711th Human Performance Wing

Mission Overview to Defense Health Board

November 6, 2014

Commander
711th Human Performance Wing
Air Force Research Laboratory

Integrity ★ Service ★ Excellence
Advance Human Performance in Air, Space, and Cyberspace through Research, Education, and Consultation

Leading synergy across science and technology, aerospace medicine, and human systems integration
At a Glance

• Activated in 2008 under Air Force Research Laboratory

• Synergizes three distinct missions to meet AF needs
  • Human Effectiveness Directorate
  • USAF School of Aerospace Medicine
  • Human Systems Integration Directorate

• $125.7M science and technology program (FY14)

• $100.6M defense health program (FY14)

• 1230+ military and government civilians covering 75 occupational specialties

• Established at WPAFB with six GSUs
  • Capitalized on 2005 Base Realignment and Closure
  • State-of-the-art research labs, clinical reference labs, classrooms, training facilities
  • Partnership with Naval Aeromedical Research-Dayton & San Antonio
711 HPW Primary Mission Areas

- Airman Health & Performance
- Airman-Machine Teaming
- Force Protection
- Education/Training

Human Performance is Fundamental to Air Force Warfighting Capabilities

The Challenge: **Cognitive and Physiological Demands of Today’s Operational Environment**

- High physical demands
- High cognitive load
- Time pressure
- Intel data overload

**RPA Operator**
- Low manning
- Long hours, shift work

**Aircrew**
- High physical demands
- High cognitive load

**ISR Analyst**
- Time pressure
- Intel data overload

**Special Ops**
- High physical demands
- High cognitive load

**Cyber Operator**
- Information overload
- Decreased vigilance

**Medical**
- Force Health Protection
- High physical demand
- High cognitive load

**Repetition, Information Overload, Fatigue, Stress**
Toxic Impacts to Health

Hypoxia detection

Decompression studies

HFE Data Collection

F-22 OBOGS

HFE Centrifuge Test

Ear cup Mounted Pulse Oximetry

Survivability Emergency Descent

Safety & HFE

In-House Prototype Fabrication

Training

NAMRU-D Reduced Oxygen Breathing & Flight Simulation
Mission:
Exploit biological and cognitive Science and Technology to optimize and protect the Airman’s capability to fly, fight, and win in air, space, and cyberspace.

4 Core Technology Competencies
31 S&T programs
Core Budget $125.7M (FY14)

Revolutionary – e.g.:
• Human Performance Sensing
• Human-Machine Teaming
• Non-Invasive Brain Stimulation

Relevant – e.g.:
• Adaptive Live Virtual Constructive (LVC) Training
• Multi Role Control Station
• ISR Analyst Performance
• Aerospace Physiology & Toxicology

Responsive – e.g.:
• Advanced Acoustic Measurement & Modeling
• BATMAN - 20+ Tech Transitions
U.S. Air Force
School of Aerospace Medicine

Education
3,801 graduates in FY13
70 Courses – technician through graduate medical education

Consultation
Only AF Clinical Reference Lab: 2M specimens/year--225 DoD sites
Flying waivers- 90% aviators returned
Nuclear/radiation safety: 24 site surveys- 9 radiation cleanups

Research
Human performance, En route care, force health protection, expeditionary medicine
70+ Defense Health projects

Mission:
Advance Aerospace Medicine to enhance the health and performance of those we serve through education, research, and consultation.

FY14 Core Budget $100.6M
**Mission:**
Optimize warfighter capability through a human-centric approach to system development, acquisition, and sustainment.

- Environment
- Habitability
- Human Factors Engineering
- Manpower
- Occupational Health
- Personnel
- Safety
- Survivability
- Training

**HSI Subject Expertise for AF Medical Service**

**Consultative support to USAF major commands**

**Consultative support to Program Executive Officers**

*Human Performance CONOPS (2014)*

711 HPW FY14 Program

Core Budget
$228.2M

Other Program Funds
$120.7M

Total Program $348.9M
1237 Government Personnel

75 Occupational Series

Scientists & Engineers
- 99 Behavioral Sciences
- 153 Engineering
- 97 Life Sciences
- 44 Math/Computer Sci
- 14 Other

Medical
- 103 Board Certified MDs
- 200 Biomedical Sci Corps
- 25 Medical Support Corps
- 32 Nurse Corps
- Enlisted Specialties
- 26 Public Health
- 48 Bioenvironmental Eng
- 37 Aerospace Physiology
- 7 Aeromedical Evac

Acquisition Corps
- 157 Level III APDP
- 147 Level II APDP

Mission Enabling Expertise
- Plans and Programs
- Financial Management
- Personnel
- Info Technology
- Contracting
- Institutional Review
- Legal
- Security
- Facilities
- ...and more...

10 AFRL Fellows
TOXICOLOGY
- Physiologically Based Pharmacokinetic Modeling
- In Vitro Tissue Models for Screening Toxicity
- Jet Fuel Toxicity

PHYSIOLOGY
- Environmental Stress Selection of UAS operators
- Effects of Modafinil and OTC Stimulants on Cognitive Performance
- Effects of fatigue on visual performance (depth perception)
- Flight Simulation Cockpit Design Evaluation
- Motion Sickness Spatial Awareness Spatial Orientation
- Oxygen delivery scheduling in F 22 Recovery after hypoxia
- Effects of Acute Hypoxic Stress on Higher Order Cognitive Functions

COGNITIVE
- Comparison of normobaric and hypobaric hypoxia effects
- Development of hypoxia sensors for OBOGS malfunction
- Neurological Toxic Impacts
- Selection of UAS operators
- In Vitro Tissue Models for Screening Toxicity

# Worldwide Collaborations, Alliances & Partnerships

## Industry

- **59** Cooperative Research and Development Agreements (CRADA)
- **12** Patent Assignment Agreements (PAA), Invention License Agreements (ILA), Patent License Agreements (PLA)
- **11** Product Evaluation Agreements (PEA)
- **4** Commercial Test Agreements (CTA)

## Academia

- **37** Education Partnership Agreements (EPA)
- **11** Training Affiliation Agreements (TAA), Faculty Affiliation Agreements (FAA)

## DoD, National and Local Government

- **149** Government to Government Alliances – Memorandum of Understanding (MOU), Memorandum of Agreements (MOA), Letters of Agreements (LOA), Support Agreements (SA)

## International

- **19** Project Agreements (PAs)
- **6** Data/Information Exchange Agreements (DEAs, IEAs)

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Leadership in Key Forums

**Communities of Interest**

- Human Systems
  - Autonomy
  - Armed Services Biomedical Research Evaluation and Management (ASBREM)

**DoD Human Genetics and Synthetic Biology Council**

**Mission Essential Conferences and Symposia**

E.g., Aerospace Medicine Association (AsMA)

**Program-Centric:**
E.g., F-35 Aeromedical Community of Interest

**Technology-Centric:**
E.g., Flexible Electronics Workshop with AF Users

**Future Vision:**
E.g., Defense Science Board Studies, USAF Global Horizons Study

**Industry**

**NDIA**

- Human Systems Division

**Alliance for Human Effectiveness and Advancement (AHEAD)**
Lead exploration of cutting-edge human performance technology to enable future air, space, cyberspace force

Ensure superior performance of the normal human in an abnormal environment

Build on a strong foundation of understanding user needs and culture of support to operations