

ATOP-R&D

Human Factors Newsletter # 05-02

January 15 – February 4, 2005

Technical Note: Gas Chromatographic/Mass Spectrometric Differentiation of Atenolol, Metoprolol, Propranolol, and an Interfering Metabolite Product of Metoprolol. Mike K. Angier, Russell J. Lewis, Arvind K. Chaturvedi, and Dennis V. Canfield. Civil Aerospace Medical Institute (CAMI), Oklahoma City, OK.

Executive Summary. Pilots who successfully control their hypertension with medication, diet, and/or exercise can be medically certified to fly aircraft. However, these pilots are considered hypertensive and are closely monitored by the FAA to ensure that their hypertension is properly controlled. Approximately 8% of active pilots fall under the category "hypertensive with medication." During the investigation of fatal civil aviation accidents, postmortem samples obtained from pilots are submitted to CAMI for toxicological evaluation. During such evaluation, biological samples are analyzed for prescription and nonprescription drugs, and it is common to find beta-blocker antihypertensives such as atenolol, metoprolol, and propranolol. This observation is consistent with the fact that 28.7% of the U.S. general population have been diagnosed with hypertension, and these antihypertensives have been in the lists of the top 200 drugs dispensed in the U.S. Over a 10-year period (1993-2002), the FAA Bioaeronautical Sciences Research Laboratory identified 50 pilot fatalities with biological samples containing atenolol, metoprolol, and propranolol. In a few of the 50 pilot fatality cases, initial analysis suggested the presence of atenolol and metoprolol. However, there was no medical history with these cases supporting the use of both drugs. Therefore, atenolol, metoprolol, and/or propranolol, with their possible metabolite(s), were re-extracted from the selected case specimens, derivatized with pentafluoropropionic anhydride (PFPA), and analyzed by gas chromatography/mass spectrometry (GC/MS). The MS spectra of these antihypertensives and a metoprolol metabolite are nearly identical. All of the PFPA derivatives had baseline GC separation, with the exception of a metoprolol metabolite product, which co-eluted with atenolol. There were four primary mass fragments (408, 366, 202, and 176 m/z) found with all of the PFPA-beta-blockers and with the interfering metabolite product. However, atenolol has three unique fragments (244, 172, and 132 m/z), metoprolol has two unique fragments (559 and 107 m/z), propranolol has four unique fragments (551, 183, 144, and 127 m/z), and the metoprolol metabolite product has two unique fragments (557 and 149 m/z). These distinctive fragments were further validated by using a computer program that predicts logical mass fragments and performing GC/MS of deuterated PFPA-atenolol and PFPA-propranolol and of the PFPA-alpha-hydroxy metabolite of metoprolol.

By using the unique mass fragments, none of the pilot fatality cases were found to contain more than one beta-blocker. Therefore, these mass ions can be used for differentiating and simultaneously analyzing these structurally similar beta-blockers in biological samples.

Researchers developed a method that will differentiate common anti hypertensive medications found in pilots. They did this to provide accurate and reliable data to aviation accident investigators and to provide aviation medical staff with information on hypertensive pilots involved in fatal aviation accidents. This new method has been implemented for use in the routine analysis of specimens from aviation accidents. This research supports the Administrator's Flight Plan Goal for Increased Safety, Objectives 1 and 2: Reduce the commercial fatal accident rate; Reduce the number of fatal accidents in general aviation.

Point of Contact: D. Canfield, CAMI

New Human Factors Subscriber Service: The ATO-P Human Factors Research, Engineering and Development Division created a "Yahoo Group" to provide a communication network for information exchange among human factors professionals. This is a follow on to the earlier implementation of the Human Factors Workbench (<u>http://www.hf.faa.gov/Portal/default.aspx</u>) which makes human factors products, processes, and other relevant human factors information available on-line. The "Yahoo Group" subscriber service is a discussion forum to share human factors information or pose inquiries related to human factors research and engineering in the FAA. Membership and participation are voluntary. Communications (both distributing and requesting information) in the following areas is invited:

- FAA human factors policies
- Human factors training
- Human factors processes, procedures, and best practices
- Human factors methodology, tools, and techniques
- Human factors publications, literature, and papers
- Other relevant issues related to the field of human factors

You are invited to join this group and help make this forum a valuable resource. The group name is: FAA_Human_Factors. Register at <u>http://groups.yahoo.com/group/FAA_Human_Factors/</u> to join the group or send an e-mail to Pratik Jha at <u>pratik.jha@titan.com</u> for assistance. This activity supports the Administrator's Flight Plan Goal for Organizational Excellence, Objective 3: Make decisions based on reliable data to improve our overall performance and customer satisfaction. (G. Hewitt, ATOP-R&D)

Risk Assessment: CAMI researcher Carla Hackworth will attend the Society of Safety Engineers Hazard Analysis and Risk Assessment Training Course in Las Vegas, NV. The objectives of the course include learning about practical information on the system safety approach. Additionally, the course includes information on identifying hazards that threaten employees and equipment, and techniques for assessing risks. This research activity supports the Administrator's Flight Plan Goal for Safety, Objectives 2 & 7: Reduce the number of fatal accidents in general aviation; Enhance the safety of FAA's air traffic systems. (C. Hackworth, CAMI) **Award**: The Flight Safety Foundation selected our nominee, Dr. Christopher Wickens, for their 2005 Flight Safety Foundation/Airbus Human Factors Award. The award will be presented at the March 14-16, 2005 Annual European Aviation Safety Seminar to be held in Warsaw. For more than three decades, Dr. Christopher Wickens' research in aviation human factors has supported the nation's aviation safety goals. As head of the prestigious Aviation Research Laboratory at the University of Illinois, he developed partnerships with the FAA, industry and other academic laboratories that have produced significant research in aircraft flight operations, flight training, simulation technology, and aviation education, including theoretical and applied areas. His applied research has led to changes in heads-up displays, while his theoretical research has investigated human attention and cognition. Dr. Wickens' impact on the aviation research community has been pervasive and broad-based.

Dr. Wickens primary research interests focus on the relevance of principles and theories of human attention to the design of complex systems, particularly aviation systems, with which humans must interact. He has authored or co-authored seven textbooks, 146 articles or book chapters, 152 technical reports, 200 publications from professional meetings and presentations, and has given 75 symposia or invited presentations. In 1997 and 1998, as chair of the FAA's Panel on Human Factors in Air Traffic Control Automation, he co-authored *Flight to the Future: Human Factors in Air Traffic Control* and *The Future of Air Traffic Control: Human Operators and Automation*, published by the National Academy of Science. (P. Krois, ATOP-R&D)

Laboratory Tour: On February 1st, Japanese Civil Aviation Bureau personnel visited the William J. Hughes Technical Center. The visitors toured human factors research laboratories and received a briefing on research capabilities and key projects. Demonstrations of simulation capabilities and weather display alternatives were also provided. (E. Stein, WJHTC)

Traffic Flow Management (TFM) Development: Researchers at the William J. Hughes Technical Center continue work on TFM. The primary goal of TFM is to optimize the flow of air traffic while maintaining a safe operating environment. During the past several years, many new systems and automated tools have been introduced into the TFM unit. A research psychologist from the NAS Human Factors Group will attend a briefing on the results of a Volpe study of human factors challenges for TFM. The study was conducted by Dr. Eric Nadler. Researchers will also work with the TFM management team to evaluate the impact of the findings on current and future TFM programs. This research supports the Administrator's Flight Plan Goal for Safety, Objective 7: Enhance the safety of FAA's air traffic systems. This research also supports the Administrator's Flight Plan Goal for Greater Capacity, Objective 1: Increase capacity to meet projected demand. (T. Yuditsky, WJHTC)

ATC Training: In response to a request from AHR-1 in late December 2004, CAMI researcher Dana Broach began retrospective analyses of Air Traffic Control Specialist (ATCS) screening and training outcomes. The focus is on individuals age 31 or older with initial entry into the FAA Academy ATCS screening programs between 1981 and 1992. The analyses were completed in January 2005 to support a workgroup to be convened in February 2005 by Dr. Jay Aul (AHR-5). The workgroup will review the policy on current maximum age at entry. This research supports the Administrator's Flight Plan Goal for Organizational Excellence, Objective

1: Make the organization more effective with stronger leadership, increased commitment of individual workers to fulfill organization-wide goals, and a better prepared, better trained, safer, diverse workforce.(D. Broach, CAMI)

HFACS: Scott Shappell will be providing the keynote address at the Medicine in Challenging Environments Conference at the University of Texas Medical Branch in Galveston, TX. The presentation entitled "Human Factors in Aviation" will review the status of recent research regarding Human Factors Analysis and Classification System (HFACS) analyses of general and commercial aviation accidents. HFACS was developed as a taxonomic system to categorize both the latent and immediate causal factors that have been identified in aviation accidents. Its purpose is to provide a framework for use in aviation accident investigations and as a tool for assessing accident trends. This research activity supports the Administrator's Flight Plan Goal for Safety, Objectives 1 &2: Reduce the commercial fatal accident rate; Reduce the number of fatal accidents in general aviation. (D. Schroeder, CAMI)

Laboratory Visit: At the request of the Office of Knowledge Management (ACK-1), personnel from the William J. Hughes Technical Center's NAS Human Factors Group provided a laboratory tour for Kelvin Coleman, Special Assistant for Programs and Planning, Commercial Space Transportation. Researchers also presented a briefing on Terminal Radar Approach Control Weather Information Requirements, Traffic Management Advisor Information Presentation, and the Future En Route Workstation. (P. Della Rocco, WJHTC)

UAVs: Engineering Research Psychologists from the William J. Hughes Technical Center's NAS Human Factors Group consulted with a representative of the US Coast Guard about the design of a Ground Controller Workstation for Unmanned Aerial Vehicles (UAVs). They also provided documentation about air traffic control workstations and examples of the details needed to design a usable computer-human interface. Following the meeting, the Coast Guard representative was referred to other researchers who have conducted research on human factors issues in UAVs. (M. McAnulty, WJHTC)

NAS Modeling: Personnel from the William J. Hughes Technical Center's NAS Human Factors Group attended a meeting on NAS modeling at the request of the Office of Knowledge Management (ACK-1). The meeting was organized to explore continuing working toward better models. Ben Willems presented information on his work with NASA-Ames on cognitive models of air traffic controllers. This research activity supports the Administrator's Flight Plan Goal for Safety, Objective 7: Enhance the safety of FAA's air traffic systems. (E. Stein, WJHTC)

Traffic Management Tools: Research Psychologists from the William J. Hughes Technical Center's NAS Human Factors Group are supporting meetings of the National Traffic Management Log (NTML) Working Group and the Traffic Management User Team. During the meetings, the psychologists are working with the user teams and software developers to evaluate and design displays for Traffic Management tools. Some of the capabilities to be addressed include coordination and documentation of Reduced Vertical Separation Minima requests, and monitoring of conformance with issued reroutes. The psychologists are providing human factors expertise in resolving issues such as inconsistency in the design of Enhanced Traffic Management System filters, and improving the readability of NTML displays. This research

supports the Administrator's Flight Plan Goal for Safety, Objective 7: Enhance the safety of FAA's air traffic systems. This research also supports the Administrator's Flight Plan Goal for Greater Capacity, Objective 1: Increase capacity to meet projected demand. (T. Yuditsky, WJHTC)

R&D Review On-Line: The latest issue of R&D Review is now on-line at

<u>http://research.faa.gov/docs/newsletters/rdreview_fall_2004.pdf</u>. (Note that the issue is slow to load on-line because of the large number of high-resolution photos.) This issue includes a message from the Director of Aviation Research and Development talking about the importance of the R&D program, as well as:

- · A Look at FY 2004
- · Making Winter Flying Safe
- Protecting Passengers and Crew
- · Lighting the Way
- · Wake Turbulence R&D

Point of Contact: Terry Kraus, ATOP-R&D

More information on human factors research can be found at the FAA Human Factors (ATOP-R&D) web site: <u>http://www.hf.faa.gov</u>

Paul Krois FAA (ATO-P R&D Human Factors)



February 16-17, 2005 – World Aerospace Symposium, Pierre Baudis Toulouse Congress Center, Toulouse, France <u>http://www.aviationweek.com/conferences/meu_e3.htm</u>

March 6-8, 2005 – Air Cargo 2005, Hotel del Coronado, San Diego, CA <u>http://www.aircargoconference.com</u>

March 14-16, 2005 – Centers of Excellence 4th Annual Joint Meeting, Radisson Hotel, Orlando, FL

March 14-16, 2005 – Flight Safety Foundation 17th Annual European Aviation Safety Seminar, Warsaw, Poland <u>http://www.flightsafety.org/eass05_preagenda.html</u>

March 17-18, 2005 – Aviation and Environment Summit, Crowne Plaza, Geneva, Switzerland <u>http://www.iata.org</u>

March 17-18, 2005 – FAA Aviation Forecast, Washington Convention Center, Wash, DC apo.faa.gov/Conference/welcome.htm

April 2-7, 2005 – CHI 2005, Portland, OR *chi2005-chair@acm.org*.

April 5-7, 2005 – Aviation Testing Expo 2005: Scientific Conference and Technology Forum, Europe, Messe Hamburg, Germany <u>http://www.aerospacetesting-</u> <u>expo.com/northamerica/conf+forum.html</u>

April 11-15, 2005 – SAE 100th Anniversary World Congress, Cobo Hall, Detroit, MI <u>http://www.sae.org/congress/about/news/congressdates.htm</u>

April 12-13, 2005 – R,E&D Advisory Committee Meeting, Bessie Coleman Auditorium, FAA Headquarters, Wash., DC <u>Gloria.dunderman@faa.gov</u>

April 12-18, 2005 – Sun 'n Fun 2005, Lakeland, FL http://www.sun-n-fun.org/

April 17-22, 2005 – International Federation of Air Traffic Controller's Associations, Melbourne, Australia <u>http://www.ifatca.org/conferences/annual_conference.htm</u>

April 18-21, 2005 – 13th International Symposium on Aviation Psychology (ISAP), Cox Convention Center, Oklahoma City, OK <u>http://www.wright.edu/isap/</u>

April 26-28, 2005 – Flight Safety Foundation 50th Annual Corporate Aviation Safety Seminar, Orlando, FL <u>http://www.flightsafety.org/cass05_preagenda.html</u>

April 28-29, 2005- Mini-Conference on Human Factors in Complex Sociotechnical Systems, hosted by HFES South Jersey Chapter, Atlantic City, NJ, <u>http://www.sjhfes.org/</u>

May 9-12, 2005 - 76th Annual Scientific Meeting of the Aerospace Medical Association, Kansas City, MO <u>http://www.asma.org/</u>

May 23-26, 2005 – DoD TAG (Human Factors Engineering Technical Advisory Group), Marriott Bay Point Resort Golf and Yacht Club, Panama City, FL <u>http://hfetag.dtic.mil/meetschl.html</u>

May 26-29, 2005 – American Psychological Society 17th Annual Convention, Westin Century Plaza Hotel, Los Angeles, CA <u>http://www.psychologicalscience.org/convention/</u>

June 2005 – 6th USA/Europe ATM Seminar, Baltimore, MD (note: call for papers deadline is January 28, 2005) <u>http://atmseminar.eurocontrol.fr/</u>

June 13-19, 2005 - Paris Air Show 2005, Parc des expositions de Paris Nord - Le Bourget, 93350, France. <u>www.paris-air-show.com</u>

June 20-22, 2005 – 3rd Human System Integration Symposium, Sheraton National Hotel, Arlington, VA <u>http://www.navalengineers.org/Events/HSIS2005/HSIS05Index.html</u> June 27-30, 2005 – TRB 3rd International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design, Rockport, Maine

June 28-30, 2005 – AAMI Human Factors, Ergonomics, and Patient Safety for Medical Devices, Capital Hilton, Washington, DC <u>http://www.aami.org/meetings/hf/</u>

July 22-28, 2005 – HCI International 2005, 11th International Conference on Human-Computer Interaction, Caesars Palace, Las Vegas, NV <u>hcii2005@ecn.purdue.edu</u>

July 25-31, 2005 – EAA AirVenture Oshkosh 2005, Oshkosh, WI http://www.airventure.org

August 15-18, 2005 - 43rd AIAA Aerospace Sciences Meeting and Exhibit, Hyatt Regency San Francisco at Embarcadero Center, San Francisco, CA <u>http://www.aiaa.org/</u>

August 18-21, 2005 - 113th Convention of the American Psychological Association, Wash, DC <u>http://www.apa.org/convention</u>

August 22-26, 2005 – SAE G-10 (Behavioral Engineering Technology Committee Meeting, Washington, DC <u>http://forums.sae.org/access/dispatch.cgi/TEAG10_pf</u>

September 12-16, 2005 – Interact 2005, Tenth IFIP TC13 International Conference on Human-Computer Interaction, Rome, Italy <u>http://www.interact2005.org/</u>

September 19-23, 2005 – ANA 2005 Aviation Conference and Exhibition, Connecticut Convention Center, Hartford. CN <u>http://www.aerospace-na.com/ace2005.asp</u>

September 20-21, 2005 - R,E&D Advisory Committee Meeting (joint meeting with NASA's Aerospace Research Advisory Committee), Bessie Coleman Auditorium, FAA Headquarters, Wash., DC <u>Gloria.dunderman@faa.gov</u>

September 25-28, 2005 - 11th Ka and Broadband Communications Conference and 23rd AIAA International Communications Satellite Systems Conference 2005 (organized by IIC), Aurelia Convention Center, Rome, Italy <u>http://www.aiaa.org/</u>

September 26-28, 2005 - AIAA 5th Aviation, Technology, Integration, and Operations Forum (ATIO), Hyatt Regency Crystal City, Arlington, VA <u>http://www.aiaa.org/</u>

September 26-28, 2005 - AIAA 2nd Intelligent Systems Conference (IS), Hyatt Regency Crystal City, Arlington, VA <u>http://www.aiaa.org/</u>

September 26-30, 2005 – Human Factors and Ergonomics Society 49th Annual Meeting, Royal Pacific Resort at Universal Orlando, Orlando, FL <u>http://hfes.org/meetings/menu.html</u>

October 3-6, 2005 – SAE 2005 AeroTech Congress and Exhibition, Gaylord Texan Resort and Convention Center, Dallas/Fort Worth Airport Area, Texas <u>http://www.sae.org/events/conferences/aerospace/</u> **October 6-9, 2005** – Aviation North Expo Conference, Fairbanks Princess Riverside Lodge, Fairbanks, AK <u>www.AviationNorth.org</u>

October 24-25, 2005 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, <u>*DC http://wwwsearch.nationalacademies.org/*</u>

October 30—November 3, 2005 – 24th Digital Avionics Systems Conference, Hyatt Regency Crystal City, Wash., DC <u>http://www.dasconline.org</u>

November, 2005 – DoD TAG (Human Factors Engineering Technical Advisory Group) Meeting, Baltimore, MD <u>http://hfetag.dtic.mil/meetschl.html</u>

November 6-9, 2005 - ACI World / Pacific Conference and Exhibition, Auckland, New Zealand. <u>www.auckland-airport.co.nz</u>

November 7-10, 2005 – Flight Safety Foundation 58th Annual International Air Safety Seminar, Moscow, Russia <u>http://www.flightsafety.org/iass05_cfp.html</u>

November 8-10, 2005 – Aerospace Testing Expo, North America: Scientific Conference and Technology Forum, Long Beach Convention Center, Long Beach, CA http://www.aerospacetesting-expo.com/northamerica/conf+forum.html

January 9-12, 2006 - 44th AIAA Aerospace Sciences Meeting and Exhibit, Reno Hilton, Reno, NV <u>http://www.aiaa.org/</u>

January 22-26, 2006 – TRB 85th Annual Meeting, Washington, DC <u>http://trb.org/calendar/</u>

August 10-13, 2006 – American Psychological Association Annual Meeting, New Orleans, LA <u>http://www.apa.org/convention05/future.html</u>

Note: Calendar events in Italics are new since the last Newsletter



Comments or questions regarding this newsletter? Please contact Bill Berger at (334) 271-2928 or via e-mail at <u>bill.ctr.berger @faa.gov</u> *Note:* Calendar events in Italics are new since the last Newsletter



Comments or questions regarding this newsletter? Please contact Bill Berger at (334) 271-2928 or via e-mail at <u>bill.ctr.berger @faa.gov</u>