



# 711th Human Performance Wing



***Integrity ★ Service ★ Excellence***

## Mission Overview to Defense Health Board

**November 6, 2014**

Commander  
711th Human Performance Wing  
Air Force Research Laboratory





# 711th Human Performance Wing Mission



***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





# 711th Human Performance Wing Mission Units



**Human Effectiveness  
Directorate**  
(711 HPW/RH)

Science & Technology  
**Research**  
Consultation



**U.S. Air Force  
School of Aerospace  
Medicine**  
(USAFSAM)

Aerospace Medicine  
**Education**  
**Consultation**  
Research



**Human Systems  
Integration Directorate**  
(711 HPW/HP)

Human Systems Integration  
**Consultation**



# 711 HPW Primary Mission Areas





# Human Performance is Fundamental to Air Force Warfighting Capabilities



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

### RPA Operator



- Low manning
- Long hours, shift work

### Aircrew



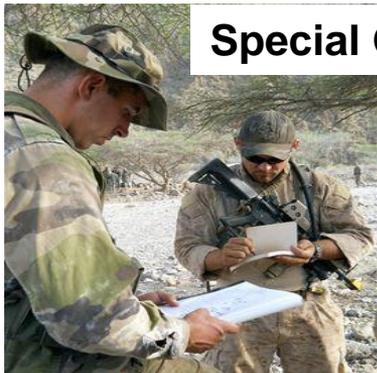
- High physical demands
- High cognitive load

### ISR Analyst



- Time pressure
- Intel data overload

### Special Ops



- High physical demands
- High cognitive load



### Medical

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

### Cyber Operator



- Information overload
- Decreased vigilance

***Repetition, Information Overload, Fatigue, Stress***



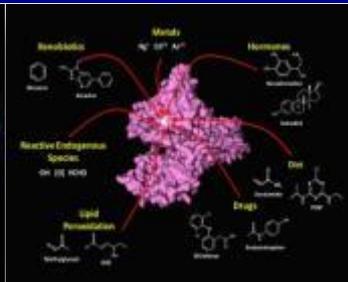
# 711 HPW F-22 Support

S&T + DHP + HSI + SPO =

Integrated Human Performance Solutions



**Toxic Impacts to Health**



**Key SAB Contributors**  
Dr Morley Stone  
Mr Randy Brown  
Col Derek Knight

United States Air Force  
Scientific Advisory Board



Report on  
Aircraft Oxygen Generation

SAB-TR-11-04  
1 February 2012

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**HFE Centrifuge Test**



**Safety & HFE In-House Prototype Fabrication**



**Hypoxia detection**

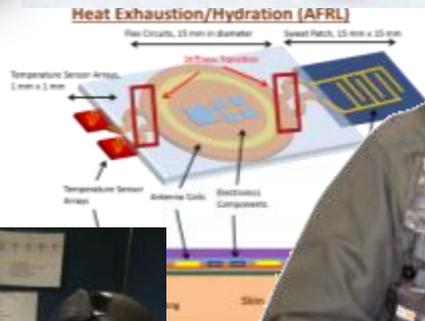
**Decompression studies**



**F-22 OBOGS**



**HFE Data Collection**



**Heat Exhaustion/Hydration (AFRL)**



SABW-2014-5



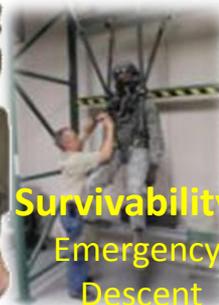
**Ear cup Mounted Pulse Oximetry**



**Training**



**NAMRU-D Reduced Oxygen Breathing & Flight Simulation**



**Survivability Emergency Descent**



**Safety & HFE Acoustic Evaluation**



# Human Effectiveness Directorate



## 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

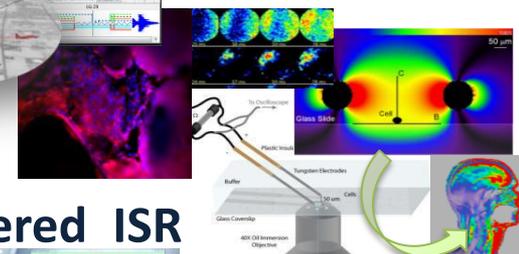
## Decision Making



## Training



## Bioeffects



## Human-Centered ISR





# U.S. Air Force School of Aerospace Medicine



## Mission:

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

## 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

**FY14 Core Budget \$100.6M**



Field Response



Epidemiology Lab



Research Altitude Chambers



Classrooms



State of the Art Centrifuge



Centers for Sustainment of Trauma And Readiness Skills (C STARS)



Aeromedical Evacuation





# Human Systems Integration Directorate

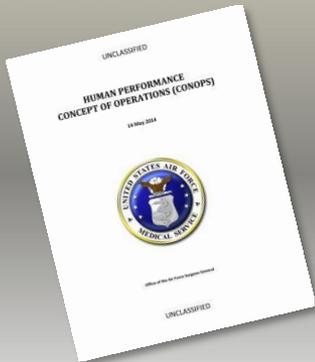


## Mission:

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**



**Human Performance CONOPS (2014)**

**Consultative support to USAF major commands**



**Consultative support to Program Executive Officers**



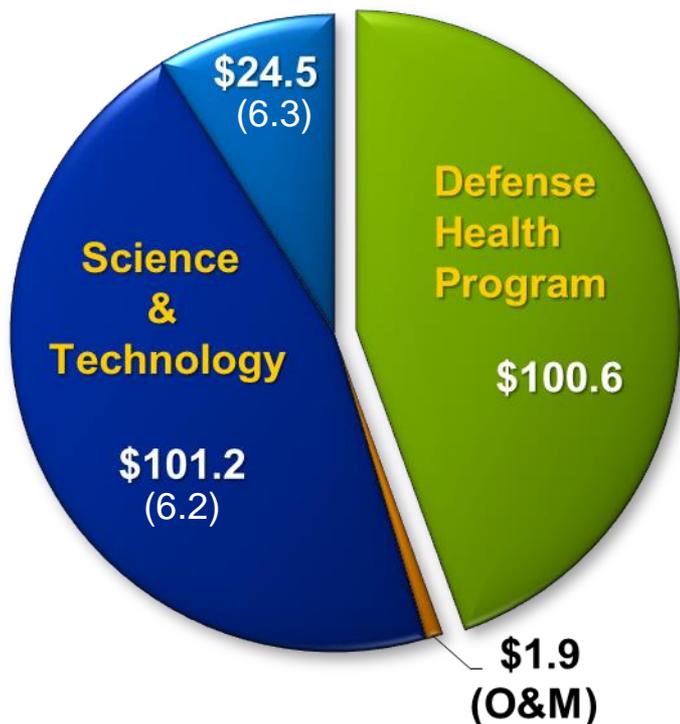


# 711 HPW FY14 Program



**Core Budget**  
**\$228.2M**

**Other Program Funds**  
**\$120.7M**



**Air Force**

S&T 6.1	\$11.8M
SBIR (FY13/14)	\$12.4M
Other PEs	\$11.6M

**DHP**

RDT&E (6.2 & 6.3)	\$30.6M
Other PEs	\$3.8M

External Customer Funding (S&T)

**\$45.8M**

External Customer Funding (DHP)

**\$4.7M**

**Total Program \$348.9M**

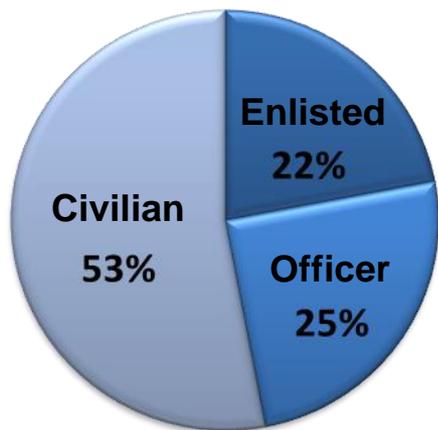




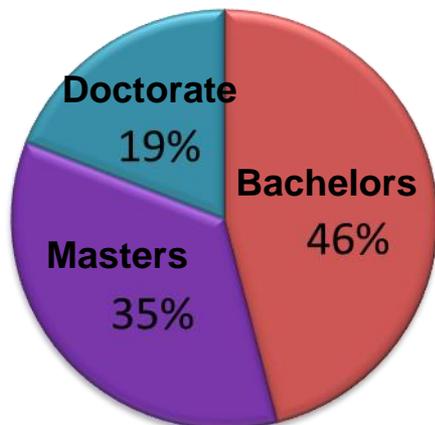
# 711 HPW Workforce



## 1237 Government Personnel



## Degrees



## 75 Occupational Series

### Scientists & Engineers

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

### Acquisition Corps

- 157 Level III APDP
- 147 Level II APDP

### 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

### Mission Enabling Expertise

- Plans and Programs
- Financial Management
- Personnel
- Info Technology
- Contracting
- Institutional Review
- Legal
- Security
- Facilities

...and more...

## 10 AFRL Fellows



# Joint Synergy

## Naval Medical Research Unit Dayton



### TOXICOLOGY

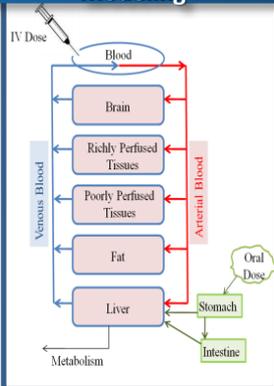
### PHYSIOLOGY

### COGNITIVE

Jet Fuel Toxicity



Physiologically Based Pharmacokinetic Modeling



Neurological Toxic Impacts

In Vitro Tissue Models for Screening Toxicity

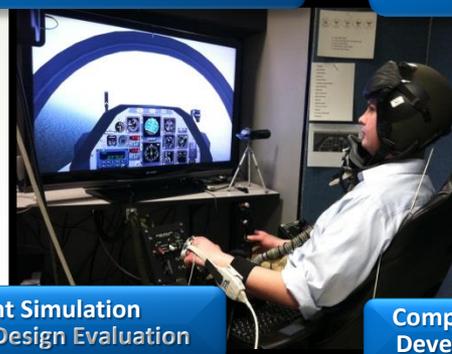


Cockpit Simulations

Effects of Acute Hypoxic Stress on Higher Order Cognitive Functions



Environmental Stress Selection of UAS operators



Flight Simulation Cockpit Design Evaluation



Motion Sickness Spatial Awareness Spatial Orientation

Effects of Modafinil and OTC Stimulants on Cognitive Performance



Effects of fatigue on visual performance (depth perception)



Comparison of normobaric and hypobaric hypoxia effects Development of hypoxia sensors for OBOGS malfunction



Oxygen delivery scheduling in F-22 Recovery after hypoxia



# 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)



# 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

## *Industry*

# NDIA

## Human Systems Division



Alliance for Human Effectiveness and Advancement (AHEAD)

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





# 711th Human Performance Wing





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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

## Research



## Education



## Consultation





# Questions?

