greatest risk is hypoglycemia. This is often not a concern in those patients treated with only medical nutrition therapy (MNT) and exercise and rare in people treated with  $\alpha$ -glucosidase inhibitors, biguanides, or thiazolidinediones. Most diabetics are aware of when they are hypoglycemic and are able to take appropriate action. Based on this ADA recommends that there should be no limitations on the employment or licensure of diabetics.

American Diabetes Association. Implications for Diabetes Control and Complications Trial. *Diabetes Care*. 2003;26(Supplement 1):S25-S27.

This study determined that a reasonable goal is a mean glucose 155 and hemoglobin A1C of 7.2. The major danger from tight control of blood glucose is hypoglycemia, especially in people with type 1 diabetes.

Clarke WL, Cox DJ, Gonder-Frederick LA, Kovatchev B. Hypoglycemia and the decision to drive a motor vehicle by persons with diabetes. *JAMA*. 1999;282:750-754.

This study examined type 1 diabetic subjects' decisions to drive during their daily routine based on perception of blood glucose (BG) levels compared with actual measured BG levels. The researchers recruited two groups of patients, all of whom were adults with type 1 diabetes, who were drivers and performed at least two BG tests per day. Subjects stated they would drive 43 percent to 44 percent of the time when they estimated their BG level to be 3.3 to 3.9 mmol/L (60-70 mg/dL), and 38 percent to 47 percent of the time when their actual BG level was less than 2.2 mmol/L (40 mg/dL). Logistic regression analysis demonstrated that number of autonomic symptoms, degree of impairment on cognitive function tests, and BG level estimate predicted 76 percent to 80 percent of decisions to drive. Approximately 50 percent of subjects in each group decided to drive at least 50 percent of the time when their BG level was less than 3.9 mmol/L (70 mg/dL). The authors concluded that people with type 1 diabetes may not judge correctly when their BG level is too low to permit safe driving and may consider driving with a low BG level even when they are aware of the low level.

Cox DJ, Gonder-Frederick LA, Kovatchev BP, Julian DM, Clarke WL. Progressive hypoglycemia's impact on driving simulation performance: occurrence, awareness and correction. *Diabetes Care*. 2000;23(2):163-170.

This study evaluated the blood glucose (BG) levels at which driving was impaired, impairment was detected, and corrective action was taken by subjects, along with the mechanisms underlying these three issues. Thirty seven adults with type 1 diabetes drove a simulator during continuous euglycemia and progressive hypoglycemia. Driving was found to be significantly impaired during hypoglycemia and subjects were aware of their impaired driving. However, corrective actions did not occur until BG was <2.8 mmol/l.

Cox DJ, Penberthy JK, Zrebiec J, Weinger K, Aikens JE, Frier B, Stetson B, et al. Diabetes and driving mishaps, frequency and correlations from a multinational survey. *Diabetes Care*. 2003;26:2329-2334.

This study investigated whether diabetes is associated with an increased risk of driving mishaps and the correlates of such a relationship. During routine visits to diabetes specialty clinics, consecutive adults with type 1 diabetes, type 2 diabetes, and non-diabetic spouse control subjects (n = 341, 332, and 363, respectively) completed an anonymous questionnaire concerning diabetes and driving. Type 1 diabetic drivers reported significantly more crashes, moving violations, episodes of hypoglycemic stupor, required assistance, and mild hypoglycemia while driving as compared with type 2 diabetic drivers or spouse control subjects. Type 2 diabetic drivers had driving mishap rates similar to non-diabetic spouses, and the use of insulin or oral agents for treatment had no effect on the occurrence of driving mishaps. Crashes among type 1 diabetic drivers were associated with more frequent episodes of hypoglycemic stupor while driving, less frequent blood glucose monitoring before driving, and the use of insulin injection therapy as compared with pump therapy. One-half of the type 1 diabetic drivers and three-quarters of the type 2 diabetic drivers had never discussed hypoglycemia and driving with their physicians.

Dionne G, Desjarding D, Laberge-Nadeau C, Maaz U. Medical conditions, risk exposure, and truck drivers' accidents: an analysis with count data regression models. *Accident Analysis and Prevention*. 1995;27:295-305.

Recent studies do not agree on the possible relationship between medical conditions and traffic safety; most of them do not control for exposure factors. This problem has become more pertinent for scientific studies because of litigation that showed that present regulations about access to driver permits might contravene human rights legislation. This study estimates the effect of different medical conditions on truck drivers' distributions of accidents. The data and models permit simultaneous control for age; medical conditions; exposure factors measured by hours, kilometer, and qualitative factors; and other characteristics of truck drivers. The results show that diabetic truck drivers of the permit class for straight trucks have more accidents than drivers in good health. No other studied medical condition has a significant effect on individual accident distributions. Many risk exposure variables are also significant. The effect of age is discussed in detail.

Hansotia P, Broste SK. The Effect of Epilepsy or Diabetes Mellitus on the Risk of Automobile Accidents. *New England Journal of Medicine*. 1991;324:22-6.

This study was a population based retrospective cohort study of 30,420 subjects, 16-90 years of age with and without epilepsy or diabetes mellitus. All subjects lived in the area around the Marshfield Clinic and St. Joseph's Hospital in Marshfield, Wisconsin. The conclusion was that drivers with epilepsy or diabetes mellitus had slightly increased risk of traffic accidents as compared with persons who are unaffected.

Koepsell TD, Wolf ME, McCloskey L, Buchner, Louis D, Wagner EH, Thompson RS. Medical Conditions and motor vehicle collision injuries in older adults. *Journal of the American Geriatric Society*. 1994;42:695-700.

This was a case control study to determine whether medical conditions that can impair sensory, cognitive, or motor function increase the risk of injury due to motor vehicle collision in older drivers. Drivers who were 65 years or older and injured were matched with controls by age, gender and county of residence. Injury risk was 2.6-fold higher in older diabetic drivers, especially those treated with insulin or oral hypoglycemic agents, those with diabetes for over 5 years, and those with both diabetes and coronary heart disease. There was also an increased risk for those older drivers with coronary artery disease, depression, alcohol abuse, or falls but these were not statistically significant.

Laberge-Nadeau C, Dionne G, Ekoe JM, Hamet P, Desjardins D, Messier S, Maag U, Impact of diabetes on crash risks of truck-permit holders and commercial drivers. *Diabetes Care*. 2000;23(5):612-7.

This study reviewed analyses of crash risks for users and nonusers of insulin among diabetic truck-permit holders in Quebec, Canada. Diabetic truck-permit holders were group-matched by age to a random sample of healthy permit holders. Information on a total of 13,453 permit holders in 1987-1990 were extracted from the files of the public insurer for automobile injuries in Quebec. Additional health status data were obtained from the provincial public health insurer and a telephone survey was conducted to collect data on driving patterns and exposure. Risk ratios for crashes were found to vary by category of diabetes. Permit holders who are diabetic without complications and not using insulin have an increased crash risk of 1.68 when compared with healthy permit holders of the same permit class. If controlled for risk exposure, they are found to have an increased risk of 1.76. Insulin use is not associated with higher crash risk. The finding that lack of consistent increases in crash risks among diabetic commercial drivers with complications or who use insulin may be a “healthy worker effect.”

Weinger K, Kinsley BT, Levy CJ, Bajaj M, Simonson DC, Cox DJ, Ryan CM, Jacobson AM. The perception of safe driving ability during hypoglycemia in patients with type 1 diabetes Mellitus. *AM J. Med* 1999;107:246-253.

Thirty men and 30 women with uncomplicated type 1 diabetes (age [mean +/- SD] 33 +/- 9 years, duration 9 +/- 3 years, hemoglobin A1C level 8.7 percent +/- 1.0 percent) underwent induced hypoglycemia. At several levels of hypoglycemia participants completed a symptom questionnaire and neuropsychological test, estimated their glucose level, and reported whether they could drive safely. The proportion of patients judging that they could drive safely decreased as serum glucose levels decreased. Men and middle-aged patients were more likely to consider it safe to drive during hypoglycemia than women and those under 25 years of age. Those who were symptomatic and those who recognized hypoglycemia were less likely to report safe driving ability during hypoglycemia. Most patients who were cognitively impaired appeared to recognize this and reported that they could not drive safely at a serum glucose level of 40 mg/dL.

Ysander L. The Safety of Drivers with Chronic Disease. *British Journal of Industrial Medicine*. 1966;23:28-36.

Six hundred twelve drivers with chronic diseases; mainly diabetes, cardiovascular disease, renal disorders; were investigated in regard to the frequency of road accidents and serious driving offenses during a 10-year period. Road accidents directly caused by the disease or its treatment occurred in 0.8 percent of cases, all due to hypoglycemic attacks in insulin treated diabetics.

### **C.3 Hepatic (Liver)**

Srivastava A, Mehta R, Rothke SP, et al. Fitness to Drive in Patients with Cirrhosis and Portal Systemic Shunting, A Pilot Study Evaluating Driving Performance. *Journal of Hepatology*. 1994;21:1023-1028.

Sixty-six percent of subjects with cirrhosis had two or more abnormal neuropsychological tests, criteria used to define the presence of sub-clinical encephalopathy. No deficiencies in simulator or real driving performance were seen when compared to patients with cirrhosis with normal neuropsychological test. In this study, stable subjects with cirrhosis and evidence of portal hypertension, portal systemic shunting, abnormal neuropsychological test and no prior history of overt encephalopathy did not exhibit a major impairment in their fitness to drive. The study highlighted the importance of testing actual driving ability rather than relying on neuropsychological tests or driving simulators to assess driving performance in patients with cirrhosis.

### **C.4 Cardiac (Heart)**

Akiyama T, Powell JL, Mitchell LB, Ehlert FA, Baessler C. Resumption of driving after life-threatening ventricular tachyarrhythmia. *New England Journal of Medicine*. 2001;345:391-397.

The risks associated with allowing patients with life-threatening ventricular tachyarrhythmias to drive have not been quantified. The Antiarrhythmics Versus Implantable Defibrillators (AVID) trial compared antiarrhythmic-drug therapy with the implantation of defibrillators in patients resuscitated from near-fatal ventricular arrhythmias. In this study, patients from the AVID trial were sent questionnaires, to be completed anonymously, requesting information about driving habits and experiences. A total of 758 of 909 patients (83 percent) responded. Of these, 627 patients drove during the year before their index episode of ventricular tachyarrhythmia and 57 percent of those resumed driving within months of their entry into the trial. Two percent of these had a syncopal episode while driving and 11 percent had dizziness or palpitations that necessitated stopping the vehicle. A total of 22 percent had dizziness or palpitations that did not necessitate stopping the vehicle and eight percent of the 295 patients with an implantable cardioverter-defibrillator received a shock. Fifty patients reported having at least one accident, for a total of 55 accidents during 1619 patient-years of follow-up after the resumption of driving (3.4 percent per patient-year). Only 11 percent of these accidents were preceded by symptoms of possible arrhythmia (0.4 percent per patient-year). The authors concluded that most patients

with ventricular tachyarrhythmias resume driving early. Although it is common for them to have symptoms of possible arrhythmia while driving, accidents are uncommon.

Several editorials including those below suggested that drawing a conclusion from this study might be premature, especially for those in certain occupations. These include;

- Lowenfels AB. Driving after life threatening ventricular tachyarrhythmia (correspondence). *N Engl J Med* 2002;346:208-209.
- Smith TW. Driving after ventricular arrhythmias (editorial) *N Engl J Med* 2001;345:451-452

American College of Cardiology / European Society of Cardiology Clinical Experts Consensus Document on Hypertrophic Cardiomyopathy. *Journal of the American College of Cardiology*. 2003;42:1687-713.

Hypertrophic cardiomyopathy is a complex, relatively common genetic disorder with a prevalence of about 1 in 500 in the general adult population. It has been subject to intense scrutiny and investigation for over 40 years. It is a particularly common cause of sudden death in young people, including trained athletes, and may cause death and disability in patients of all ages, although it is also frequently compatible with normal longevity. Because of its heterogeneous clinical course and expression, hypertrophic cardiomyopathy frequently presents uncertainty and represents a management problem for cardiovascular specialists and other practitioners. Risk factors for sudden death include cardiac arrest, spontaneous sustained ventricular tachycardia, family history of premature sudden death, unexplained syncope, left ventricular thickness greater or equal to 30mm, abnormal exercise blood pressure, and non-sustained ventricular tachycardia by Holter monitor.

Antecol DH, Roberts WC. Sudden death behind the wheel from natural disease in drivers of four-wheeled motorized vehicles. *American Journal of Cardiology*. 1990; 66:1329-1335.

Post-mortem pathological studies of 30 persons who died suddenly from natural causes in the driver's seat of an automobile, truck or bus revealed that 20 had cardiac arrest while driving and the other ten while sitting in the driver's seat of a parked vehicle. Of the twenty drivers, sixteen died from atherosclerotic coronary artery disease (CAD) while the other four died from: aortic rupture associated with the Marfan syndrome in one; cardiac sarcoidosis in one; thoracic aortic dissection in one; and severe mitral regurgitation from infective endocarditis, which had healed in one. Accidents occurred in twelve (40 percent of those who died behind the wheel), all minor. Of the ten persons who were found dead in the driver's seat of a parked vehicle, eight had fatal CAD. The authors concluded that characteristics of drivers who die suddenly are similar in age, gender, and extent of coronary artery involvement. They also found that the resulting accidents were minor.

Bansch D, Brunn J, Castrucci M, Weber M, Gietzen F, Borggrefe M, Breithardt G, Block M, Syncope in patients with an implantable cardioverter-defibrillator: incidence, prediction and implications for driving restrictions. *Journal of the American College of Cardiology*. 1998 Mar 1;31(3):608-15.

Recognizing that syncope while driving can lead to accidents, the authors sought data on the risk of syncope in individuals who have implantable cardioverter defibrillators. This retrospective study on 421 with an implantable cardioverter-defibrillator (ICD) found that 229 (54.4 percent) had recurrent ventricular fibrillations/ventricular tachycardia (VT/VF), and 62 (14.7 percent) had syncope. The actuarial survival rate free of VT/VF was 58 percent, 45 percent and 37 percent and that for survival free of syncope was 90 percent, 85 percent and 81 percent at 12, 24 and 36 months after implantation, respectively. Once VT/VF had occurred, 76 percent, 68 percent and 62 percent of patients remained free of syncope during the following 12, 24 and 36 months, and 68 percent, 64 percent and 56 percent remained free of second syncope 12, 24 and 36 months after first syncope, respectively. A low baseline left ventricular ejection fraction (LVEF), induction of fast VT (CL <300 ms) during programmed ventricular stimulation and chronic atrial fibrillation (AF) were associated with an increased risk of syncope. Once patients had a VT recurrence, syncope during the first VT and a high VT rate were the strongest risk predictors of future syncope.

Bellet S, Roman L, Kostis J. The Effect of Automobile Driving on Catecholamine and Adrenocorticoid Excretion. *The American Journal of Cardiology*. 1969;24:365-368.

This was a study of 17 young normal subjects aged 19-25 and 19 patients with coronary heart disease ages 38-72 years. The effects of automobile driving on urinary catecholamine and 11-Hydroxycorticosteroids (11-OHCS) excretion was measured in both groups. In both groups, excretion of catecholamines and 11-OHCS was found to be significantly increased during a two-hour period of driving compared with a two-hour control period. These results support the contention that ischemic ST segment depression, premature ventricular contractions (PVC's) or both on the electrocardiogram (EKG) which occur during driving in subjects with coronary artery disease are induced by this stress.

Bellet S, Roman L, Kostis J, Slater A. Continuous Electrocardiographic Monitoring During Automobile Driving. *American Journal of Cardiology*. 1968;22:856-862.

The authors reported 65 young normal males subjects aged 25-39 with no clinical evidence of heart disease and 66 subjects with documented coronary heart disease. In this study, 16.7 percent of subjects with the coronary heart disease had electrocardiographic changes during a 2½-hour driving period during daylight hours. The patients were driving their own cars and had been instructed to drive in their usual manner with regard to speed and traffic conditions. Among the subjects with coronary heart disease, significant electrocardiographic changes occurred. These changes occurred under relatively favorable driving conditions.

Bonow RO, Chair. ACC/AHA Guidelines for the Management of Patients with Valvular Heart Disease. A Report of the American College of Cardiology / American Heart Association Task Force on Practice Guidelines. *Journal of the American College of Cardiology*. 1998;32:1486-1588.

This report discusses the diagnosis, treatment, course, and natural history of the major valvular diseases such as aortic stenosis, aortic insufficiency, mitral stenosis. This document was used by the FMCSA 2002 cardiovascular guidelines.

Booze CF. Sudden Incapacitation in General Aviation. Office of Aviation Medicine Federal Aviation Administration DOT/FAA/AM/87/7. August 1987.

Data indicates that approximately three accidents per 1,000 (15 per 1,000 fatal accidents) are known to result from incapacitation of the pilot from all causes. Coronary heart disease is the most important cause of sudden incapacitation or death among diseases likely to be diagnosed in general aviation accidents. U.S. population mortality data reports that cerebrovascular disease accounts for approximately 20 percent of all deaths due to cardiovascular disease. Autopsy studies conducted by the FAA have found an average of five cases per year involving cardiovascular incapacitation with an autopsy rate of 38 percent, or 13 cases per year if extrapolated to the entire fatal general aviation population. FAA studies also indicate a prevalence of severe coronary artery disease in about 5 percent of autopsied general aviation pilots in command for the years 1975 through 1977. Accident rates for cardiovascular incapacitation are low compared to other factors known to contribute to general aviation accidents. Older age groups experience higher incapacitation rates and contribute more to the total incapacitation in general aviation.

Chaitman BR, Davis KB, Dodge HT, et.al. Should Airline Pilots be Eligible to Resume Active Flight Status after Coronary Bypass Surgery?: A CASS Registry Study. *Journal of the American College of Cardiology*, 1986, 1318-24.

Medical certification to return-to-work after coronary bypass surgery in occupations that carry a risk to public safety is controversial, particularly in airline pilots. To address this issue, 2,326 men out of 10,312 patients in the Coronary Artery Surgery Study (CASS) registry who had coronary artery bypass surgery were selected based on clinical and post-operative characteristics similar to those of the average airline pilot who might apply to renew his license after surgery. The data from this CASS registry study are pertinent to the question of first class medical certification after bypass surgery. The data is also relevant to the issue of medical certification after coronary bypass surgery of individuals in other occupations in the transportation industry where public safety is an issue. Data from this study of highly selected patients reveal a relatively low probability of developing an acute cardiac event in the 5-7 years after successful coronary bypass surgery. The risk of an acute cardiac event or death is low in patients with normal or relatively well preserved left ventricular function in the initial seven years and for this highly selected group of CASS patients the risks appears to compare favorably with U.S. male population of similar age.

Christian MS. Incidence and implications of natural deaths of road users. *British Medical Journal*. 1988;297:274-285.

This was a prospective study for the period 1978 – 87 to determine the incidence of a sudden death in road users. In East Berkshire emergency departments 30,000 people were brought in for injuries from motor vehicle crashes. Of the 267 who were dead on arrival (DOA) or died within 2 hours of admission, 64 (24 percent) died from natural disease or were killed in an accident because of pre-existing medical disease. Seven of the cases were from ruptured abdominal aortic

aneurysm. None of the seven knew of the aneurysm. A second finding was that sudden natural death in road users is not an appreciable hazard to other road users.

Cocco G, Iselin HU. Cardiac Risks of Speed Traps. *Clinical Cardiology*. 1992;15:441-444.

Twenty-two patients with stable cardiac disease drove into a radar trap while wearing an ambulatory electrocardiogram. All patients reported cardiac symptoms, with heart rate increase and repetitive ventricular arrhythmias. Myocardial ischemia was observed in some patients. This data confirmed the effects of stress and adrenergic tone on ventricular arrhythmias. No changes lasted longer than four minutes, but increased heart rate and ventricular couplets and ventricular triplets reached statistical significance.

Cupples LA, Gagnon DR, Kannell WB. Long and Short-term Risks of Sudden Coronary Death. *Circulation*. 1992;85(Supplement 1):1121-28.

The short and long-term relationship between risk factors and sudden cardiac death was examined in the Framingham Heart Study of 2011 men and 2,534 women aged 35-70 at the 4th biannual examination. In men, pre-existing coronary heart disease conferred a 3.3-fold increased long-term risk of sudden cardiac death and a 5.3-fold increase short-term risk. In women the long-term risk is 1.9 and short-term risk is 2.8. Cardiac failure in men conferred a 4.8-fold increased long-term risk and a 2.6-fold increased short-term risk. In women, the increased long-term risk was 1.8-fold and the increased short-term risk 6.2-fold. Over the 28 years of follow-up, 171 men and 80 women experienced sudden cardiac death. Women had a lower incidence than men at all ages. Another essential feature is a short time span from the onset of symptoms to death. Time criteria however, have ranged from instantaneous to death within 1, 2, 6, and even 24 hours. The essential elements of the definition are the unexpected occurrence of a natural process that develops rapidly. This data suggests that short-term vulnerability to sudden death is determined more by intrinsic cardiac factors such as the degree of silent myocardial ischemia, left ventricular hypertrophy (LVH) and coronary circulatory reserve than by predisposing risk factors. Hence the effect of electrocardiogram (ECG) abnormalities, heart rate and pre-existing congestive heart failure (CHF) is stronger in the short-term than in the long-term. In the long-term, risk factors play a more important role.

Dhala A, Bremner S, Blanck Z, Sra J, Deshpande S, Jazayeri MR, Akhtar M. Impairment of driving abilities in patients with supraventricular tachycardia. *American Journal of Cardiology*. 1995;75:516-518.

This study involved a survey of 589 patients with supraventricular tachycardia and symptoms, syncope and driving. A total of 15 percent of those surveyed experienced syncope or near syncope. Of those, two had accidents preceded by syncope and 22 stopped driving due to the onset of presyncope. While syncope can occur and result in impairment in driving ability, voluntary restriction of driving is uncommon. The only good predictor of identifying those at risk was the history of previous syncope.

Epstein AE Chair, Miles WM Chair. Medical/Scientific Statement From the American Heart Association and the NAPSE. Personal and Public Safety Issues Related To Arrhythmias That May Effect Consciousness: Implication for Regulation Physician Recommendations. *Circulation*. 1996;94:1147-1166.

This is a comprehensive review article of arrhythmias and recommendations for drivers of both commercial and private vehicles. The authors acknowledge that a zero risk is unattainable but that the acceptable risk differs depending on the setting and activity. They discussed the regulations relating to driving and flying, and the ethics of regulating driving. Guidelines, but not practice standards, were provided on specific arrhythmias such as bradycardia, ventricular tachycardia and conduction disturbances. Implantable defibrillator and pacemakers were part of this review.

Halinen MO, Jaussi. Fatal road accidents caused by sudden death of the driver in Finland and Vaud, Switzerland. *European Heart Journal*. 1994;15:888-894.

This retrospective analysis looked at incidence of fatal traffic accidents caused by sudden incapacity of the driver due to cardiac and other illnesses. Data was obtained from Finnish traffic accident data files from 1984-1989, and police records of traffic accidents, from Canton de Vaud, Switzerland from 1986-1989. Sudden driver incapacity caused 1.5 percent of all traffic deaths in Finland (including other than drivers), and 3.4 percent in Vaud. Probable cardiac arrest caused 2.1 percent of all drivers' deaths in Finland (driver only deaths) and 1.7 percent in Vaud, respectively. Deaths caused by professional drivers' sudden incapacity were responsible for 0.11 percent of all traffic deaths in Finland, and for 0 percent in Vaud. Old age and short mileage were associated with illness-caused accidents.

Haskell WL, Brachfeld N, Bruce RA, et al. Determination of Occupational Working Capacity in Patients with Ischemic Heart Disease. *Journal of American College of Cardiology*. Task Force 2. 1989;14:1016-42.

The energy requirements and myocardial oxygen demands of various work tasks are significantly influenced by hot and cold temperatures, conditions of heat, or humidity or both. High levels of air pollution reduced the exercise tolerance of healthy people as well as those limited by ischemia. Occupational work classification by energy requirements: very heavy and heavy - carrying heavy objects, climbing many stairs rapidly is greater than 6 METS; medium - carrying moderate weight objects (i.e. 50 pounds) is 4 to 6 METS; light - carrying light objects (i.e. 20 pounds) – 2 to 4 METS; and sedentary –sitting, slow walking, lifting light objects of 10 pounds is less than 2 METS.

Cardiac demands of driving various types of commercial vehicles reflect physical, psychological, and environmental factors. Physical factors include the work of driving and the fatigue of extended work hours. Psychological factors include driving in bad weather, heavy traffic, or demanding situations such as meeting schedules and environmental factors of air pollution, heat and altitude. Physical factors include the work of driving, especially isometric exercise.

Kou WH, Calkins H, Lewis RR, et.al. Incidence of Loss of Consciousness During Automatic Implantable Cardio-defibrillator Shocks. *Annals of Internal Medicine*. 1991; 115:942-945.

This was a study of 180 patients who had an implantable cardioverter-defibrillator (ICD) for treatment of ventricular tachycardia or ventricular fibrillation. Patients with sustained ventricular tachycardia or ventricular fibrillation, who received an ICD that delivered only high-energy shock therapy, are at moderate risk for experience of loss of consciousness during shocks. No clinical variables were found to be predictors of syncope. Therefore, driving and other activities that require patients to be extra vigilant should not be assumed to be safe after implantation of an ICD that delivers only high energy shock therapy. Of 180 patients, 59 percent experienced shocks during the follow-up period of 16 ±12 months. Sixteen (9 percent) experienced loss of consciousness, 13 of these 16 patients had syncope and three died suddenly in association with the shocks.

Kjeksus J. Arrhythmias and Mortality in Coronary Heart Failure. *American Journal of Cardiology*. 1990;65:421-48.

Sudden death occurs in 8-10 percent of New York Heart Association functional Class 1 patients and in 20 percent of Class 2, 3, and 4 patients. Yearly mortality rates increase from 12 to 15 percent in Class 1 and 2 to 60 percent in Class 4. Sudden death in Class 1 and 2 is 50 to 60 percent of all deaths, whereas in Class 4, it is only 20 to 30 percent. The most important cause of death in Class 4 is progressive congestive heart failure.

Larsen GC, Stupey MR, Walance CG, et.al. Recurrent Cardiac Events in Survivors of Ventricular Fibrillation or Tachycardia. *JAMA*. 1994;271:1335-39.

The study included 501 consecutive survivors of sustained ventricular tachycardia (VT) or ventricular fibrillation (VF) cared for by a university arrhythmia service between August 1978 and October 1989. One-year event rate for all 501 patients was 17 percent. Three distinct periods of risk were identified. The monthly hazard rate was highest in the first month at 4.22 percent, intermediate at months 2-7, 1.81 percent, and lowest in months 8-12 at 0.63 percent. Among the 191 patients for whom no successful conventional anti-arrhythmic drug could be found during electrophysiological testing, there was a high monthly event risk of 1.6 percent during months 8-12.

Ostrom M, Eriksson A. Natural Death While Driving. *Journal of Forensic Sciences*. 1987;32:988-998.

From 1980 through 1985, all 126 cases of sudden natural death of persons while driving cars (69), bikes (35), snowmobiles (11), mopeds (6), kick-sleds (4), and motorcycles (1) that occurred in the northern half of Sweden were autopsied. The mean age of the 69 car drivers was 59 years. Ischemic heart disease accounted for 112 of the 126 deaths and other cardiovascular disease for an additional nine deaths. Only 20 percent of the victims experienced previous symptoms of disease. Although natural death at the wheel is fairly common, the risk for other persons is not significant.

Petch MC. Heart disease, guidelines, regulations and the law. *Heart*. 2002;87:472-479.

This article discusses guidelines and regulations that cardiologists should consider when advising their patients with heart disease whether or not to drive. Aviation medical advisors chose a 1 percent annual risk of incapacity as the acceptable risk for an individual in a pilot. This is the annual risk of a heart attack of a healthy male age 45-64. Pilots should be at no increased risk compared to their peers. Epilepsy guidelines in the U.K. use a 2 percent annual risk, about that of death from coronary artery disease in an individual in their 70's.

Wielgosz AT, Azad N. Effects of cardiovascular disease on driving tasks. *Clinics of Geriatric Medicine*. 1993;9:341-348.

This article reviews the impact of heart disease on driving in the elderly. Elderly drivers aged 60 and over have more motor vehicle crashes per miles driven and more traffic violations than drivers aged 30-59. While cardiovascular disease may be associated with this increased risk, cognitive impairment may be a more important factor. Only about 0.9 to 2.1 per 1000 motor vehicle crashes are caused by sudden incapacity, but of those, about half are due to cardiovascular disease. Most of these are able to avert a major accident. Sudden death or loss of consciousness accounted for about 2 percent of driving related injury or death to other. The risk is related to the probability of the incapacitating event occurring and the time spent driving. The authors recommended that drivers with unstable angina wait one month before resuming driving. It was also recommended that elderly should not drive for more than 6 hours per day or longer than 90 minutes without a rest. The authors advise providers that the risk of incapacity must be considered before a patient is advised to drive. The physician must also consider the impact of concomitant illnesses or medications.

### **C.5 Vision**

Dille JR, Booze CF. The 1980 and 1981 Accident Experience of Civil Airman with Selected Visual Pathology. June 1983. Office of Aviation Medicine Federal Aviation Administration FAA-AM-83-18.

Monocular, aphakic, lens implant and amblyopic accident airmen had higher accident rates than did the total airmen population. It is possible for persons with 20/200 vision to have useful peripheral vision in the affected eye.

Ivers R, Mitchell P, Cumming RG. Sensory impairment and driving: the Blue Mountains eye study. *American Journal of Public Health*. 1999;89:85-87.

This study examined the associations between vision, hearing loss, and car accidents. The study group was a cross-sectional survey of 3654 people aged 49 years and older. Self-reported car accident rates in the past year among 2379 current drivers were 5.6 percent for those aged 49 to 79 years and 9.1 percent for those 80 years and older. A 2-line difference in visual acuity was associated with increased risk of accidents. Also associated with increased risk of accidents was visual acuity worse than 6/18 in the right eye, overall moderate hearing loss, and hearing loss in the right ear.

Nakagawara VB, Montgomery RW, and Wood KJ. The Aviation Accident Experience of Civilian Airmen with Refractive Surgery. June 2002. Office of Aviation Medicine Federal Aviation Administration. DOT/FAA/AM-02/10.

This study examined the relationship between aviation accidents and airman who had undergone refractive surgery. Records of airman who had undergone refractive surgery (n=130) or general eye surgery (n=5179) during the years 1994-1996 were reviewed. This was cross-referenced with the Accident/Incident Data System database to determine those airmen involved in aircraft accidents. Frequency totals and mean accident rates (accidents/100,000 flight hours) were calculated for each class of FAA medical certification. Analysis of Variance was performed to compare the mean accident rates of non-refractive and refractive surgery airmen. The total accident rate was higher for airmen with refractive surgery (3.86/100,000 flight hours) when compared with those without refractive procedures (2.62/100,000 flight hours). Accident rates for airmen with refractive surgery were also higher in all three classes of medical certification, but the difference was not statistically significant. In no accident was the refractive surgery identified as a causal factor. The authors concluded that while no direct association between refractive surgery and aviation accidents was identified, these airmen did have a higher accident rate. Ongoing monitoring would be needed to ensure that airman with the newer refractive surgery techniques are able to fly safely.

Nakagawara VB, Montgomery RW, and Wood KJ. Aviation accidents and incidents associated with the use of ophthalmic devices by civilian pilots. July 2001. Office of Aviation Medicine Federal Aviation Administration. DOT/FAA/AM-01/14.

Approximately 54 percent of civilian pilots rely on ophthalmic lenses to correct defective vision. This report reviews aviation accidents and incidents, in which ophthalmic lenses used by civilian pilots were contributing factors in the mishaps between 1 January, 1980 and 31 December, 1998. The National Transportation Safety Board's (NTSB's) Aviation Accident/Incident Database and the Federal Aviation Administration's (FAA's) Incident Data System were queried for terms related to ophthalmic lenses for the period 1980-98. The Aviation Safety Reporting System (ASRS) was also reviewed. The NTSB and FAA databases included 16 mishaps in which factors, such as lost/broken eyeglasses (11), problems with sunglasses (7), incompatibility with personal protective breathing equipment (6), new or inappropriate corrective (12), and contact lenses becoming damaged or dislodged (2), were found to be contributing factors in aviation accidents or incidents. Aviation personnel voluntarily submitted 26 ASRS reports describing operational problems involving traditional ophthalmic devices that adversely affected aviation safety. The authors concluded that ophthalmic devices used by pilots have contributed to aviation accidents and incidents. Recommendations included the following: eyeglasses should fit snugly and a strap should be used; refractive prescription should be optimal for all applicable distances; contact lenses should be well maintained and frequently replaced and a back up pair of corrective lenses should be available in the event the contact lens is displaced, dislodged or damaged; appropriate sunglasses should be available to prevent glare but should not be worn in low light conditions; and corrective lenses should not interfere with the use of personal protective equipment or communication devices.

Nakagawara VB, Wood KJ. Aviation Accident Risks for Airmen with a Aphakia and Artificial Lens Implants. July 1993. Office of Aviation Medicine Federal Aviation Administration DOT/FAA/AM-93/11.

The entire population of aphakia and interocular lens implants had significantly higher accident rates than the corresponding non-aphakic airman population ( $p < .5$ ). Conditions in which the crystalline lens has been extracted is usually a result of cataract removal. The relationship of age to aphakia is well established. Spectacles, contact lenses and artificial intraocular lens implants can be used. Aphakia spectacles have many optical deficiencies and are now not recommended for flight operation. Contact lenses used to correct aphakia have deficiencies. Lens implantation has become the primary therapeutic modality. For aphakia pilots: third class pilots can be certified, first and second class pilots are considered on a case by case basis.

Szlyk JP, Seiple W, Viana M. Relative effects of age and compromised vision on driving performance. *Human Factors*. 1995;37(2):430-6.

The study examined the effects of age and compromised vision on driving-related skills and on-road accidents. A total of 107 subjects were tested from the following four groups: 1) a younger, normally sighted group, 2) an older, normally sighted group, 3) a younger, visually compromised group, 4) an older, visually compromised group. Driving performance was assessed by self-reported and state-recorded accident frequency and by an evaluation of performance on an interactive driving simulator. The older groups had poorer driving-related skills, than had the younger groups, but not significantly higher on-road accident rates. The older subjects and those with compromised vision had reduced risk-taking scores. All older drivers had increased eye movements and had slower simulator driving speeds. Regression analyses showed that compromised vision and visual field loss predicted real-world accidents in the study population.

## **C.6 Neurology**

Berg AT, Vickrey BG, Sperling MR, Langfit JT, Bazil CW, Shinnar S, Walczak TS, Pacia S, Spencer SS. Driving in adults with refractory localization-related epilepsy. *Neurology*. 2000;54:625-630.

This study examined the frequency of driving an automobile and characteristics associated with driving in individuals with refractory localization-related epilepsy. In an ongoing, prospective, study of resective epilepsy surgery, individuals were interviewed when they presented for surgical evaluation. Of 367 eligible participants, 115 (31.3 percent) had driven in the last year, most on at least a weekly basis. Factors found to be associated with an increased likelihood of driving were having a current license or ever having had a license and being younger. Lower levels of driving were found in women, those self-described as disabled, and those who were employed full-time or part-time. A total of 144 individuals experienced one or more seizures while driving, and 98 experienced at least one accident because of a seizure. Of those who had accidents, 94 percent reported property damage, 32 percent had an injury and 20 percent caused injury to others.

Cockerell OC, Johnson AL, Sander J, Shorvon SD. Prognosis of Epilepsy: A Review and Further Analysis of the First Nine Years in the British National General Practice Study of Epilepsy, a Prospective Population-Based Study. *Epilepsia*. 1997;38:31-46.

The national general practice study of epilepsy is the first large population based study that has prospectively assessed patients with newly diagnosed epilepsy over a prolonged period. There are two important aspects of prognosis in epilepsy – the chance of achieving remission of seizures and the chance of premature death. A total of 1,091 patients newly diagnosed in the United Kingdom between 1984 and 1987 were studied. Only 33 patients were completely lost to follow-up. After nine years, 86 percent of patients with definite epilepsy had achieved a remission of three years and 68 percent had achieved a remission of five years. The proportion of patients with definite epilepsy still in remission at nine years was 68 percent for three year remission and 54 percent for five years. When stratified by etiology, the proportion achieving the five-year remission by nine years was 69 percent for idiopathic seizures and 61 percent for remote symptomatic epilepsy, partial seizures having lower remission rates than generalized seizures. The number of patients still in five-year remission at nine years is explained by the percentage of patients who have since relapsed.

The chance of a patient with epilepsy dying prematurely is more than twice than expected in the general population. The study has shown that patients with epilepsy generally have a good uniform chance of long-term seizure freedom, although patients with epilepsy secondary to underlying structural causes are at significant risk for premature death.

Drazkowski JF, Fisher RS, Sirven JI, Demaerschalk BM, Uber-Zak L, Hentz JG, Labiner D. Seizure-related motor vehicle crashes in Arizona before and after reducing the driving restriction from 12 to 3 months. *Mayo Clinic Proc*. 2003 Jul;78(7):819-25.

This was a time trend study with analysis of motor vehicle crash reports in the state of Arizona 3 years before and 3 years after the seizure-free interval was decreased from 12 to 3 months. Seizure-related crashes increased from 125 for the 3 years before to 136 for the 3 years after the law changed; however, the rate of seizure-related crashes did not increase. During the same time period, crashes related to other medical conditions increased from 288 to 310. The incidence rate of crashes associated with seizures decreased approximately 2 percent during the same period that crashes attributed to other causes increased approximately 8 percent. The incidence rate of crashes was calculated by dividing the number of crashes by the number of miles driven during the given period. In the period after the law changed, miles traveled were approximately 17 percent greater than miles traveled before the law changed. The number of registered vehicles and drivers over the study period increased. For the 6 years studied, approximately 614,000 crashes were recorded in the state of Arizona, 859 of which were related to all medical conditions.

The authors concluded that the rate of seizure-related crashes did not significantly increase in the state of Arizona after the seizure-free interval was reduced from 12 to 3 months.

Dubinsky RM, Stein AC, Lyons K. Practice Parameter: The Risk of Driving and Alzheimer's Disease. Report of The Quality Standards Subcommittee of the American Academy of Neurology. *Neurology*. 2000;54:2205-2211.

The impairment of drivers with probable Alzheimer's Disease or a clinical dementia rating of 0.5 was no greater than that tolerated in other segments of the driving population or those driving under the influence of alcohol at a blood alcohol concentration of less than 0.8 percent. This study was based on 0.5 memory deficit: consistent/slight forgetfulness, partial recollection of events, orientation, fully oriented except for slight difficulty with time relationships, slight impairment in solving problems, similarities and differences, slight impairment in community activities, life at home, hobbies and intellectual interests slightly impaired but fully capable of self-care. Drivers with Alzheimer's dementia with a severity of one posed a significant traffic safety problem both in crashes and from driving performance.

Heikkila VM, Purkk AJ, Korpelainen J. Decreased Driving Ability in People with Parkinson's Disease. *Journal of Neurology, Neurosurgery and Psychiatry*. 1998;64:325-330.

The purpose of this study was to assess the relationship between Parkinson's disease and driving ability. The driving ability of 20 patients with idiopathic Parkinson's disease and 20 age and sex matched healthy control subjects was evaluated by a neurologist, psychologist, vocational rehabilitation counselor, and driving instructor using a standard 10 point scale. The patients and controls also evaluated their own driving ability. Cognitive and psychomotor laboratory tests and a structured on road driving test were used for evaluating the subjects' driving ability. The patients with Parkinson's disease performed worse than the controls both in the laboratory tests and in the driving test. The neurologist overestimated the ability of patients with Parkinson's disease to drive compared with the driving ability evaluated by the structured on-road driving test and with the driving related laboratory tests. The authors concluded that patients were not capable of evaluating their own driving ability accurately and that driving ability is decreased even in those patients with mild disease.

Hobson DE, Lang AE, Martin WRW, Razmy A, Rivest J, Fleming J. Excessive daytime sleepiness and sudden-onset sleep in Parkinson Disease, a survey by the Canadian Movement Disorders Group. *JAMA* 2002;287:455-463.

This survey was designed to study the frequency of and predictors for sudden-onset sleep and, particularly, episodes of falling asleep while driving among patients with Parkinson's disease (PD) through a prospective study. A total of 638 consecutive highly functional PD patients without dementia were enrolled, of whom 420 were currently drivers. Excessive daytime somnolence was found in 327 (51 percent) of the 638 patients and in 213 (51 percent) of the 420 drivers. Sixteen patients (3.8 percent) had experienced at least one episode of sudden onset of sleep while driving, occurring without warning in three. The two risk factors associated with falling asleep at the wheel were the Epworth Sleepiness Scale score greater than 7 and the Inappropriate Sleep Composite Score of 1. The authors concluded that excessive daytime sleepiness is common even in patients with PD who are independent and do not have dementia.

Krauss GL, Ampaw WL, Krumholz A. Individual State Driving Restrictions for People with Epilepsy in the United States. *Neurology*. 2001;57:1780-1785.

Fifty-five percent of patients who had seizures while driving had motor vehicle crashes. One recent U.S. study showed that patients with intractable seizures often continue driving. Among these drivers, 39 percent had a seizure at the wheel and 27 percent crashed because of a seizure.

Krauss GL, Krumholz A, Carter RC, Li G, Kaplan P. Risk factors for seizure related motor vehicle crashes in patients with epilepsy. *Neurology*. 1999;52:1324-1329.

This was a retrospective case-control study to determine the influence of clinical risk factors associated with seizure-related motor vehicle crashes. Fifty patients with epilepsy who crashed during seizures and 50 matched control patients were compared. Factors that significantly decreased the odds of patients with epilepsy having motor vehicle crashes due to seizures were: long seizure-free intervals, reliable auras, few prior non-seizure related accidents, and not having had their antiepileptic drugs (AEDs) reduced or switched. It was also found that 25 percent of patients had more than one seizure-related crash and 20 percent had missed an AED dose just prior to their crash. The majority (54 percent) of patients who crashed were driving illegally, with seizure-free intervals shorter than legally permitted.

Lings S. Increased driving accident frequency in Danish patients with epilepsy. *Neurology*. 2001;57:435-439.

A 10-year historical cohort register study of 159 subjects with epilepsy and 559 controls individually matched for age, gender, place of residence, and exposure period to determine driving accident frequency. Those with diagnoses of other neurologic diseases, diabetes, psychoses, seizures, abuse, or poisoning of any kind were not included. Ten patients with epilepsy and five controls had been treated at the casualty department, the rate per 1,000 person-years with epilepsy being seven times higher.

McKiernan D, Jonathan D. Driving and Vertigo. *Clinical Otolaryngology*. 2001;26:1-2.

Vertigo is a common condition and would rarely be severe enough to make driving unsafe. Whether a patient should be advised to stop driving will depend on the doctor's judgment on the severity and frequency of the attacks. It is difficult to lay down rigid criteria. The English Licensing Board distinguished between group 1 drivers - motor cars and motor bikes, and group 2 drivers - lorries and buses, and impose higher medical standards for the latter. Group 1 drivers liable to sudden attacks such as Meniere's disease, labyrinthine or other brain stem disorders should cease driving on diagnosis. Driving will be permitted when satisfactory control of symptoms is achieved. For Group 2, the driver must be symptom free and completely controlled for at least one year before re-application.

Norton R, Vander Hoorn S, Roberts I, Jackson R, MacMahon S. Migraine: a risk factor for motor vehicle driver injury. *Accident Analysis and Prevention*. 1997;29:699-701.

Data was collected from 10,529 individuals with a personal history of migraine and motor vehicle injury. The adjusted odds ratio for motor vehicle driver injury associated with migraine

was 2.3, 1.5 after excluding those with a history of head injury. The authors concluded that migraine may be associated with a 50 percent increase in the risk of motor vehicle driver injury.

Schultheis MT, Garay E, DeLuca J. The influence of cognitive impairment on driving performance in multiple sclerosis. *Neurology*. 2001;56:1089-1094.

This study evaluated incidence of motor vehicle crashes and violations among drivers with multiple sclerosis (MS) when cognitive impairment is present. Researchers reviewed records of Department of Motor Vehicles (DMV) records of 27 patients with MS, 14 without cognitive impairment and 17 healthy controls. MS individuals with cognitive impairment had a higher incidence of motor vehicle crashes and violations than MS patients without cognitive impairment.

Taylor J, Chadwick D, Johnson T. Risk of accidents in drivers with epilepsy. *Journal of Neurology, Neurosurgery and Psychiatry*. 1996;60:621-7.

This study compared the risk of traffic accidents in drivers with history of single seizures or epilepsy (16,958) with drivers followed by Transport Research Laboratory (8,888) in a retrospective study and questionnaire. After adjustment for differences in age, sex, driving experience and mileage between the two populations there was no evidence of any overall increase in risk of accidents in the population of drivers with a history of epilepsy. There was evidence of an increased risk of more severe accidents in the population with epilepsy.

### **C.7 Non-cardiac Syncope**

Bhatia A, Dhala A, Blanck Z, Deshpande S, Akhtar M, Sra AJ. Driving safety among patients with neurocardiogenic (vasovagal) syncope. *Pacing and Clinical Electrophysiology*. 1999;22(11):1576-80.

Risk of injury due to syncope while driving and driving behavior was evaluated in 155 consecutive patients (92 women and 63 men; mean age 49 +/- 19 years) with history of syncope in whom hypotension and syncope or presyncope could be provoked during head-up tilt testing. Patients with syncope and positive head-up tilt table test were treated with pharmacological therapy. All participants were asked to fill out a detailed questionnaire regarding any driving related injuries and their driving behavior before tilt table testing and during follow-up. Prior to head-up tilt testing two patients had syncope while driving, and one of these patients had a syncope related injury during driving. Of the 155 patients, 52 (34 percent) had no warning prior to syncope, while 103 (6 percent) had warning symptoms such as dizziness prior to their clinical syncope. Following a diagnosis of neurocardiogenic syncope established by head-up tilt testing, six patients stopped driving on their own. During a median follow-up of 22 months recurrent syncope occurred in five (3.2 percent) patients. No patient had syncope or injury during driving.

Li H, Weitzel M, Easley A, Barrington W, Windle J. Potential risk of vasovagal syncope for motor vehicle driving. *American Journal of Cardiology*. 2000 Jan 15;85(2):184-6.

This study analyzed the clinical characteristics of patients who had syncope during driving and subsequently underwent the head-up tilt test (HUTT). Of the 245 consecutive patients undergoing HUTT, 23 (9 percent) had at least one episode of syncope during driving. HUTT was positive in 19 (group A) and negative in 4 (group B) patients. The authors concluded that vasovagal syncope during driving is not uncommon in patients referred for syncope evaluation.

### **C.8 Attention Deficit Disorders**

Barkley R, Guevremont DC, Anastopoulos AD, DuPaul GJ, Shelton T. Driving-related risks and outcomes of attention deficit hyperactivity disorder in adolescents and young adults: a three to five year follow-up survey. *Pediatrics*. 1993;92:212-218.

Two groups of teenagers and young adults (ADHD and normal) were followed for 3 to 5 years after original diagnosis. There were thirty-five subjects with ADHD and 36 control subjects between 16 and 22 years of age, all of whom were licensed drivers. Parent ratings of current symptoms of ADHD, oppositional defiant disorder, and conduct disorder, a survey of various negative driving outcomes, and a rating scale of driving behavior were measured. Subjects with ADHD were more likely than control subjects to have had auto crashes, to have had more such crashes, to have more bodily injuries associated with such crashes, and to be at fault for more crashes than control subjects. These individuals were also more likely to have received traffic citations and received more such citations than control subjects, particularly for speeding. The authors concluded that ADHD and ADHD with oppositional defiant disorder/ conduct disorder, is associated with a substantially increased risk for driving among teenagers and young adults.

Barkley RA, Murphy KR, Kwasnik D. Motor vehicle driving competencies and risks in teens and young adults with attention deficit hyperactivity disorder. *Pediatrics*. 1996;98:1089-1095.

A total of 25 young adults with ADHD and 23 young adults without ADHD were evaluated using interview, behavior ratings by self and others, video test of driving knowledge, computer simulated driving test, and official motor vehicle records. The ADHD young adults were cited more often for speeding, were more likely to have had their licenses suspended, were involved in more crashes, were more likely to have had crashes causing bodily injury, and were rated by themselves and others as using poorer driving habits.

Cox DJ, Merkel RL, Kovatchev B, Seward R. Effect of stimulant medication on driving performance of young adults with attention-deficit hyperactivity disorder: a preliminary double-blind placebo controlled trial. *Journal of Nervous and Mental Disease*. 2000;188(4):230-4.

This study compared driving ability using a driving simulator in seven ADHD patients and six non-ADHD controls. At 0800 and 1530, subjects consumed either a placebo or Ritalin pill and at 0930 and 1700, subjects drove the simulator. After both drives, subjects rated their driving performance. Compared with non-ADHD subjects, ADHD subjects had more career driving accidents ( $p < .04$ ) and motor vehicle violations ( $p = .059$ ), drove worse on the simulator under placebo condition ( $p < .05$ ), demonstrated significant improvement under the Ritalin condition ( $p$

< .05). ADHD patients rated themselves as driving poorer during the placebo condition ( $p = .05$ ), and tended to perceive their driving to be better during the Ritalin condition ( $p = .07$ ). The authors concluded that patients with ADHD judge that they drive better with medication and this was supported by the results of the driving simulator.

Jolly BT, Todd KH, Driving histories of ADHD subjects. *Annals of Emergency Medicine*. 1997;29:546-547.

This study, performed for the National Highway Traffic Safety Administration (NHSTA), reviewed a longitudinal database of 492 children with ADHD and comparable age-matched non-ADHD subjects. Those with ADHD in childhood had a higher risk of motor vehicle accidents in early adulthood.

### **C.9 Sleep Disorders**

Barbe F, Pericas J, Munoz A, et al. Automobile Accidents in Patients with Sleep Apnea Syndrome. *American Journal of Respiratory and Critical Care Medicine*. 1998;158:18-22.

Researchers prospectively recruited 60 consecutive patients with sleep apnea syndrome (AHI  $58 \pm 3$ ) and 60 healthy control subjects. The authors quantified the degree of daytime sleepiness (Epworth Scale), anxiety and depression (Beck Tests), and level of vigilance and driving performance. Patients had more accidents than the control group and were more likely to have had more than one accident. These differences persisted after stratification for amount of driving, age, and alcohol consumptions. Patients were more somnolent, anxious and depressed than control subjects and had a lower level of vigilance and poorer driving performance. There was no correlation between the clinical or physiologic markers used to define severity and patients at higher risk of having an automobile accident.

Findley L, Smith C, Hooper J, et al. Treatment with Nasal CPAP Decreases Automobile Accidents in Patients with Sleep Apnea. *American Journal of Respiratory and Critical Care Medicine*. 2000;161:857-859.

A study of 50 consecutive patients tested the hypothesis that successful treatment of obstructive sleep apnea with nasal continuous positive airway pressure decreases automobile accidents. Thirty-six patients reported using nasal continuous positive airway pressure (CPAP) regularly during two years. Fourteen patients reported they had not used CPAP during the two years. Patients with sleep apnea in this study had a higher automobile crash rate than all drivers in the state of Colorado, 0.07 vs. 0.01 crashes per driver per year. Patients that were treated with nasal CPAP had a lower crash rate while being treated than before treatment, 0.07 vs. 0. Untreated patients with sleep apnea continued to have a high crash rate, 0.07 crashes. This is the first study to confirm with traffic records that patients with sleep apnea have fewer automobile crashes while being treated with nasal CPAP.

George CFP. Vigilance Impairment: Assessment by Driving Simulators. *Sleep*. 2000;23(Supplement 4):115-118.

Sleep related accidents comprise 16 percent of all vehicle crashes on major roads in southwest England and over 20 percent of accidents on midland motorways. Crash rates of drivers using company cars and/or those who fall asleep at the wheel are closely associated with daytime sleepiness. A French study suggests approximately half of drivers involved with sleep related accidents have sleep disorders. Because sleepiness can worsen inattention, it is quite logical to assume that it will lead to more accidents. This study showed that driving simulators are useful tools for repeated evaluation of performance in a number of patient groups including sleep apnea and narcolepsy.

Horne JA, Reyner LA. Sleep related vehicle accidents. *British Medical Journal*. 1995;310:565-567.

Surveys of either police databases or interviews of drivers involved in 679 sleep related accidents were reviewed. The data revealed three peaks when drivers were involved in sleep related accidents, at around 0200, 0600, and 1600. About half these drivers were men under 30 years; few such accidents involved women.

Horstmann S, Hess CW, Bassetti C, Gugger M, Mathis J. Sleepiness-related accidents in sleep apnea patients. *Sleep*. 2000 May 1;23(3):383-9.

The frequency of motor vehicle and working accidents was analyzed by anonymous questionnaire in 156 patients with sleep apnea syndrome in 160 age-gender matched controls. In the sleep apnea syndrome (SAS) group 12.4 percent of all drivers had motor vehicle accidents as compared to 2.9 percent in the control group. The motor vehicle accident rate was 13.0 per million km in patients with more severe sleep apnea syndrome compared to 1.1 in patients with milder sleep apnea syndrome and 0.78 in control group. During treatment with nasal continuous airway pressure (nCPAP) in 85 SAS patients, the motor vehicle accident rate dropped from 10.6 to 2.7 per million km. The authors concluded that patients with moderate to severe SAS have an up to 15-fold risk increase of motor vehicle accidents.

Lindberg E, Carter N, Gislason T, Janson C. Role of snoring and daytime sleepiness in occupational accidents. *American Journal of Respiratory and Critical Care Medicine*. 2001;164:3031-5.

This was a prospective study of the relationship between excessive daytime sleepiness (EDS), snoring and occupational accident. A total of 2,874 men aged 30-64 were asked questions on snoring and EDS. Ten years later 2,009 (73.8 percent of the survivors) responded to a follow-up questionnaire including work-related questions and potential confounders. A total of 345 occupational accidents were reported by 247 of the men (12.3 percent). Multivariate analysis revealed that men who reported both snoring and EDS at baseline were at an increased risk of occupational accidents during the following 10 years, with an adjusted odds ratio of 2.2 (95 percent CI 1.3-3.8) after adjusting for age, body mass index, smoking, alcohol dependence, years at work, blue-collar job, shift work, and exposure to noise, organic solvents, exhaust fumes, and

whole-body vibrations. However, no significant increased risk was found for snorers without EDS or non-snorers with EDS. The researchers concluded that sleepy, male snorers have an increased risk of occupational accidents.

Lloberes P, Levy G, Descals C, et al. Self-reported Sleepiness While Driving as a Risk Factor for Traffic Accidents in Patients with Obstructive Sleep Apnea Syndrome and in Non-Apneic Snorers. *Respiratory Medicine*. 2000;94:971-76.

A series of 189 consecutive patients with a driving license referred for a sleep study because of the suspicion of obstructive sleep apnea were matched for age and sex with a control group of 40 hospital staff workers who denied snoring. Patients underwent an over-night polysomnograph and both patients and controls completed a self-answered questionnaire. One hundred and twenty-two patients were diagnosed as obstructive sleep apnea and 67 patients as non-apneic snorers. The self-reported number of accidents was significantly higher in obstructive sleep apnea patients compared to the control group. The authors conclude that self-reported sleepiness while driving is associated with an increased risk of traffic accidents in obstructive sleep apnea patients and in non-apneic snorers. Although the association between obstructive sleep apnea and traffic accidents seems to be proved in the light of recent literature, the evidence of a relationship between the severity of obstructive sleep apnea and an increased risk for accidents is based on limited data.

Lyznicki JM, Doege TC, Davis RM, Williams MA. Sleepiness, driving, and motor vehicle crashes. *JAMA* 1998;279:1908-1913.

This is a review of the literature on the contribution of driver sleepiness to highway crashes. Driver sleepiness is a causative factor in 1 percent to 3 percent of all U.S. motor vehicle crashes. About 96 percent of sleep-related crashes involve passenger vehicle drivers and 3 percent involve drivers of large trucks. Risk factors include youth, shift work, alcohol and other drug use, over-the-counter and prescription medications, and sleep disorders.

Masa JF, Rubio M, Findley LJ, and Cooperative Group. Habitually Sleepy Drivers Have a High Frequency of Automobile Crashes Associated with Respiratory Disorders During Sleep. *American Journal of Respiratory and Critical Care Medicine*. 2000;162:1407-1412.

Sleepiness is considered a common cause of traffic crashes. A recent study found that 2 percent-3 percent of drivers are habitually sleepy while driving and these drivers reported a significantly higher frequency of auto crashes than control subjects. The adjusted odds ratio was 13.3. The habitually sleepy drivers had a significantly higher prevalence of respiratory sleep disorders (apneas, hypopneas, and other respiratory effort-related arousals). The total respiratory event index was significantly higher in subjects with automobile crashes. This study had several important findings: 1) Approximately 1 of every 30 drivers is habitually sleepy and is involved in several fold more automobile crashes than control subjects. 2) One-half of habitually sleepy drivers report sleepiness occurring predominantly during driving and did not report excessive sleepiness during all activities. 3) Habitually sleepy drivers report falling asleep more frequently while driving and have a 13-fold increased risk of having an automobile crash than control subjects. 4) A high proportion of habitually sleepy drivers have an unrecognized respiratory

disorder during sleep, and 5) the presence of respiratory disorders during sleep is an independent risk factor for auto crashes in the habitually sleepy drivers.

The percentage of professional drivers was higher in habitually sleepy drivers than control subjects. A higher prevalence of respiratory disorders during sleep, chronic alterations of wakefulness/sleep rhythm, poor quality of sleep and insufficient sleep have been observed in truck drivers. It is possible that even though professional drivers have many risks for crashes, these drivers are more practiced, cautious and skillful and are able to overcome their many risk factors for a crash. Only 50 percent of sleepy drivers had a value of greater than or equal to 9 on the Epworth Scale.

Excessive daytime sleepiness, as measured by the Epworth Sleepiness Scale, did not predict an increased automobile crash rate in this study. Several previous studies also found that excessive sleepiness measured by the Epworth Sleepiness Scale or the Multiple Sleep Latency Test does not predict which drivers with sleep apnea will or will not have automobile crashes. Overall excessive daytime sleepiness measured by the Epworth sleepiness scale does not predict a higher number of automobile crashes in our studies as well as other studies. Findings suggested that asking about excessive sleepiness while driving may better predict which subjects with breathing disorders during sleep have crashes than asking about overall sleepiness.

Risser MR, Ware JC, Freeman FG. Driving simulation with EEG monitoring in normal and obstructive sleep apnea patients. *Sleep*. 2000;23(3):393-8.

This prospective study measured simulated driving performance in obstructive sleep apnea patients (n=15) and healthy controls (n=15) and evaluated the relationship with electroencephalogram (EEG) defined attention lapses. A computer based driving simulator recorded lane position variability, speed variability, steering rate variability, and crash frequency. The frequency and duration of EEG-defined attention lapses were also measured. The results demonstrated that the apnea group had significantly greater variability in lane position, steering rate, and speed than the control group. The apnea group also had more crashes. In addition, the apnea group had more EEG-defined attention lapses of longer duration. These lapses increased over the 60-minute test period. The driving simulation task unmasked and quantified marked performance impairments in the sleep apnea group that increased over time. The poor performance appeared related to the EEG-defined attention lapses. This study suggests that poorer driving performance and crashes are not entirely due to overt sleep, but inattention due to sleepiness.

Shiomi T, Arita AT, Sasanabe R, Banno K, Yamakawa H, Hasegawa R, Ozeki K, Okada M, Ito A. Falling asleep while driving and automobile accidents among patients with obstructive sleep apnea-hypopnea syndrome. *Psychiatry and Clinical Neurosciences*. 2002;56(3):333-4.

Among 448 patients with obstructive sleep apnea-hypopnea syndrome (OSAHS), 40 patients (8.9 percent) had been involved in one or more automobile accidents during the preceding five years. The main cause of these accidents was falling asleep while driving. Excessive sleepiness during driving was associated with an Epworth sleepiness scale (ESS) score of over 11 and/or an apnea-hypopnea index (AHI) of > 15. The automobile accident rate among 182 patients with severe OSAHS (AHI > 30) was significantly higher than the rate among 106 simple snorers

(AHI < 5). Although four of the simple snorers were involved in automobile accidents, their ESS scores were all very high (15 or more). Falling asleep while driving appears to be related those with higher AHI.

Stoohs RA, Guilleminault C, Itoi A, Dement WC. Traffic Accidents in Commercial Long Haul Drivers: The Influence of Sleep Disorders, Breathing and Obesity. *Sleep*. 1994;17:619-623.

This was a cross-sectional population study of 90 commercial long haul drivers, 20-64 years of age. The main outcomes included presence or absence, as well as severity of sleep disordered breathing, and the frequency of automobile accidents. Truck drivers with sleep disordered breathing had a two-fold higher accident rate per mile than drivers without sleep disordered breathing. Accident frequency was not dependent on the severity of the sleep related breathing disorder. Obese drivers with a body mass index (BMI) >30kg per m<sup>2</sup> also presented a two-fold higher accident rate than non-obese drivers.

Teran-Santos J, Jimenez-Gomez A, Cordero-Guevara J. The association between sleep apnea and the risk of traffic accidents. *New England Journal of Medicine*. 1999;340:847-851.

This was a case-control study of the relation between sleep apnea and the risk of traffic accidents. The case patients were 102 drivers who received emergency treatment at hospitals and the controls were 152 randomly selected patients from primary care centers. Patients were screened for sleep apnea at home and the diagnosis was confirmed by conventional polysomnography. Patients with an apnea-hypopnea index of ten or higher had an odds ratio of 6.3 for having a traffic accident. This relation remained significant after adjustment for potential confounders, such as alcohol consumption, visual-refraction disorders, body-mass index, years of driving, age, history with respect to traffic accidents, use of medications causing drowsiness, and sleep schedule. Among subjects with an apnea-hypopnea index of ten or more, the risk of an accident was higher among those who had consumed alcohol on the day of the accident than among those who had not. The researchers concluded that there is a strong association between sleep apnea, as measured by the apnea-hypopnea index, and the risk of traffic accidents.

Young T, Blustein J, Finn L, Palta M. Sleep-disordered breathing and motor vehicle accidents in a population-based sample of employed adults. *Sleep*. 1997;20(8):608-13.

The goal of this investigation was to determine if unrecognized sleep-disordered breathing in the general population was associated with motor vehicle accidents. The sample comprised 913 employed adults enrolled in an ongoing study of the natural history of sleep-disordered breathing. Sleep-disordered breathing status was determined by overnight in-laboratory polysomnography. Motor vehicle accident (MVA) history was obtained from a statewide data base of all traffic violations and accidents from 1988 to 1993. Men with five or more apneas and hypopneas per hour of sleep [apnea-plus-hypopnea index (AHI) > 5], compared to those without sleep-disordered breathing, were significantly more likely to have at least one accident in 5 years (adjusted odds ratio = 3.4 for habitual snorers, 4.2 for AHI 5-15, and 3.4 for AHI > 15). Men and women combined with AHI > 15 (vs. no sleep-disordered breathing) were significantly more likely to have multiple accidents in 5 years (odds ratio = 7.3). These results, free of clinic selection bias, indicate that unrecognized sleep-disordered breathing in the general population is

linked to motor vehicle accident occurrence. If the association is causal, unrecognized sleep-disordered breathing may account for a significant proportion of motor vehicle accidents.

### **C.10 Medications**

Adelsberg BR. Sedation and performance issues in the treatment of allergic conditions. *Archives of Internal Medicine*. 1997;157:494-500.

This article evaluates and summarizes the results of studies investigating the central nervous system effects of second-generation antihistamines, with particular emphasis on psychomotor and cognitive effects. The data sources were computer-assisted MEDLINE searches using the search terms histamine H1 antagonists, psychomotor performance, sleep, and specific drug names, including astemizole, cetirizine, loratadine, and terfenadine. Only controlled studies using standardized or quantitative methods for defining drug-induced effects on sedation, psychomotor performance, or cognition were reviewed. Objective and subjective measures of sedation show that loratadine and terfenadine produce sedation at a rate comparable with placebo. Cetirizine is associated with sedation or psychomotor impairment in some studies but not all studies. The data on central nervous system effects of astemizole are limited and were not evaluated. The absence of sedation and psychomotor or cognitive impairment in patients receiving loratadine or terfenadine justifies the cost of these agents, particularly for patients who drive, pilot aircraft, or operate machinery. Whether the potential for rare but serious cardiovascular events (associated with astemizole and terfenadine) is justifiable must be decided on a case-by-case basis.

Aiken A, Chaturvedi AK. Prevalence of Selective Serotonin Reuptake Inhibitors in Pilot Fatalities of Civil Aviation Accidents, 1990 – 2001. May 2003. Office of Aerospace Medicine, Federal Aviation Administration. DOT/FAA/AM-03/7.

With few exceptions, these psychotropic medications are not approved by aeromedical regulatory authorities for use by aviators, since selective serotonin reuptake inhibitors (SSRI's) have the potential for impairing performance and causing drug/drug interactions. Out of 4,184 fatal civil aviation accidents from which CAMI received samples, there were 61 accidents in which pilot fatalities had SSRI. As determined by the NTSB, the use of an SSRI had been a contributory factor in at least 9 of the 61 accidents. The interactive affects of other drugs, ethanol and/or even altitude hypoxemia producing adverse affects on pilots cannot be ruled out.

The reluctance of aeromedical regulatory authorities to allow SSRI use stems primarily from the basic pharmacological nature of SSRI's as psychotropic drugs. These drugs have a potential to affect the central nervous system and might impair performance or ultimately compromise aviation safety. SSRI's themselves may not exhibit considerable adverse affects on human performance at the recommended therapeutic doses, but depression itself has a significant potential for performance impairment. Because of the pharmacologic potencies and drug metabolism inhibitory properties of SSRI's and their metabolites, SSRI's may adversely affect CNS function and cause drug/drug interactions. SSRI's inhibit their own metabolism at high doses. The potential for the inhibition of the metabolism of other drugs is further increased when SSRI's are taken in higher doses.

Barbone F, McMahon, Davey PG, Morris AD, Reid IC, McDevitt DG, MacDonald TM. Association of road-traffic accidents with benzodiazepine use. *Lancet*. 1998;352:133-1336.

This study evaluated risk of a first traffic accident in drivers aged 18 and older who had used a psychoactive drug (tricyclic antidepressant, benzodiazepine, selective serotonin-reuptake inhibitor, or other psychoactive drug). Use was determined by measures of dispensed medications. A total of 19,386 drivers were involved in a first road-traffic accident during the study period and 1731 were users of at least one of the study drugs. On the day of the accident, 189 individuals were taking tricyclic antidepressants, 84 selective serotonin re-up-take inhibitors, 235 benzodiazepines, and 47 other psychoactive drugs. The authors concluded that users of anxiolytic benzodiazepines and zopiclone were at increased risk of experiencing a road-traffic accident and should be advised not to drive. There was also an increased risk of accidents in patients on tricyclic antidepressants, selective serotonin re-uptake inhibitors, benzodiazepines and other psychoactive drugs.

Canfield DV, Flemig J, Hordinsky J, Veronneau S. Unreported Medication Used and Incapacitating Medical Conditions Found in Fatal Civil Aviation Accidents. Office of Aviation Medicine Federal Aviation Administration Report Number DOT/FAA/AM-94/14. August 1994.

Review of toxicology results from 2192 fatal aviation accidents detected 48 cases in which the pilot had taken a drug that used to treat a potentially incapacitating medical condition. Drug use in the treatment of cardiovascular disease was found in 13 cases. Neurological medications were found in seven and medications used in the treatment of psychiatric conditions were found in 28 of the cases. There were only three cases out of the 48 cases studied in which the pilots reported the drugs detected during laboratory analysis on the medical application. These cases were all for the treatment of cardiovascular conditions. Although these 48 cases represent only approximately 2 percent of the pilot fatality caseload examined at CAMI, the specific drugs should help channel the index of suspicion of aviation medical examiners.

Canfield DV, Hordinsky J, Miller DP, et al. Prevalence of drugs and alcohol in fatal civil aviation accidents between 1994 and 1998. U. S. Department of Transportation Federal Aviation Administration DOT/FAA/AM-00/21 June 2000.

Between 1994 and 1998, specimens were taken from 1,683 pilots for postmortem toxicologic analysis. Controlled dangerous substances schedules 1 and 2 were found in 89 of the pilots. Schedules 3-5 were found in 49 of the pilots tested. Prescription drugs were found in 240 of the pilots and over-the-counter pills were found in 301. Alcohol at or above the legal limit of 0.04 was found in 124 pilots. Over-the-counter medications are the most frequently found drugs in fatal aviation accidents and many of these drugs, or the medical conditions for which they are used, could impair a pilot's ability to safely fly an aircraft. The low incidence of drugs in the 3-5 category may be a result of difficulty in finding and identifying the new Benzodiazepines commonly prescribed.

Fishbain DA, Cutler RB, Rosomoff HL, Steele R, Romanoff RS. Are Opioid-Dependent/Tolerant Patients Impaired in Driving-Related Skills? A Structured Evidence-Based Review. *Journal of Pain and Symptom Management*. 2003;25(6):559-577.

This study began with the statement that previous studies have concluded that opioids cause dose related impairment in driving skills among opioid naïve individuals. This group performed a literature review of all available studies involving individuals who were opioid dependent/tolerant. This review concluded that there was no consistent evidence of impairment in cognitive function, greater incidence of motor vehicle accidents or impairment in driving simulators for opioid dependent/tolerant individuals.

Frucht S, Rogers JD, Greene PE, Gordon MF, Fahn S. Falling asleep at the wheel: motor vehicle mishaps in persons taking pramipexole and ropinirole. *Neurology*. 1999;52:1908-1910.

This study reported on eight patients with Parkinson's disease who were taking either Pramipexole or Ropinirole and who fell asleep while driving with resultant accidents. Five of the individuals had no warning. These attacks ceased when the medication was discontinued.

Galski T, Williams B, Ehle HT. Effects of Opioids on driving ability. *Journal of Pain and Symptom Management*. 2000;19:200-208.

This study looked at the driving abilities of patients using opioid medications on a regular basis (Chronic Opioid Analgesic Therapy - COAT) for chronic pain. Sixteen patients with chronic nonmalignant pain on COAT, who underwent an off-road driving evaluation using a pre-driver evaluation (PDE), a simulator evaluation (SDE), and behavioral observation during simulator performance. Patients in the COAT group were compared to a historical control group of 327 cerebrally compromised patients (CComp) who had undergone the same evaluation. Results revealed that COAT patients generally outperformed the CComp patients as a group. The COAT patients had a relatively poorer performance than CComp patients on specific neuropsychometric tests in the PDE; however, the differences were not statistically significant. Behaviorally, COAT patients were generally superior to CComp patients; however, COAT patients had greater difficulty in following instructions as well as a tendency toward impulsivity, similar to the CComp patients who failed the behind the wheel test. While there was general support for the notion that COAT did not significantly impair the perception, cognition, coordination, and behavior measured in off-road tests, the authors note that there may be problems generalizing the results of this study.

Grabe HJ, Wolf T, Gratz S, Laux G. The influence of clozapine and typical neuroleptics on information processing of the central nervous system under clinical conditions in schizophrenic disorders: implications for fitness to drive. *Neuropsychobiology*. 1999;40(4):196-201.

The present study investigated the psychomotor performance of schizophrenic inpatients receiving neuroleptic medication in regard to their fitness to drive. Researchers compared patients taking clozapine with those taking classical neuroleptics and measured reaction time, vigilance, visual perception and stress tolerance. The patients' driving ability was equally impaired in both treatment groups; 11 percent of patients passed all tests without major

impairment; 32 percent of the patients showed some impairment that required individual evaluation of their driving ability; 57 percent were considered to be severely impaired and driving could not be recommended.

Grabe HJ, Wolf T, Gratz S, Laux G. The influence of polypharmacological antidepressive treatment on central nervous information processing of depressed patients: implications for fitness to drive. *Neuropsychobiology*. 1998;37(4):200-4.

This study evaluated the influence of antidepressants and common co-medications such as lithium, carbamazepine, benzodiazepines or neuroleptics on central nervous information processing on the ability to drive. Forty-four inpatients with major depression were evaluated on a Act & React Testsystem ART-90. A total of 88.6 percent of the patients failed to pass all the tests. With respect to different groups of antidepressants, no differences in psychomotor reaction performance were observed in poly-drug treatment.

Hemmelgarn B, Suissa S, Huang A, Boivin JF, Pinard G. Benzodiazepine use and the risk of motor vehicle crash in the elderly. *JAMA*. 1997;278:27-31.

This study reviewed the effect of benzodiazepines of either long- or short half-life on the risk of motor vehicle crash in the elderly. This was a nested case-control design within a cohort of 224,734 drivers from the Canadian province of Quebec, aged 67 to 84 years, followed from 1990 to 1993. The study included 5579 drivers involved in an injurious crash (cases) and a random sample of 10 controls per case selected. The adjusted rate ratio of crash involvement within the first week of long-half-life benzodiazepine use was 1.45 with the rate ratio for continuous use of longer duration up to 1 year was slightly lower but remained significant. There was no increased risk after beginning treatment with short-half-life benzodiazepines.

Kay GG, PhD. The effects of antihistamines on cognition and performance. *Journal of Allergy and Clinical Immunology*. 105(6, part 2) (Supplement):S622-S627, June 2000.

This article reviews the effects of allergic disorders and antihistamines on disability. The first generation antihistamines are highly lipophilic and readily cross the blood-brain barrier, causing considerable sedation. The second-generation agents are more lipophobic and less likely to cross the blood-brain barrier, causing little if any sedation. In a recent comparative study, subjects treated with the first-generation agent diphenhydramine were found to have significant performance deficits on tests of divided attention, working memory, vigilance, and speed. Those treated with the second-generation antihistamine, Loratadine, performed as well as subjects who were treated with a placebo. It was recommended that patients whose occupations require vigilance, divided attention, or concentration receive only second-generation antihistamines.

Logan BK, Case GA, Gordon AM. Carisprodol, meprobamate, and driving impairment. *Journal of Forensic Sciences*. 2000;45(3):619-623.

This article reviews the pharmacology and driving impairment of the centrally acting muscle relaxant carisprodol, and its metabolite meprobamate. A series of 104 incidents in which these

drugs were detected in the blood of drivers involved in accidents or arrested for impaired driving was considered. Reported driving behaviors included erratic lane travel, weaving, driving slowly, swerving, stopping in traffic, and hitting parked cars and other stationary objects. Many of these cases had alcohol or other centrally acting drugs present also, making difficult the attribution of the documented impairment specifically to carisoprodol and meprobamate. In twenty-one cases, however, no other drugs were detected. Impairment appeared to be possible at any concentration of these two drugs; however, the most severe driving impairment and most overt symptoms of intoxication were noted when the combined concentration exceeded 10 mg/L.

Menzin J, Lang K, Levy P, Levy E. A general model of the effects of sleep medications on the risk and cost of motor vehicle accidents and its application to France. *Pharmacoeconomics* 2001;19:69-78.

This paper reported on a model to evaluate the potential effects of sleep medications on motor vehicle accidents and costs. The researchers evaluated impairment in driving performance, in a randomized controlled open-road study using the standard deviation of a vehicle's lateral position (SDLP), a measure of weaving. The degree of driving impairment was expressed in terms of equivalent blood alcohol (ethanol) concentration (BAC) which was then used to predict excess risk of motor vehicle accidents. A non-impairing medication would not increase risk; a medication that produces mild impairment in driving performance equivalent to 0.05 percent BAC would increase motor vehicle accident risk by 25 percent. One that leads to moderate impairment (an SDLP change of 4.5 cm, equivalent to 0.08 percent BAC) would roughly double this risk, and a severely impairing medication (an SDLP change of 7 cm, equivalent to 0.12 percent BAC) would result in up to a 5-fold increase in motor vehicle accident risk. A hypothetical population of 100,000 adult drivers with insomnia was assumed to be treated for 14 days with either a medication that has been shown not to significantly impair driving performance or one that has been shown to cause moderate impairment. The moderately impairing medication would be expected to result in 503 excess accidents per 100,000 drivers.

O'Hanlon JF, Ramaekers. Antihistamine effects on actual driving performance in a standard test: a summary of Dutch experience, 1989-94. *Allergy*. 1995;50:234-242.

This review summarizes the results of eight double-blind, placebo-controlled, volunteer studies looking at the effects on actual driving performance of "sedating" and "non-sedating" antihistamines. Standard deviation of lateral position was used to measure driving impairment. The newer drugs were generally less impairing.

O'Neill WM, Hanks GW, Simpson P, Fallon MT, Jenkins E, Wesnes K. The cognitive and psychomotor effects of morphine in healthy subjects: a randomized controlled trial of repeated (four) oral doses of dextropropoxyphene, morphine, lorazepam and placebo. *Pain*. 2000;85:209-215.

This was a randomized double-blind four-way crossover study of ten healthy subjects to examine the cognitive and psychomotor effects of repeated oral doses of dextropropoxyphene and morphine. Four treatments were compared: dextropropoxyphene napsylate 100 mg, morphine sulphate 10 mg, lorazepam 0.5 mg and placebo. The study found that oral morphine may

enhance performance in some measures of cognitive function, whereas dextropropoxyphene seems more likely to cause impairment. Neither opioid has substantial effects on cognition and psychomotor function compared with lorazepam.

Ray AR, Thapa PB, Shorr RI. Medications and the older driver. *Clinics in Geriatric Medicine*. 1993;9:413-438.

This is a review article on the effects medications on driving in the elderly. Some studies used 65 years as the age cut off while others included those over 55 as "older." The various methods to evaluate potential impairment on driving including psychomotor tests, driving simulators, on-road driving tests, tests of attention were reviewed. Some evaluators favored the on-road test for prediction of driving ability while others preferred a battery of tests.

Medications that should be of concern include the benzodiazepines, antidepressants, opioid analgesics, antihistamines and hypoglycemics. Conclusions included that benzodiazepines impair performance in a dose related manner and may be responsible for up to a six-fold increase in crash risk. Other anxiolytics and hypnotics may also impair but different drugs in this category will have less or no effect. The sedating antidepressants were found to decrease psychomotor function. Frequent use of the cyclic antidepressants was found in one study to have a more than doubled risk of injurious crashes. Opioids were found to also impair performance, but this effect was blunted in opioid tolerant individuals. The non-sedating antihistamine did not affect performance, but the sedating antihistamines decreased ability on a number of test protocols.

Weiler JM, Bloomfield JR, Woodworth GG, Grant AR, Layton TA, Brown TL, et al. Effects of fexofenadine, diphenhydramine, and alcohol on driving performance. A randomized, placebo-controlled trial in the Iowa Driving Simulator. *Annals of Internal Medicine*. 2000;132:354-63.

This was a randomized, double-blind, double-dummy, four-treatment, four-period crossover trial study comparing the effects of fexofenadine (60 mg), diphenhydramine (50 mg), and alcohol on driving performance in the Iowa Driving Simulator. Participants had significantly better ability to match the speed of the vehicle they were following after taking alcohol or fexofenadine than after taking diphenhydramine. Ability to stay in lane was impaired after alcohol and diphenhydramine use compared with fexofenadine use. Mean response time to a blocking vehicle was slowest after alcohol use. Self-reported drowsiness did not correlate with lack of coherence and was weakly associated with minimum following distance, steering instability, and left lane excursion.

Wylie KJ, Thompson DJ, Wildgust HJ. Effects of Depot Neuroleptics on Driving Performance in Chronic Schizophrenic Patients. *Journal of Neurology, Neurosurgery and Psychiatry*. 1993;56:910-13.

Twenty-two patients receiving depot neuroleptics for chronic schizophrenia were compared with sixteen control subjects in performance on simulated driving tests. There was a significant decrement in driving performance in the index group compared with the normal control group. Parkinsonism is likely to be the main mechanism by which neuroleptic drugs may impair

driving. Neuroleptics are potentially sedative and may lead to drowsiness. Two surveys of patients admitted to the hospital for schizophrenia were not found to have increased road traffic accident rates. The index sample has the potential source of bias in that only those patients who felt confident in their general capabilities, which may include driving, were volunteering for the study. It also remains unclear to what extent performance on a driving simulator reflects real driving ability. Nevertheless, the panel concluded that tests using driving simulators may be a better measure of driving skills than tests of competence and motor function. It is not clear how much of the impairment is due to chronic schizophrenia and how much is due to the medication or side-effects of medication. In this study, the index group was stabilized on their medication. They were also on anti-cholinergic medication. Regular review of psychopathology and movement disorders by the physician is necessary, especially for those seeking advice on their suitability to drive a vehicle.

### **C.11 Provider Knowledge**

Cable G, Reines M, Salwa G, Thirumavalavan V. Knowledge, attitudes and practice of geriatricians regarding patients with dementia who are potentially dangerous automobile drivers: a national survey. *Journal of the American Geriatric Society*. 2000;48:14-17.

This paper reports the findings of a survey among 467 geriatricians of their knowledge regarding how to prevent a patient with dementia who is a potentially dangerous driver from driving. The survey also assessed the geriatricians' willingness to recommend license revocation against the wishes of both the patient and the patient's family. More than 28 percent of all geriatricians did not know how to report patients with dementia who are potentially dangerous drivers. More than 75 percent agreed that physicians are responsible for reporting patients. This study demonstrated that although the majority of geriatricians knew that they were responsible for reporting unsafe drivers, a majority did not know how to do so.

King D, Benbow SJ, Barrett JA. The law and medical fitness to drive - A study of doctor's knowledge. *Postgraduate Medical Journal*. 1992;68:624-628.

Doctors' knowledge on laws and recommendations regarding fitness to drive was assessed through questionnaire. A total of 400 general practitioners and 246 hospital doctors were asked to respond to the survey anonymously. Only 26 percent of general practitioners and 32 percent of hospital based physicians responded. Results showed that physicians either did not ask about medical conditions which might impact driving or did not report when required to do so. Only 59 percent of general practitioners and 30 percent of hospital physicians responded correctly based on Driver Vehicle Licensing Agency requirements for those who had a myocardial infarction. Several indicated they would tell their patient to drive if they felt able. Less than 50 percent were aware of the guidelines on transient ischemic attacks (TIAs).

### **C.12 Multiple Medical Conditions / Other**

Koepsell TD, Wolf ME, McCloskey L, Buchner, Louis D, Wagner EH, Thompson RS. Medical Conditions and motor vehicle collision injuries in older adults. *Journal of the American Geriatric Society*. 1994;42:695-700.

This was a case control study to determine whether medical conditions that can impair sensory, cognitive, or motor function increase the risk of injury due to motor vehicle collision in older drivers. Drivers who were 65 years or older and injured were matched with controls by age, gender and county of residence. Injury risk was 2.6-fold higher in older diabetic drivers, especially those treated with insulin or oral hypoglycemic agents, those with diabetes for over 5 years, and those with both diabetes and coronary heart disease. There was also an increased risk for those older drivers with coronary artery disease, depression, alcohol abuse, or falls but these were not statistically significant.

Li G, Baker SB, Grabowski JG, et al. Age, Flight Experience and Risk of Crash Involvement of Cohort or Professional Pilots. *American Journal of Epidemiology*. 2003;157:874-80.

This was a ten-year study (1987-1997) on a cohort of 3,306 commuter air carrier and air taxi pilots who were age 45-54 in 1987. Flight Experience as measured by total flight time at baseline showed a significant protective effect against the risk of crash involvement. The protective effect of flight experience levels off after total flight time reaches 10,000 hours. The lack of an association between pilot age and crash risk may reflect a strong "healthy worker effect" stemming from the rigorous medical standards and periodic physical examination required for professional pilots.

Marshall SC, Spasoff R, Nair R, Van Walraven C. Restricted driver licensing for medical impairments: does it work? *Canadian Medical Association Journal*. 2002 Oct 1;167(7):747-51.

This research evaluated the rates of crashes and traffic violations among drivers with a restricted license, compared with the rates in the general driving population. It compared the crash and traffic violation rates before and after driving restrictions were imposed using a retrospective analysis of all licensed Saskatchewan drivers registered from Jan. 1, 1992 to Apr. 19, 1999.

Of the 703,758 drivers in the study, 23,185 (3.3 percent) had a restricted license and a higher crash rate than drivers without restrictions. This rate was lower than that among male drivers and urban drivers. Drivers with restricted licenses had a lower traffic violation rate than those without restrictions. During the study period, license restrictions may have averted up to 816 crashes and 751 traffic violations.

Parsons M. Fits and Other Causes of loss of Consciousness While Driving. *Quarterly Journal of Medicine*. 1986;58:195-303.

The accounts of incidences in which a driver lost consciousness or had a fit at the wheel were obtained from 92 patients who attended a neurology clinic and 131 press reports. Of these episodes, 78 percent were attributed to fits, coronary thrombosis or sleep. Fits and coronary thrombosis, of which drivers frequently had some premonition, caused few serious accidents,

although the latter was usually lethal. Coronary thrombosis is more common among those over 55 years, with known or suspected coronary thrombosis accounting for 50 percent of the cases and 82 percent of driver's deaths. Although the driver's chance of survival is poor, the risk of a serious accident is small, which confirms the other studies. Drivers who fell asleep often did so without warning on arterial roads and in commercial vehicles. This group represented 27 percent of the entire series but accounted for 83 percent of deaths attributable to trauma. Twenty-five percent of the people drove professionally.

Sjogren H, Eriksson A and Ostrom. Role of disease in initiating the crashes of fatally injured drivers. *Accident Analysis and Prevention*. 1996;28:307-314.

This study examined the results of autopsies of 480 car drivers who were fatally injured and died within 3 days of the crash over a 13-year period. Almost one quarter of the drivers were found to have medical conditions such as heart disease, seizures, or diabetes. These medical factors were more common in males than in females. In 6 percent of the drivers, intrinsic medical factors were probably the underlying cause of the crash; in 1.3 percent the probability was strong. In 19 percent of the cases 60 or over age group, intrinsic medical factors were the underlying cause of the crash.

Vernon DD, Diller EM, Cook LJ, Reading JC, Suruda AJ, Dean JM. Evaluating the crash and citation rates of Utah drivers licensed with medical conditions, 1992-1996. *Accident Analysis and Prevention*. 2002;34:237-246.

The objective of this retrospective case-controlled study was to compare the rates of adverse driving events (crash, at-fault crash and citations) experienced by drivers licensed with medical conditions to those of age-, sex- and location-matched controls. The study also compared drivers reporting medical conditions licensed with full driving privileges, and those with restricted driving privileges. All drivers licensed in the state of Utah who reported a medical condition on their driver license application over the five year period 1992-1996 were included. Controls were from the entire driving population during the same time. Medical conditions drivers had modestly elevated rates of adverse driving events compared with control drivers. Rates in the cardiovascular condition category were not higher than controls. There did not appear to be an increased rate in drivers with more than one medical condition compared to the entire group with medical conditions. Underreporting of medical conditions and inaccurate assessment of exposure rates may have been weaknesses in this study.

Ysander L. The Safety of Drivers with Chronic Disease. *British Journal of Industrial Medicine*. 1966;23:28-36.

A total of 612 drivers with chronic diseases, mainly diabetes, cardiovascular disease, or renal disorder, were investigated in regard to the frequency of road accidents and serious driving offenses during a 10-year period. Road accidents directly caused by the disease or its treatment occurred in 0.8 percent of cases, all due to hypoglycemic attacks in insulin treated diabetics. The percentage of drivers experiencing road accidents were 4.1 in the investigation series and 7.7 in the control series. The corresponding figures for road accidents and serious driving offenses taken together were 9.8 and 15.3. The conclusion is drawn that any increased risk to road safety constituted by drivers with specific chronic diseases may be satisfactorily offset by restrictions

applied in Sweden in the granting of licenses to these drivers. In 1958, Tannenbaum found that 8.2 percent of all accident cases were wholly or partly caused by the affects of acute or chronic illness.

### **C.13 Glossary**

*amblyopia* –dimness of vision, especially when occurring in one eye without apparent physical defect or disease; also called lazy eye

*aneurysm* – widening of a vessel involving the stretching of the tissue of the media, the muscular layer of the vessel wall; major concern is rupture with sudden incapacitation

*angina* – chest pain caused by inadequate oxygen to heart muscle in relation to demand. Usually caused by coronary artery atherosclerosis

*antiarrhythmic* - a drug used to treat an abnormal heart rhythm

*anxiolytic* – a tranquilizer used to relieve anxiety and reduce tension and irritability

*aphakia* – absence of the natural lens of the eye (usually resulting from the removal of cataracts)

*arrhythmia* – abnormal heart rhythm

*atherosclerosis* – thickened and hardened lipid rich lesions within the innermost layer of medium and large arteries

*cardiomyopathy* – diffuse group of diseases of heart muscle that are generally classified based on structure and functional abnormalities; currently divided into dilated, hypertrophic, and restrictive

*cerebrovascular* – relating to the brain and the blood vessels that supply it; commonly used in relation to acute loss of blood flow to the brain with associated symptoms and signs

*coronary thrombosis* – obstruction of blood flow in a coronary artery by a blood clot; commonly called a heart attack

*encephalopathy* – any disorder or disease of the brain; associated with alterations in consciousness and ability to think and can be acute or chronic

*euglycemia* – a normal blood glucose level based on time since last meal

*hemoglobin* – a hemoprotein whose function is transport of oxygen from lung to body tissues

*hemoglobin A1C* (glycosylated hemoglobin) – formed when blood glucose reacts with the hemoglobin A molecule. Percent of HbA1C is based on the level of glucose over preceding 6 to 12 weeks, the life of the red blood cell. Hemoglobin A1C is tested to monitor the long-term control of diabetes

*hypoglycemia* - abnormally low blood sugar (glucose) usually resulting from excessive insulin. Depending on glucose level and the rate of change in its level in blood, can be associated with anxiety, sweating and rapid heart beat, as well as altered alertness, seizures and loss of consciousness

*hypopnea* – reduction of airflow or effort lasting at least 10 seconds. Requires at least a 30 percent decrease in thorax and abdominal breathing or airflow, and at least a 4 percent decrease in oxygen in the blood

*hypotension* – abnormally low blood pressure

*hypertrophy* – increase in mass of left ventricle of heart in response to abnormal pressure or volume

*hypertrophic cardiomyopathy* – genetic factors lead to hypertrophied walls of ventricle that are so thickened that they obstruct blood flow from the ventricle to the aorta

*idiopathic* – unexplained cause

*ischemia* – lack of adequate oxygen delivery by red cells to tissue due to diminished blood flow

*neuroleptic* – medications that work on the nervous system; primarily used to treat psychotic conditions. Have calming effect on almost all agitated persons

*neuropsychological* – a science concerned with the integration of psychological observations on behavior and the mind with neurological observations on the brain and nervous system

*palpitations* – sensation of rapid or irregular heart beat

*selective serotonin reuptake inhibitors* – a class of antidepressant drugs

*sleep apnea* – a sleep disorder involving cessation of breathing and disrupted sleep; major sleep disorder causing excessive daytime sleepiness

*syncope* - a brief spontaneous loss of consciousness caused by insufficient blood to the brain

*tachycardia* – abnormally rapid heartbeat; generally defined as over 100 beats a minute while at rest

*transient ischemic attack* – a brief period during which the brain gets insufficient blood supply; all symptoms and findings resolve within 24 hours

*vasovagal syncope* – most common cause of fainting, often associated with emotional upset. Caused by transient slowing of heart rate and a drop in arterial pressure

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## **Appendix D – Summary of Relevant ADA Cases**

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This appendix summarizes selected U.S. Supreme Court cases that have implications for any transportation medical standards program. These three cases illustrate the limitations on the applicability of the ADA. Following this summary are abstracts of 42 ADA cases involving railroads. In nearly all of the railroad cases, the ADA was found not applicable.

### **D.1 Transportation-Related Cases**

1. *Albertson’s v. Kirkingburg*, 527 U.S. 555, (1999).

The following case, decided by the U.S. Supreme Court in 1999, is summarized because it is instructive in its brief discussion of the interface between the Americans with Disabilities Act (ADA) and federal medical regulations in the transportation industry.

The case, *Albertson’s v. Kirkingburg*, 527 U.S. 555, is cited above in the summary of legal considerations provided in subsection 6.4.

A truck driver who had driven successfully for several years was fired after he failed to meet a vision standard in a return-to-work medical exam required by the Dept. of Transportation. In effect, the trucker had monocular vision.

At the time, the Department of Transportation had established a trial waiver program for those who failed the vision exam but could demonstrate through testing that the impairment did not create a safety hazard. Through the trial program, the DOT hoped to amass data to assist it in determining whether its vision standards were more restrictive than safety required. In this instance, the Employer elected not to provide the trucker with the option of demonstrating that he qualified for a waiver.

The trucker filed a claim under the ADA asserting in part that the employer's failure to provide him the opportunity to demonstrate he was entitled to a waiver contravened the requirement under the ADA to make reasonable accommodation for an employee with a physical impairment. It appears the Court had some difficulty rendering a final judgment. However, it concluded the employer did not violate the ADA when it ended the trucker's employment. It based its holding in significant part on the fact that the waiver program was experimental and so was not on par with the regulation itself.

Had the waiver program been part of the formal regulations and not a trial program, it is unclear whether the court would have held differently.

The *Albertson’s* case is relevant to the FRA’s medical standards project for two things it says about the interface between federal medical regulations and the ADA. First, it indicates that as a matter of law federal safety rules limit the application of the ADA to covered employees. At the same time, the case notes that when the ADA was enacted, Congress asked the Department of Transportation to review its medical standards for truckers to ensure they were not more demanding than safety required. The Court states in pertinent part:

When Congress enacted the ADA, it recognized that federal safety rules would limit application of the ADA as a matter of law. . . .Accordingly, two of these Committees asked 'the Secretary of Transportation [to] . . . ‘review these

requirements to determine whether they are valid under this Act [the ADA].’ at pp. 573,574.

2. U.S. Airways, Inc. v. Robert Barnett, 535 U.S. 391, (2002).

The Americans with Disabilities Act of 1990 (ADA or Act), 104 Stat. 328, prohibits an employer from discriminating against an “individual with a disability” who, with “reasonable accommodation,” can perform the essential functions of the job. This case asks how the Act resolves a potential conflict between: 1) the interests of a disabled worker who seeks assignment to a particular position as a “reasonable accommodation,” and 2) the interests of other workers with superior rights to bid for the job under an employer’s seniority system. In such a case, does the accommodation demand override the seniority system?

In this case Mr. Barnett sustained an on-the-job back injury. He invoked his seniority rights and transferred to a less physically demanding mailroom position. However, two employees with more seniority also bid for the job. Mr. Barnett asked U.S. Airways to accommodate his disability-imposed limitations by making an exception that would allow him to remain in the mailroom. After initially allowing Mr. Barnett to work in the mailroom, U.S. Airways eventually decided not to make an exception to the seniority rules and terminated Mr. Barnett.

The Supreme Court found that if a requested accommodation conflicts with the rules of a seniority system then the accommodation is not “reasonable.”

3. Sutton et al. v. United Airlines, Inc., 527 U.S. 471, (1999).

Twin sisters with uncorrected visual acuity of 20/200 or worse, applied to a major commercial airline carrier for employment as commercial airline pilots but were rejected because they did not meet the airlines minimum requirement of uncorrected visual acuity of 20/100 or better. They filed an ADA claim. The District Court dismissed their complaint finding that the sisters were not actually disabled under the ADA because they could fully correct their visual impairments. The Tenth Circuit and the United States Supreme Court affirmed.

The Court relied heavily upon the point that the EEOC and the Justice Department have issued interpretive guidelines indicating that the determination whether an individual is substantially limited in a major life activity (working) must be made on a case-by-case basis “without regard to mitigating measures such as assistive or prosthetic devices.” Because the sisters in this case alleged that their vision was correctable to 20/20 the Court concluded that they are not disabled under the ADA. A key point in this case is that correctable conditions may not be protected under the ADA.

4. Toyota Motor Manufacturing, Ky., Inc. v. Williams, 534 U.S. 184, (2002).

A female employee of Toyota claimed she was disabled by carpal tunnel syndrome and related impairments and sued Toyota for failing to provide her with a reasonable accommodation under the ADA. The Supreme Court found that because she was not limited in “activities of daily living,” she was not disabled in terms of the ADA.

5. Murphy v. United Parcel Service, Inc., 527 U.S. 516, (1999).

United Parcel Service (UPS) hired Mr. Murphy as a mechanic, a position that required him to drive commercial vehicles. Despite his high blood pressure, he was erroneously granted a

commercial driver's license. After the error was discovered, UPS fired him. The Supreme Court found that because hypertension is treatable, the individual can function normally in everyday activities and thus is not disabled in terms of the ADA. UPS's termination of the employee was justified because of the employee's failure to meet the FMCSA regulations for commercial motor vehicle operators.

## **D.2 ADA Cases Involving Railroads**

NOTE: These cases have not been "shepardized," but are illustrative of the kinds of medically-related claims that have been brought by railroad employees.

1. Poindexter v. Atchison, Topeka and Santa Fe Railroad Company, 914 F.Supp. 454 (D. Kansas 1996): Plaintiff, a clerk for defendant railroad, had been transferred to a different office to which she had to commute. Plaintiff began having anxiety attacks, was diagnosed with major depression, panic disorder agoraphobia and separation anxiety, and went on medical leave of absence. Plaintiff requested a transfer to the railroad's local office, which was refused by defendant. Although the railroad's medical board had initially approved the request, it later denied the request after consulting with the legal department. The issue before the District Court was whether the plaintiff was required to arbitrate her dispute with the railroad under the Railway Labor Act. The Court held that the ADA claim was independent of her rights under the collective bargaining agreement, permitting the employee to bring suit.
2. Poindexter v. Atchison, Topeka and Santa Fe Railroad Company, 168 F.3d 1228 (10<sup>th</sup> Cir. 1999): This case deals with the same facts and parties, after the plaintiff had won a jury verdict. The Court reversed and remanded the matter for a new trial, holding that the judge had erred by submitting to the jury the legal question of whether the claimed affliction is an impairment and whether the identified endeavor is a major life activity. The Court also held that the plaintiff must, but failed to, specifically plead or prove at trial the claimed impairments and major life activities.
3. Crown v. Union Pacific Railroad Company, 44 Fed.Appx 44; 2002 U.S.App. LEXIS 16581 (8<sup>th</sup> Cir. 2002): Plaintiff was a corridor manager supervising train dispatchers. He suffered a psychological breakdown, specifically, alcohol dependence and major depression. Although Union Pacific cleared him to work, he declined to return to work, claiming he needed some sort of accommodation. Plaintiff received short and then long-term disability payments, and when those expired in 1996 Union Pacific informed him he was not eligible for its health plan but could elect private coverage, which he did. In 1999 plaintiff was told by his doctor that he could return to work without restriction, but Union Pacific declined to give him a position. The Court held that it is irrelevant whether the plaintiff had been discharged in 1996 or in 1999, because the Court saw nothing illegal about the action of the railroad. Plaintiff did not contend he was a qualified person with a disability under the ADA, but claimed instead that the refusal to re-hire him was retaliatory for two earlier claims of discrimination. The Court found no evidence to support this claim.
4. Stoll v. C.P. Rail System, 2000 U.S.App. LEXIS 27953 (8<sup>th</sup> Cir. 2000): The plaintiff brought, among other claims, state and federal claims of disability discrimination against Soo Line Railroad. Although he is not disabled, the plaintiff alleged he was "regarded as" disabled, apparently due to his physical condition and history of injuries. Plaintiff's claim

failed because there was no evidence that the manager responsible for ending the plaintiff's employment had any knowledge of the plaintiff's physical condition or history of injuries.

5. Phillips v. Union Pacific Railroad Company, 216 F.3d 703 (8<sup>th</sup> Cir. 2000): The plaintiff brought various claims against her railroad employer, including a claim for handicap discrimination under the ADA. Plaintiff had been a personnel department stenographer when the railroad suspended her from active service pending medical clearance due to its concerns about her behavior, including threats to kill two co-workers, her history of psychological and substance abuse problems, and her occasional carrying of a gun. A psychiatrist who examined her at Union Pacific's request found that the plaintiff should not resume work until she received psychiatric treatment. The plaintiff eventually began treatment, but missed appointments and eventually stopped treatment altogether, without having achieved any of the stated goals. The plaintiff brought suit, alleging, among other things, that she had been discriminated against due to her psychological impairment. This claim was dismissed at the close of her case, pursuant to the District Court's allowance of defendant's motion for judgment as a matter of law. The Eighth Circuit affirmed, finding that the plaintiff had failed to show that she is a qualified individual.
6. Roelen v. Union Pacific Railroad, 1996 U.S.App. LEXIS 15677 (9<sup>th</sup> Cir. 1996): Plaintiff was terminated from his position as a hostler. He was barred from pursuing his claim due to his failure to timely file a charge of discrimination with the EEOC as a prerequisite to his ADA action. The court found there was no continuing violation after his termination, so that his termination was the most recent act.
7. Henzel v. Delaware Ostego Corporation, 285 F.Supp.2d 271 (N.D.N.Y. 2003): Plaintiff brought claims under the ADA and the New York Human Rights Law. Plaintiff was a diesel mechanic when he developed ulcerative colitis. He was out of work for a while, returned on a part-time basis for one month, then left again and did not return. He had two surgical procedures in 1999. The railroad disputed the plaintiff's contention that he was on unpaid leave. Following this, the railroad notified the plaintiff that his employment had been terminated due to a reduction in force, and his position had been completely eliminated. In 2000 the plaintiff had a surgical procedure that would have made him medically capable of working. The plaintiff conceded that he never requested any accommodation; he was not medically fit to return to work until the surgery in 2000; and he never told the railroad he was able to return to work. The Court found he had failed to show he was otherwise qualified, since he admitted he could not do his job at all, even with accommodation, until after the 2000 surgery, and the plaintiff does not dispute that at the time he was terminated in 1999 his position as a steam locomotive mechanic was eliminated. Moreover, plaintiff admitted he never requested an accommodation, and there was no accommodation that would have permitted him to do his job. Even if unpaid leave were to be considered an accommodation, there was no job to return to. Finally, plaintiff offered no evidence in support of his retaliation claim.
8. Valtierra v. Burlington Northern & Santa Fe Railroad Company, 2002 U.S. Dist. LEXIS 24472 (E.D. Ill. December 19, 2002): Plaintiff brought claims against his railroad employer for race and disability discrimination (ADA). Plaintiff was working as a switchman and brakeman, became a conductor in 1984, was working as a conductor in 1994 when he slipped and hurt his shoulder. He was on medical leave until 1997 when he was cleared for work as an engineer and entered the training program. He became concerned that he would not have

steady work because his seniority dated from 1997. After discussions with other employees he concluded that but for his injury he would have been trained in 1994 and promoted in 1995. Despite his requests, and his reliance on a letter of understanding, the railroad did not adjust his seniority position. Plaintiff brought suit in 1998. This suit was ultimately settled. In 2002 he filed an EEOC charge, and brought suit. The suit was dismissed based on the late filing of the EEOC charge, and based on res judicata, because the same claims were being brought as those settled in the prior suit, resulting in the dismissal of the earlier, identical claims, with prejudice.

9. Newberry v. Burlington Northern Santa Fe Railroad, 2002 U.S. Dist. LEXIS 6235 (D. Minn., March 29, 2002): Plaintiff was a machinist who suffered a lower back injury at work, returned to work, suffered a second back injury following which he returned to work again. He sought compensation by bringing a FELA claim. At about the same time, he was restricted to light-duty work, was given an assistant, and was permitted to work only 4-6 hours per day. The plaintiff decided that even light duty was too much for him, and stopped working. The FELA claims were tried to a jury, and the plaintiff's doctors testified that even with the accommodations provided by the defendant, the plaintiff could not perform the duties of a machinist. The plaintiff also testified that he could not work. He won the FELA action. Subsequently, the plaintiff sought reinstatement with the defendant. He also sought disability benefits, which were awarded to him. Before the defendant officially responded to the request for reinstatement, the plaintiff filed a charge of disability discrimination with the EEOC. This was subsequently dismissed. The plaintiff then filed an action alleging violations of the ADA and the Minnesota Human Rights Act. The Court held that the plaintiff was judicially estopped from bringing these claims. The Court found that at the earlier trial the plaintiff alleged he was completely unable to work, and he prevailed. The Court examined the Supreme Court case of Cleveland v. Policy Management Systems Corp., in which an employee was not judicially estopped from pursuing an ADA claim because she had applied for social security disability, where SSKE does not take reasonable accommodations into account. The Supreme Court held that the employee must be able to offer an explanation as to why her SSDI application is not inconsistent with her ADA allegations in order to avoid judicial estoppel. Here, the plaintiff failed to offer such an explanation.
10. Wilhelm v. CSX Transportation, Inc., 169 F. Supp. 2d 755 (N.D. Ohio, 2001); *reversed and remanded*, 65 Fed. Appx. 973, 2003 U.S. App. LEXIS 10864 (6<sup>th</sup> Cir. 2003): The plaintiff, a locomotive engineer, was an asthmatic who brought suit under the FELA and the Ohio handicap discrimination act for the defendant's failure to enforce its no-smoking policy. The plaintiff alleged that despite the policy, and despite the plaintiff's complaints and a medical letter documenting his sensitivity to cigarette smoke, employees and supervisors smoked in the workplace. He claimed that he was ostracized as a result of his complaints. The defendant admitted that its practice was to tell the smoker to "put it out" on request. The District Court granted the defendant's motion for summary judgment. It found that, as to the FELA claim, the plaintiff had not provided the Court with sufficient evidence of the harmful effects of second hand smoke on others, and therefore had failed to show that second hand smoke created an unsafe work environment. As to the handicap discrimination claims, the Court found that the plaintiff had failed to show that the non-enforcement of the smoking ban was caused by the plaintiff's handicap. Further, the Court found that the ostracism he suffered was not an adverse employment action, having failed to show that they rose to the

level of a material change in the terms and conditions of his employment. On appeal, the Court reversed and remanded with respect to the FELA claim, finding that the plaintiff had offered evidence that he was exposed to second hand smoke almost daily; that this exposure triggered asthma attacks; that the defendant knew about this; and that the defendant had enacted the no-smoking policy out of concern for the health of non-smokers.

11. Felix v. New York City Transit Authority, 154 F.Supp.2d 640 (S.D.N.Y. 2001): The plaintiff (who died while the action was pending and was represented by her Estate) was a railroad clerk working in a subway station. She developed post traumatic stress disorder and a serious sleep disturbance following the firebombing of a token booth where she had been scheduled to work. The plaintiff was evaluated, and found to be unable to do subway work. The plaintiff was put on a “restricted work, temporary” status, later changed to “no work, temporary.” The plaintiff was terminated under a provision in the Civil Service law authorizing the defendant to terminate a civil service employee who, for medical reasons, is unable to work after a year’s absence. The plaintiff was twice informed by letter that the defendant was intending to terminate her, but neither letter informed her about the right to challenge a medical “no work” determination. The plaintiff did ask her union to file a grievance contesting the denial of work and requesting reasonable accommodation. This was denied, a step II hearing was held, and appeal of the denial was dismissed. The plaintiff brought a claim under the ADA alleging that the defendant should have transferred her to a different position. The Court held that the plaintiff’s application for (and award of) SSDI benefits did not preclude her from pursuing her ADA claim, as there were explanations for her apparently contradictory positions. Thus, a jury should be permitted to decide whether the claim of total disability to the Social Security Administration should preclude the ADA claims. The Court also found that the plaintiff’s PTSD was an impairment that interfered with sleep, a major life activity. After some discussion of whether the requested transfers were reasonable accommodations, the Court found that the plaintiff had failed to show a causal connection between her PTSD, which limited her ability to sleep, and the reasonable accommodation sought. The Court found that the plaintiff’s sleep problems did not impair her ability to work, nor was any accommodation of her sleep problem sought.
12. Swierkowski v. Consolidated Rail Corporation, 168 F.Supp.2d 389 (E.D.Pa., 2001): Plaintiff suffered from scoliosis. In 1993 he transferred from the clerical craft to the trainman craft, which encompasses a variety of positions, some requiring heavy duty, some light duty. Plaintiff began training as a brakeman/conductor, but found that the duties caused him back pain. He was examined by several doctors, all of whom concluded that the plaintiff could not return to work as a brakeman/conductor. The plaintiff was medically disqualified from all but sedentary trainman jobs. After turning down a number of positions that were too far from his home, he eventually returned to work as a switch tender. Plaintiff brought an action pursuant to ADA and the Rehabilitation Act, claiming that he had not been notified of other suitable positions that became available at an earlier point in time. The ADA claims were dismissed for failure to exhaust administrative remedies. The Court held that the plaintiff was not barred by the statute of limitations. The Court held that the plaintiff had presented sufficient evidence to support his claim that he is unable to perform a broad range of jobs and that he had presented sufficient demographic evidence. Thus, he had met his burden of presenting evidence of a disability substantially limiting the major life activity of working. The Court also found there as a genuine issue of material fact as to whether plaintiff was a qualified individual.

13. Lapinsky v. Amtrak Commuter Services Corp., 2001 U.S. Dist. LEXIS 2174, 11 Am. Disabilities Cas. (BNA) 1092 (E.D.Pa. February 28, 2001): The plaintiff had nerve damage stemming from a car accident. She alleged that Amtrak discriminated against her based on the perception that she was disabled, and that her union discriminated against her and also breached its fiduciary duty by failing to waive a typing test. The Court held that the plaintiff had raised a genuine issue of material fact with respect to whether Amtrak regarded her as being disabled. While she did not raise a genuine issue of material fact with regard to whether the Union regarded her as disabled, she did raise a genuine issue of material fact as to whether she is substantially limited in the major life activity of performing manual tasks, and whether she is a qualified individual with a disability. She also presented evidence in support of her claim that Amtrak knew of her disability and her desire for reasonable accommodation, and that Amtrak failed to make a good faith effort to reasonably accommodate her. Finally, the fair representation claim was barred by the statute of limitations.
14. Kellogg v. Union Pacific Railroad Company, 2000 U.S. Dist. LEXIS 734 (D.Nebraska, January 28, 2000): The plaintiff was a senior Manager of Intermodal Service Delivery, a high-stress job with long hours. He suffered a panic attack at work, and was diagnosed with major depression and anxiety. After treatment he was released to return to work, but was restricted to a 40-hour week during daylight hours. This accommodation was made for one month, following which the plaintiff took some time off for the adjustment of his medications. When he sought to return to work he was refused. The plaintiff filed a charge with the Nebraska Equal Opportunity Commission for violation of the ADA. The NEOC issued a right-to-sue letter. The Court found that the 40-hour-daylight limitation was not sufficient to find a “disability” under the ADA. The Court also found that there was no evidence the defendant considered the plaintiff to be “disabled”.
15. Cain v. Union Pacific Railroad Company, 1999 U.S. Dist. LEXIS 20174 (N.D.Ill., December 29, 1999): Plaintiff worked in a position where he could be called to work as either a conductor or an engineer. He was diagnosed with sleep apnea. When he reported this to the defendant he was pulled from all duty. He sued under the ADA alleging that he should have been permitted to work as a conductor only. The defendant argued that this would have infringed on the collective bargaining agreement (CBA). The parties each interpreted the CBA differently with respect to whether it permitted an employee to take only conductor jobs if he or she is unable to work as an engineer due to disability. The Court held that the interpretation of the CBA is a “minor dispute” for which arbitration is required under the Railway Labor Act, and therefore the Court lacked jurisdiction.
16. Donahue v. Consolidated Rail Corporation, 52 F.Supp.2d 476 (E.D.Pa., 1999): (See also 224 F.3d 1083, copied separately). The plaintiff, a conductor, alleged that the defendant had discriminated against him by failing to transfer him to a different position when his heart condition made him unable to perform his job as a conductor. Although the plaintiff had initially been cleared for work as a conductor, it became clear that this would be dangerous for him and for others as he was likely to pass out. Indeed, he passed out while walking down the track. He attempted to obtain a job as a road foreman or a dispatcher, but there were no jobs available. Plaintiff applied for disability benefits. That application did not estop him from asserting the ADA claim because the statements in his application were consistent with his position that he could have performed some other job. The Court also

found that plaintiff submitted enough evidence to support his claim of disability, and that he was substantially limited in the major life activity of working. The Court found there was at least a jury question as to whether the defendant made a good faith effort to accommodate him. However, the plaintiff did not show that he could have been accommodated but for the defendant's lack of good faith because he failed to show there was any vacant job available for him. Therefore, his claim was dismissed (defendant's motion for summary judgment allowed).

17. Ricciardi v. Consolidated Rail Corporation, 1999 U.S. Dist. LEXIS 1232 (E.D. Pa. February 5, 1999): The plaintiff was employed in defendant's safety department. In 1996 he suffered an injury at work, and brought a suit pursuant to the FELA, for which he recovered a favorable verdict. He then brought suit for, among other things, a claim under the ADA. The defendant moved to dismiss. The Court dismissed the wrongful discharge claims on the grounds that Pennsylvania recognizes such claims only when made by at-will employees, and because it should have been arbitrated under the Railway Labor Act. The Court also found that, although the plaintiff's EEOC charge was untimely, equitable tolling was warranted because the EEOC had allegedly lost the timely-filed charge.
18. Williams v. Northeast Illinois Regional Commuter Railroad Corporation, 1998 U.S. Dist. LEXIS 20013 (N.D. Ill., December 16, 1998): The plaintiff was a ticket sales clerk who was disabled by alcoholism. Nevertheless, he was able to perform his job duties with or without reasonable accommodation. The plaintiff alleged he was harassed and discriminated against due to race. After complaining about this, the plaintiff was suspended for 20 days without pay. At the end of the suspension it was recommended that the plaintiff meet with the Employee Assistance Program for help with his alcoholism. The plaintiff took a day off to seek treatment, and received an excuse letter from the medical center that was deemed inadequate (it referred only to "general medical treatment." Ultimately, the defendant conducted an investigative hearing that resulted in the plaintiff's termination. The Union appealed the discharge. The plaintiff also filed a charge of discrimination with the EEOC. The plaintiff was reinstated on the condition he submit to alcohol and drug screening tests. In 1997 the plaintiff arrived at work before his shift began and was asked to take the tests, but stated he had an appointment with his counsel, and agreed to be tested when he returned to work at the beginning of his shift. The plaintiff was terminated for allegedly failing to comply with the conditions of the reinstatement agreement. He brought suit pursuant to the ADA, and for racial discrimination. The defendant's motion to dismiss the racial discrimination charges was denied; the ADA claim was not discussed.
19. Mandichak v. Consolidated Rail Corporation, 1998 U.S. Dist. LEXIS 23005 (W.D. Pa., August 20, 1998): Various plaintiffs certified as a class brought claims against the defendant for violations of the ADA, the Rehabilitation Act, and the Pennsylvania Human Relations Act. There were two classes: applicants for employment who were administered medical examinations or inquiries prior to defendant making a job offer, and current and former employees and applicants who received offers of employment but were denied employment or other benefits because of their disabilities. The Court found that the plaintiffs had failed to establish a prima facie case of violation of the ADA. This case is interesting for the process Conrail had in place under its collective bargaining agreements for the evaluation of employees' medical fitness. The agreements contained a "Board of Doctors Rule" which provided a mechanism for employees who have been disqualified for physical reasons can

get a binding decision from a team comprised of his doctor, a doctor designated by Conrail, and a third doctor chosen by the first two. Conrail must honor an employee's invocation of the Board of Doctor's Rule. Conrail relies on "fee for service" doctors to do medical examinations and evaluations for a variety of purposes. The fee for service doctor receives an instruction sheet with a description of the essential functions of the job and the examination components. The fee for service doctor can evaluate the employee as: 1) qualified; 2) qualified with an accommodation; 3) deferred to Conrail medical; or 4) disqualified. Only if the fee for service doctor finds that the employee fails to meet regulatory requirements or there is an immanent risk of harm may the doctor disqualify the employee from further work. When the fee-for service doctor finds an employee should be deferred or disqualified the Conrail medical department becomes involved, and attempts, with the employee's doctor and his supervisor, to understand the nature of the medical restriction and what accommodation is necessary. If the medical department cannot reach an accommodation, then the Manager of Vocational Rehabilitation is involved. The employee then fills out an "ADA form" developed by the Manager. The Manager then tries to determine a reasonable accommodation. If he is unable to convince a supervisor to accept his recommendation, the matter is taken up by the ADA Committee, made up of representatives from the medical, labor relations, human resources, claims, legal, and the particular operating departments. According to Conrail, very few cases get that far.

20. Gustafson v. Burlington Northern Santa Fe Railroad Company, 1998 U.S. Dist. LEXIS 15977 (D. Nebraska, July 31, 1998): The plaintiff was a carman who sustained several back injuries while at work. He was removed from duty and placed on sick leave based on the employer's claim that his injuries and work created a hazard to both the plaintiff and to his coworkers, even though there had been no complaints about his ability to do the work. The plaintiff's doctor advised the defendant that he could return to work with certain restrictions, such as no bending, stooping, prolonged standing, walking, excessive flexion or rotation of the spine. The defendant did not tell the plaintiff whether he could return to work, so plaintiff filed a grievance with his union. The plaintiff filed suit pursuant to the FELA, alleging his back injuries were permanent, and received an award. Subsequently, he underwent back surgery, and was cleared for work with no restrictions. The defendant denied his request to return to work, and plaintiff brought suit pursuant to the ADA. The Court found that the plaintiff's claims were not preempted by the Railway Labor Act, nor was his claim barred by equitable estoppel. It also found that he had presented sufficient evidence that the defendant perceived him as having a disability to withstand defendant's motion for summary judgment.
21. Adler v. I&M Rail Link, L.L.C., 13 F. Supp. 2d 912 (N.D. Iowa, 1998): The plaintiffs were all railroad track workers who had been employed by co-defendant Soo Line Railroad Company. When I & M bought 1100 miles of track from Soo Line, they were not re-hired by I & M, even though most of Soo Line's employees had been re-hired. The Track workers alleged that they had been asked by I & M about whether they had physical problems or disabilities, had been injured on the job or made any claims for on-the-job injuries, and whether they had filed union claims or grievances. They also alleged that Soo Line had provided I&M with information about each plaintiff's history of union activity, medical conditions, work related injuries and claims for work related injuries, and disabilities. They brought various claims against the defendants, including claims under the ADA. The Court wrote a lengthy and detailed opinion discussing the defendants' motions to dismiss the plaintiffs' various claims. As to the ADA claims, the Court analyzed the provisions of the

ADA that restrict inquiry into whether a job applicant has a disability. The Court concluded that the track workers can state a claim for per se violation of these provisions only if they can also state a claim that they are disabled. The Court found that while they had not sufficiently pleaded disability, they did (barely) adequately allege perceived disability. The Court dismissed the ADA claim but permitted the plaintiffs to replead the disability and perceived disability elements of that claim.

22. EEOC v. Union Pacific Railroad, 1997 U.S. Dist. LEXIS 22182 (D. Idaho, October 24, 1997):  
The plaintiff filed an ADA claim challenging the defendant's decision to bar an employee from driving vehicles because he has only one eye. The employee had passed a physical examination at the beginning of his employment, including an eye examination. In 1994 he began working as a utility clerk, spending about 90% of his time driving company vehicles. Later that year he was involved in an accident while driving a company vehicle. At first he was told that the only consequence would be the issuance of a disciplinary notice, but he was subsequently suspended from work pending an examination by an ophthalmologist. Although the ophthalmologist concluded that the employee's vision was within legal driving abilities, the defendant's assistant director of occupational medical services decided that his inadequate visual field posed a direct threat of causing another accident, and barred him from driving based on his interpretation of the defendant's medical rules, the fact he had less than typical vision, the occurrence of the accident, and the ophthalmologist's report. The parties made cross motions for summary judgment. The Court concluded that the employee has a disability, or, alternatively, was regarded by the defendant as having a disability; that the employee can perform the essential functions of the job with or without reasonable accommodation; that there is no evidence of any investigation as to whether the employee's loss of eyesight contributed to the accident. (see 6 F.Supp.2d 1135 (D.Idaho 1998), copied separately)
23. Stevo v. CSX Transportation, Inc., 1997 U.S. Dist. LEXIS 16781 (N.D.Ill., October 23, 1997):  
The plaintiff, who was a switchman, and who had been engaged in yard work, suffered a herniated disk in 1991. He filed suit pursuant to the FELA. Although he was told on numerous occasions that he was free to return to work without restriction, the plaintiff declined to do so, fearing re-injury. In 1992 he was diagnosed as having degenerative lumbar spine disease with early stenosis, and, after treatment, was cleared to return to light duty, with instructions to increase activity over time. The defendant attempted to place the plaintiff in various positions, and to refer him to a vocational rehabilitation specialist, but he declined. In 1994 the plaintiff attempted to access the defendant's computer to check for job openings, but was denied permission because he had filed an FELA suit. In 1995 and 1996 the defendant continued to contact the plaintiff with reference to job placements, but the plaintiff was interested in sales and marketing positions. He also expressed interest in having the defendant sponsor his attendance at an MBA program. He eventually brought suit under the ADA, alleging that the defendant had discriminated against him based on his disability by restricting his access to the computer and failing to reasonably accommodate him, and claiming retaliation for having filed an ADA claim by refusing to hire him as an account executive or sponsoring him in the MBA program. The defendant moved for summary judgment. The Court held that the plaintiff had failed to show he was disabled; that the defendant had initiated the interactive process required by the ADA; that the plaintiff had failed to show he was a qualified individual; that the plaintiff failed to show that the had

suffered a materially adverse change in the terms or conditions of his employment; and that the plaintiff had failed to establish retaliation.

24. Amariglio v. National Railroad Passenger Corporation, 941 F.Supp. 173 (D.C.Cir., 1996): Plaintiff was a train attendant on coaches and sleeping cars. Following a suspension, the plaintiff was directed to report for a physical examination. The doctor concluded that the plaintiff had poorly controlled diabetes, and should not return to his former duties, but should work at a job with more regular hours. The defendant permits diabetics to work as train attendants so long as their diabetes is under control. Based on the medical reports, the defendant advised the plaintiff he was medically disqualified from work. Under the defendant's rules, a medically disqualified employee may seek to have the disqualification lifted by submitting documentation from his treating physician showing that his condition has improved. The defendant then arranges for a specialist to examine the employee, and if the examination confirms the improvement, the disqualification is lifted. The plaintiff never submitted a letter showing improvement, although the defendant attempted to obtain one by contacting the plaintiff's doctor and the plaintiff. The plaintiff filed a charge with the EEOC, alleging a violation of the ADA, alleging the defendant had discriminated against him by requiring fitness for duty examinations. The EEOC dismissed the complaint, and plaintiff filed suit. The Court allowed defendant's motion for summary judgment, finding that the defendant's conclusion that plaintiff's diabetes was not under control was reasonable. The Court also found that the defendant had met its duty to reasonably accommodate plaintiff by informing plaintiff of the procedures by which he could apply for a transfer or reassignment to a position with regular hours. Plaintiff did not apply for the transfer or reassignment.
25. Terry v. Norfolk Southern Railway Company, 948 F.Supp.1058 (N.D.Georgia, 1996): The plaintiff was a shop laborer, then a conductor who, by 1982, had been injured on the job three times, requiring multiple surgeries on his knee and the insertion of rods into his back. After the implantation of the rods the plaintiff received medical disability benefits. The plaintiff also received social security disability benefits, and represented that he usually needed help even to put on his shoes. The plaintiff was taking Percocet. A collective bargaining agreement provided that an employee who has been medically disqualified may return to work if improvement is verified in writing by a doctor and the employee is examined by a physician on behalf of the defendant. If the disqualification is affirmed the employee may notify the union and provide further written verification from his own doctor, and is also entitled to a three-doctor panel review. In 1989 the plaintiff sought to return to work, but the disqualification was affirmed, and plaintiff's request for the three-doctor panel was denied. The defendant felt that the implanted rods were a prosthetic, and as such the plaintiff failed to meet defendant's minimum medical standards for conductors. The plaintiff initiated the arbitration procedures mandated by the Railway Labor Act. The Public Law Board found that the defendant failed to meet minimum medical standards. The plaintiff then filed a complaint with the Office of Federal Contract Compliance, alleging violation of the Rehabilitation Act. The OFCCP concluded that the defendant had not violated the Rehabilitation Act. Plaintiff filed a charge of discrimination with the EEOC alleging violations of the ADA. The EEOC found for the defendant, and the defendant brought this action. The Court found the plaintiff was estopped from claiming he is a qualified individual with a disability. (But see Cleveland v. Policy Mgt. Syst. Corp., 526 U.S. 795, 119 S.Ct. 1597 (1999)).

26. Malascalza v. National Railroad Passenger Corporation, 1996 U.S. Dist. LEXIS 4198 (D. Del., March 12, 1996): This plaintiff, a car repairman, had been injured (apparently suffering some sort of back injury) and brought a claim under the FELA. As part of that claim, plaintiff's doctors testified he was disabled from working as a car repairman. The plaintiff and defendant settled that claim. The dispute arose over whether the settlement agreement provided that plaintiff be employed as a coach cleaner only, or whether the defendant might still be required to employ him in some other position, for example, by making a reasonable accommodation for him as a car repairman, his former position. The Court held that the settlement agreement did limit the defendant's obligation to employing plaintiff as a coach cleaner, using the principles of judicial estoppel.
27. Marschand v. Norfolk and Western Railway Company, 876 F.Supp. 1528 (N.D. Indiana, 1995); aff'd, 81 F.3d 714 (1996): Plaintiff was an engineer, and was the engineer of a train involved in an accident in which the train he was operating hit a pick-up truck, killing all three passengers. Although the plaintiff seemed fine, on the one-year anniversary of the accident he suffered a mental breakdown, and was diagnosed with Post Traumatic Stress Disorder. Thereafter, the plaintiff requested a return to work, and his doctor opined he could return to custodial or clerical duties. The defendant's chief clerk determined a clerical position was open, and referred the plaintiff for a fitness evaluation. The doctor affirmed that he could work as a yard clerk, and the plaintiff was given medical clearance. However, the plaintiff was unable to pass the required typing test, although he tried several times. The defendant, realizing that the plaintiff might never pass the test, referred the matter to the defendant's System Manager for Disability Support Services. The plaintiff filed a charge with the EEOC, alleging that he had been discriminated against in violation of the ADA. The defendant then contacted plaintiff's counsel, offering to pay for a typing class, and offering to find some other kind of position if the plaintiff would submit to aptitude testing. The plaintiff took the typing class, but could not pass the test. The railroad then waived the typing test, and offered a position to the plaintiff which plaintiff accepted. The Court allowed defendant's motion for partial summary judgment on plaintiff's FELA claim, finding that the plaintiff could only recover for that emotional distress caused by fear for his own safety in the accident. The court found that the plaintiff failed to make out a colorable ADA claim.
28. Jones v. Illinois Central Railroad Company, 859 F.Supp. 1144 (N.D. Ill., 1994): The plaintiff brought a claim under the ADA alleging the defendant had refused to accommodate his work-related shoulder injury. The plaintiff also brought an FELA claim in state court. The Court dismissed the ADA claim, holding that it should be heard with the FELA claim in state court.
29. Julian v. New York City Transit Authority, 857 F.Supp. 242 (E.D.N.Y. 1994): The plaintiff was a railroad clerk who was promoted to train operator. She injured her back while training for her new job, and did not return to work. The Transit Authority medical services department found her permanently disabled from performing the duties of a train operator. The plaintiff received workers' compensation benefits, and applied for accident disability retirement. Ultimately, the plaintiff's application was denied, but through a bureaucratic mix-up she was denied her appeal rights. The plaintiff hired an attorney, who secured a stipulation from the defendant to reinstate plaintiff so that she could file an application for disability retirement and accident disability retirement benefits. These were denied, and the

plaintiff filed an action in state court, claiming the defendant had failed to abide by the agreement. The state court found they had complied. The plaintiff then filed this action against myriad defendants, claiming employment discrimination based on race, gender, age, marital status and disability. The Court dismissed all of the plaintiff's claims, finding, among other things, that she had failed to file a complaint with the EEOC, as required prior to bringing a Title VII action.

30. Verdon v. Consolidated Rail Corporation, 828 F.Supp. 1129 (S.D.N.Y. 1993): The plaintiff worked as a trainman when he claimed that he took a medical leave of absence starting in 1978, in order to obtain drug treatment. While he was absent, his employer, Conrail, was relieved of its responsibility to provide commuter rail service, and the commuter line for which plaintiff allegedly worked was transferred to Metro-North. An implementation agreement was put in place providing for seniority rights and procedures for employees who were on disability or other leave when the commuter service was transferred to Metro-North. In 1986 plaintiff claimed to have been fully rehabilitated, and claimed to be ready to return to work. The dispute arose when the plaintiff attempted to obtain the position of assistant conductor (roughly equivalent to his former position of trainman) at Metro-North pursuant to the implementation agreement. Apparently, Conrail did not have full documentation of the plaintiff's position and status with Conrail. The plaintiff brought suit for violation of his rights under the implementation agreement and under §1145 of the NRSA, and for violation of his constitutional rights pursuant to 42 U.S.C. §1983 and the Fourteenth Amendment. The Court dismissed all of the plaintiff's claims, finding, among other things, that the Court lacked jurisdiction over the claims arising under the implementation agreement and NRSA, that the defendant had not deprived plaintiff of due process, and that the §1983 claims are time-barred. Further, plaintiff's attempt to add an ADA claim and a claim under the New York Human Rights Act was denied where the ADA did not come into effect until after the events complained of, and the human Rights Law claim was time barred. Interestingly, the Court imposed Rule 11 sanctions on plaintiff's attorney.
31. Sizemore v. Consolidated Rail Corporation, 56 Fed.Appx. 582, 2003 U.S.App.LEXIS 952 (3<sup>rd</sup> Cir., January 16, 2003): Plaintiff worked as a yardmaster and as acting trainmaster, a position of greater responsibility. Plaintiff suffered from a hearing impairment corrected by hearing aids. He alleged that the defendant did not hire him for a permanent position as trainmaster because it regarded him as disabled. Plaintiff's ADA claim failed because he did not produce evidence showing that defendant's employment decisions were based on a perceived disability.
32. Payne v. Consolidated Rail Corporation, 2000 U.S.Dist.LEXIS 1488 (E.D.Pa., February 10, 2000): Plaintiff was an engineer. Periodic hearing examinations showed he had suffered a high frequency hearing loss, and plaintiff was told to wear a hearing protector. Following a complaint that plaintiff could not hear, plaintiff was sent home, and was then required to report to the head of defendant's hearing program. The head of the hearing program cleared him to return to work. The trainmaster was present at this meeting, and told the superintendent that plaintiff had been cleared for work. Nevertheless, the trainman reported that the superintendent had instructed him to get rid of the plaintiff, and plaintiff was told to leave. The plaintiff brought suit pursuant to the ADA and the Rehabilitation Act. The plaintiff, who had been a member of a class action that was subsequently decertified, had never filed a charge of discrimination with the EEOC or any other administrative agency.

The Court found that the plaintiff did not have to exhaust his administrative remedies under the Rehabilitation Act, but that his ADA claim was precluded.

33. D'Amato v Long Island Railroad Co., 2001 U.S. Dist. Lexis 6768 (S.D.N.Y., May 23, 2001): In 1996 the plaintiff suffered from smoke inhalation while working on one of defendant's trains, exacerbating plaintiff's preexisting health problems. He also suffered a heart attack, and alleged that, as a result, he was limited with regard to walking, standing, and lifting. He alleged the defendant failed to accommodate his request to be transferred to a sedentary position. Plaintiff had been an assistant conductor. All assistant conductors were required to pass a series of tests. Upon passing, they were promoted to full conductor, but after repeated failures they were terminated. Plaintiff was unable to pass one of the tests. Prior to being notified of his termination, plaintiff requested the health-related transfer. The defendant informed the plaintiff that due to his less than satisfactory service record, he would not be considered for another position. Plaintiff filed a complaint with the EEOC and brought suit under the ADA. The Court held that the claim was not preempted by the Railway Labor Act, and that there was a genuine issue of material fact as to whether plaintiff had a disability and was otherwise qualified.
34. Cade v. Consolidated Rail Corporation, 2002 U.S. Dist. LEXIS 8131; 13 Am. Disabilities Cas. (BNA) 1684 (E.D.Pa., May 7, 2002): The plaintiff alleged that the defendant discriminated against her in violation of the ADA and the Rehabilitation Act. Plaintiff alleged defendant refused to return her to her former job as a block operator, or to reasonably accommodate her right knee condition and astigmatism in her left eye. As a result of two knee injuries suffered at work plaintiff stopped working because climbing the block tower stairs aggravated her knee. Plaintiff filed an FELA action during which she testified that she could not climb stairs, but could work in some other capacity. The FELA claim was settled. Plaintiff's condition improved to the point where she could climb stairs, but not frequently. Plaintiff notified the defendant that she wanted to return to work as a block operator. She was seen for a back to work physical. Although the doctor essentially cleared her for work, plaintiff did not return to work (plaintiff claimed she notified defendant of her desire to return to work, but received no response). Defendant was terminated. The Court found that plaintiff was not disabled, nor did Conrail regard her as being disabled, and granted defendant's motion for summary judgment.
35. McCuin v. The Burlington Northern And Santa Fe Railway Company, 2002 U.S. Dist. LEXIS 24021 (N.D.Tx, December 11, 2002): The plaintiff, a carman and forklift operator, fainted while at work. The defendant told him he was being withheld from service pending medical evaluation. A medical evaluation indicated that he could return to full work status, but with certain permanent restrictions. The defendant's field manager of clinical and rehabilitation services had some questions about the doctor's letter, and received a further note with a cardiology evaluation. Despite further requests for information, the doctor did not send further information to the defendant. Eventually, the plaintiff sent test results to the defendant, and he was cleared to return to work, although he had not done so. Plaintiff's claims for wrongful termination and breach of the labor agreement were preempted by the Railroad Labor Act, and there was no evidence that plaintiff's race, age, or perceived disability played a role in the defendant's delay in allowing plaintiff to return to work.
36. Johnson v. Norfolk Southern Corporation, 2003 U.S. Dist. LEXIS 4674 (N.D.Ill., March 25, 2003): The plaintiff was a locomotive engineer who began suffering from knee pain, causing

difficulty with walking, and making it difficult for him to fully straighten his leg. The plaintiff went to the Union Health Service complaining of the pain. The doctor told him to take 3 days off from work. When he tried to return to work the trainmaster told him that he needed a release from his doctor. He was examined, and although he was observed to be limping, the doctor released him for work based on his statement that his job entailed sitting “on my rump” all day. The plaintiff returned to work, but was observed having problems walking. The Occupational Health Nurse said he should have a physical examination, as his job required walking on uneven terrain and climbing into the locomotive. The Assistant Superintendent interpreted this instruction to mean that the plaintiff could not work until after he had the examination, and held him out of service. The plaintiff was examined and released to perform the essential functions of an engineer. At a meeting between the plaintiff and the Superintendent during which the plaintiff sought pay for the days he was out of service, the Superintendent noticed his limp, and took him out of service, citing safety concerns. The plaintiff was put on “medical hold” pending a determination of his fitness for duty. Ultimately, the plaintiff’s doctor signed a note that he could return to work, but the defendant was not sure the doctor knew the essential duties of the work. After further delays regarding the obtaining of records, the plaintiff was cleared for work, although he was not paid for the time he was on medical hold. The Court found that the plaintiff was unable to demonstrate an actual disability (the impairment was too minor and temporary), nor was there evidence that he was regarded as disabled, and summary judgment was entered against him.

37. Lundberg v. Burlington Northern and Santa Fe Railway, 2003 U.S. Dist. LEXIS 10393 (D. Minn., June 17, 2003): The plaintiff was a trainman/yardman who suffered three work-related injuries: a hernia, corrected by surgery, and two reinjuries. After the third injury the plaintiff no longer worked as a switchman because she could not ride on rail cars or throw track switches. Plaintiff trained to work as a hump foreman, a desk job, and as a switch tender. In 1995 plaintiff brought an FELA claim, that was settled in 1996. In 2000 the plaintiff underwent surgery to repair a ruptured bowel, and was placed on a 30-pound lifting restriction. Plaintiff sought to go on the switchperson’s extra board, which is comprised of five positions. The purpose of the extra board was to cover openings in the core jobs of switchperson and switch foreman, which comprised 80% of the positions filled by the extra board. The extra board also filled positions of hostler, switch tender and hump foreman. Defendant did not permit her onto the extra board because she could not perform these core jobs. Plaintiff filed a charge with the EEOC, which determined that the defendant’s policies violated the ADA. Plaintiff was allowed to work on the extra board until 2002. At some point she was informed that her pay would be cut so that she no longer received guaranteed pay for days when she could not perform a job due to her physical restrictions. Plaintiff brought suit under the ADA and the Minnesota Human Rights Act, and also sought rescission of the FELA settlement agreement. The Court found that the lifting restriction and hernia were temporary, and were not a disability, and dismissed the disability claims. The Court also dismissed her claim of mutual mistake with reference to the settlement agreement.
38. Rodgers v. Norfolk Southern Corporation, 304 F. Supp.2d 961 (S.D. Ohio, 2003): Plaintiff was a locomotive engineer, classified as an “extra board” engineer, meaning that he was on call to cover for regular engineers. Plaintiff was diagnosed with Hepatitis C in 1999, and began a medical leave. Plaintiff’s doctor noted that plaintiff’s condition causes fatigue, and that he should be permitted to rest between eight hour runs for a period of 8-12 hours.

Plaintiff was also diagnosed with rheumatoid arthritis. Plaintiff was cleared for work, limited one trip with time off between trips. Defendant informed plaintiff that it could not accommodate her, and told her to update her information when her doctor releases her without restrictions. She was later told to obtain a work release indicating any restrictions. Extra board engineers are required to conduct runs that regularly exceed eight hours. Plaintiff filed a timely EEOC charge. The Court found that plaintiff did have a physical impairment under the ADA, but that there was no evidence that the impairment disqualified her from a broad class of similar jobs, and so she was not limited in the major life activity of working. The court also found that plaintiff was not regarded as substantially limited in her ability to perform a broad range of jobs. Her claim was dismissed.

39. Eckhaus v. Consolidated Rail Corporation, 2003 U.S. Dist. LEXIS 25045 (D.N.J., December 24, 2003): Plaintiff applied for a job as a train person. The duties of a train person include relaying oral and written instructions, communicating signals to co-workers, and recognizing audible signals or warnings. Plaintiff received an offer, and underwent a pre-employment medical examination. At the examination, plaintiff was found to have a hearing deficit, and hearing aids were recommended. Initially, plaintiff did not obtain the hearing aids because she thought she had passed the exam. Plaintiff was sent to a three-week training program, which she attended, and passed the final exam. During the training course plaintiff was told that her medical records appeared to be under review. Plaintiff provided the defendant with some audio test results, and was informed by defendant that she needed to be fitted with hearing aids and retested. Plaintiff obtained the hearing aids, and was found to hear well when they were in place. She was found qualified to work as a train person with three restrictions: she had to wear a hearing aid; she had to wear an electronic headset when near a moving train; she should avoid exposure to noises over 80 decibels when wearing her hearing aid. Plaintiff reported for work. Her new supervisor observed that she seemed to have trouble hearing and understanding him, and conducted a field test. The supervisor had her listen to the kind of portable radio equipment used by train persons, and asked plaintiff to repeat back what she heard. Based on that field test, the supervisor informed her that her employment was terminated. Plaintiff claimed that defendant ignored her requests for assignment to another position. Plaintiff filed claims with the EEOC and the N.J. Division of Civil Rights. She then brought suit against the railroad and her supervisor under the ADA, and also for age discrimination (ADEA) and for intentional infliction of emotional distress. The Court dismissed her claims, finding that, both with and without the hearing aids, she was not disabled under the ADA, that she had failed to show that either defendant regarded her as being substantially limited in one or more major life activities, and failed to show defendant had failed to accommodate her. The Court also found that the plaintiff could not bring suit against the individual supervisor under the ADA or the ADEA because he was not an “employer,” and she failed to show sufficiently extreme conduct to sustain her suit for intentional infliction of emotional distress.
40. Smith v. Union Pacific Railroad, 2004 U.S. Dist. LEXIS 2101 (N.D. Ill., February 5, 2004): The plaintiff, who had been furloughed, accepted a transfer to a position as a conductor/brakeman in a different seniority district. The plaintiff had an undisclosed history of depression. After beginning work there as a trainee, the plaintiff began to miss days of work, and then stopped reporting altogether. A manager of Manpower Planning called his home and left a message for the plaintiff to call him regarding his status, but plaintiff claimed never to have received the message. The plaintiff was marked “EA,” meaning “evading

assignment,” pending some communication from the plaintiff. The plaintiff eventually called a representative of the Union Employee Assistance Program. The plaintiff told the Representative that he was suffering from depression, was being treated, and needed information about how to take time off from work. The Representative told him he needed to contact a local manager and to contact his service unit (the plaintiff did not want the Union’s EAP to open a file on him). The plaintiff then sent a letter to the General Superintendent of his unit, informing him that he should not be marked “EA” because he was out sick, and was undergoing treatment. Several months later, the plaintiff’s therapist sent a letter to the union representative, informing him that the plaintiff was experiencing a major depressive episode, and that he could not work, although he was currently functioning well, but might need additional time off. The Representative did not understand this to be a request for accommodation. The plaintiff was eventually terminated. The plaintiff wrote a letter challenging the termination, and then brought suit under the ADA. The Court concluded that the plaintiff did suffer a mental impairment and that there was a genuine issue of material fact as to whether it substantially limited a major life activity. However, the Court found that he was not a qualified individual under the ADA, and allowed the defendant’s motion for summary judgment.

41. Roberts v. Union Pacific Railroad Company, 16 Fed.Appx. 730, 2001 U.S.App.LEXIS 17990 (9<sup>th</sup> Cir., August 6, 2001): Plaintiff was discharged for theft. After his discharge he was diagnosed with diabetes, hypoglycemia, high blood pressure, and poor impulse control. He was also diagnosed as having suffered a series of small strokes. Plaintiff sought long-term disability benefits and vacation pay, claiming he was disabled prior to his termination. While the past due vacation pay was ultimately paid, the plaintiff brought suit for breach of contract and discrimination under the ADA. The District Court granted summary judgment on the grounds that he had failed to exhaust administrative remedies, and had failed to show disability discrimination. The Court of Appeals affirmed, finding that the defendant did not act arbitrarily or capriciously when it denied plaintiff’s benefits, and finding that the plaintiff failed to timely file a complaint with the EEOC or with the local state agency (he had filed with the Idaho Human Rights Commission, but the statute of limitations had run).
42. Peterson v. Burlington Northern and Santa Fe Railway, 15 Fed.Appx. 378, 2001 U.S.App.LEXIS 15098 (8<sup>th</sup> Cir., 2001): The plaintiff was not permitted to return to work for 30 months following a medical leave of absence. Plaintiff had suffered a head injury, and had taken sick leave. His FELA claim was settled. When he subsequently sought to return to work the defendant refused, claiming the FELA settlement, in which the plaintiff had claimed a permanent disability, meant that the plaintiff was no longer employed by the defendant. At plaintiff’s request a Union official interceded on his behalf, and obtained permission for plaintiff to return to work pending a medical release by the defendant’s medical department. The defendant convened a Medical Board inquiry, and recommended that he be returned to active duty. Plaintiff resumed working, but brought suit under the ADA for damages. The Court agreed with the District Court’s assessment that even assuming plaintiff to be disabled, the defendant had articulated a legitimate reason for its treatment of the plaintiff, and there was no evidence of pretext. The grant of summary judgment to the defendant was affirmed.

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