Maintaining Hydration for Peak Cognitive Performance

Kelly VandenBossche, Ph.D.
Omni Defense Technologies

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Human Body & Hydration Needs

Daily Intake and Output Of Water (mL/Day)		
	Normal	**Prolonged, Heavy Activity**
Intake		
Fluids Ingested	2,100mL	?
From Metabolism	200mL	200mL
Total Intake	**2,300mL**	**?**
Output		
Insensible – Skin	350mL	350mL
Insensible – Lungs	350mL	650mL
Sweat	100mL	5,000mL
Feces	100mL	500mL
Urine	1,400mL	500mL
Total Output	**2,300mL**	**6,600mL**

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Dehydration

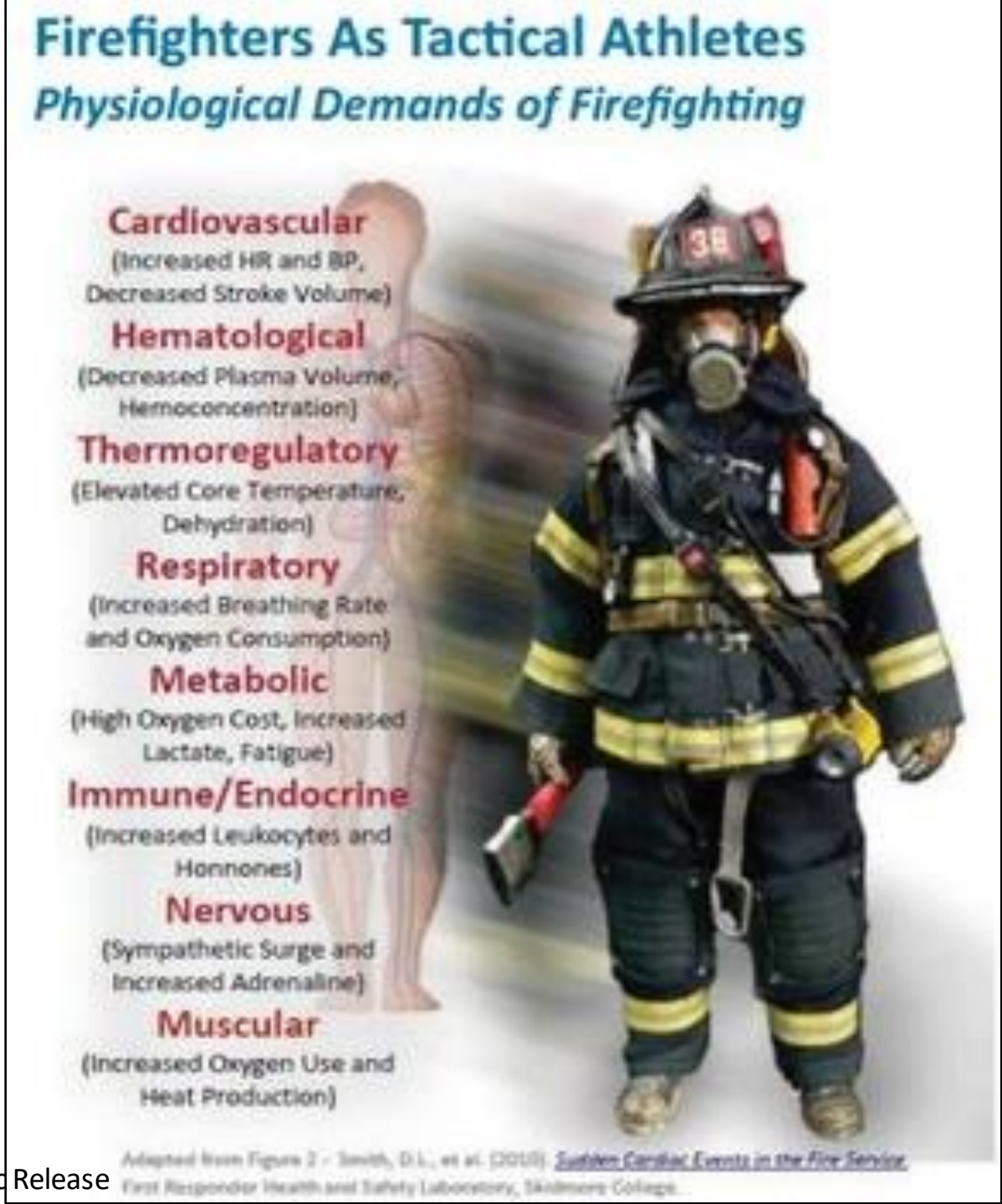
Losing Body Water at a Greater Rate than It is Replaced

- Dehydration & Sodium Deficits are Associated with Skeletal Muscle Cramps
- Risk Factor for Heat Exhaustion and Exertional Heat Stroke

Present in 17% of All Heat Stroke Hospitalizations In the US Army Over a 22-Year Period

Present in 16% of 82 Cases of Heat Stroke In Israeli Military

Orange County Fire Authority Found that 91% of Firefighters Were Dehydrated Prior to Drilling and Lost On Average 3lbs Body Mass In 15 Minutes of Work



Effects of Dehydration on Performance

BML	Effects
0.5%	Increased Strain on the Heart
1.0%	Reduced Aerobic Endurance Thirst mechanism is Activated Reduced Short-Term Memory on Verbal Material
2%	Impaired Cardiovascular Function & Temperature Regulation Impaired Attention, Motor Coordination, and Executive Function Reduced Hand-Eye Coordination & Accuracy
3%	Reduced Muscular Endurance
4%	Reduced Muscle Strength and Fine Motor Skills Heat Cramps 23% Reduction in Response Time
5%	Heat Exhaustion, Cramping & Fatigue Reduced Mental Capacity

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Dose-Response Relationship Regardless of Environmental Conditions

Fluid Replacement

Pre-Activity
At Least 4 Hours Prior:
Slowly Drink Beverages (e.g., 5-7mL/Kg Body Weight (BW))
During Activity
Periodically Drink Throughout Activity to Replace Fluid Lost
Amount & Rate Depends on:
-Individual Sweating Rate
-Exercise Duration
-Opportunities to Drink
30-60g/hour Carbohydrates Sustains Performance (6-8% CHO)
Post Activity
Rehydration With Plain Water and Normal Consumption of Meals & Snacks
Substantially Dehydrated/Short Recovery, 1.5L/Kg BW Lost

From, American College of Sports Medicine's Position Stand on Exercise and Fluid Replacement (2007)

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Urine Production

For the Average Healthy Adult:	
Average Daily Urine Produced	1,400mL
Average Hourly Urine Produced	50-100mL
Bladder Capacity	350-550mL
Urge to Void	200mL

A Euhydrated Individual Will Feel the Urge to Void Within 2 to 4 Hours

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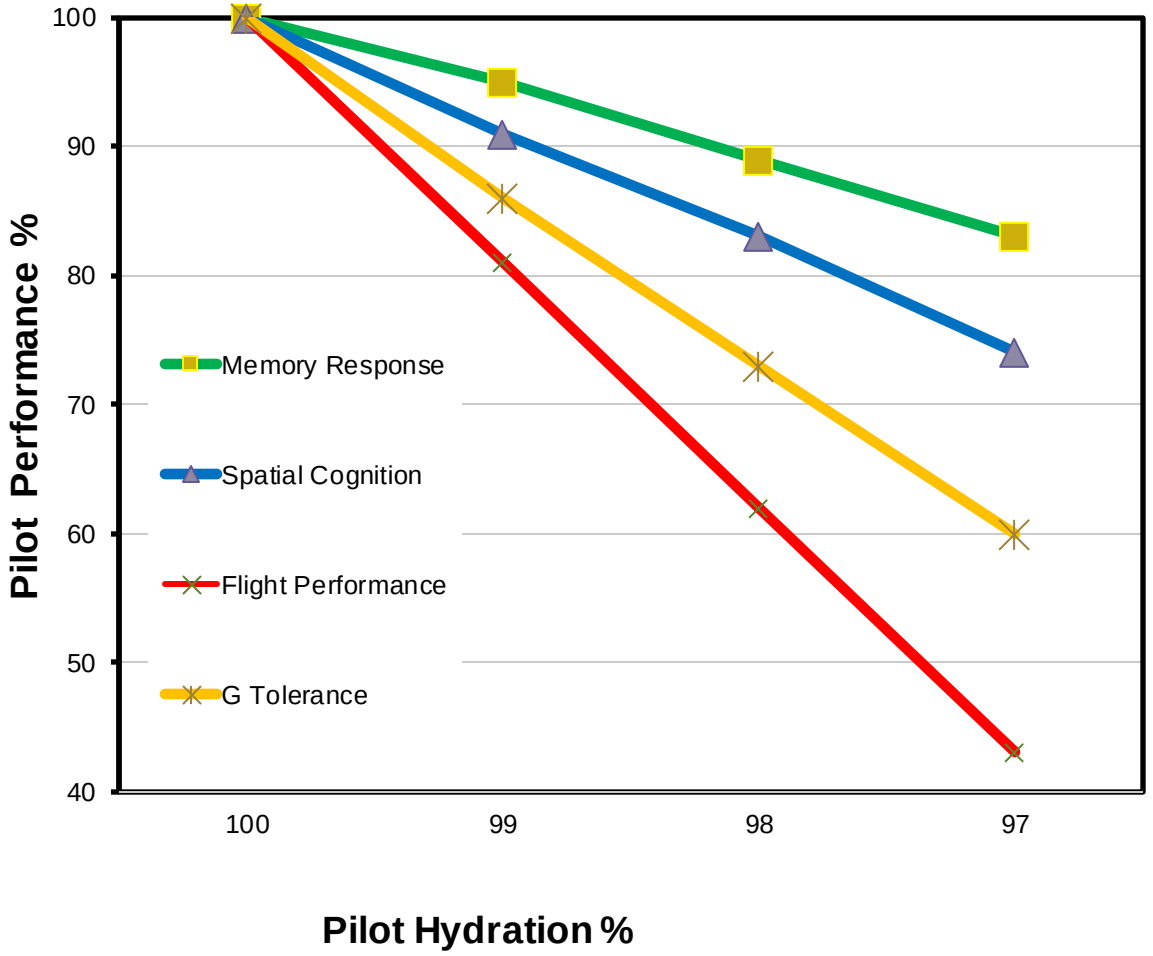
The Work Environment

- Suboptimal Situations Increase the Risk of Dehydration
  - Cramped Spaces
  - Hot, Humid Environments
  - Bulky Personal Protective Equipment
- No Restrooms Available
- Multi- and/or Mixed-Gender Crew
- Highly Technical/High Workload
- Can’t Leave the Work Station

Hydration and Job Performance



Bladder Relief Options

- Piddle Pack and Funnel Systems Are Flammable
  - Fail Safe-to-Fly Flame Tests
- All Require One- or Two-Handed Operation
- Distraction from the Task At Hand

How Aviators Use a Piddle Pack

- *Set the Autopilot But Continue to Monitor Flight Parameters*
- *Unstrap from the Aircraft & Harness*
- *For Women,*
  - *Lift Butt Up About 4 Inches to Allow the Piddle Pack to Hang Straight*
  - *Maneuver Clothes Out of the Way*
  - *Holding the Front Edge of the Piddle Pack, Place the Top of the Piddle Pack Hard Against the Body to Create a Seal, Making Sure It's Hanging Straight Before Using*

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New Challenges State-of-the-Art Solutions

Generation 1 – The Advanced Mission Extender Device (AMXD)

- 2006 – USAF Safe-To-Fly approval

Generation 2 – The AMXD Max

- Smaller Size, Fully Automatic
- Enhanced Performance Specs
- 2014 – USAF & USN Safe To Fly
- 2018 – F-35-Specific Safe To Fly

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Skydrate (Generation 3)

- Automatic
- Fully Self-Contained
- Male and Female Systems
- Collection Bags Come in 2 Capacities as well as Reusable & Disposable Variants
- 16-hour Battery Life (~12 Uses)
- 2.25Liter Per Minute Flow Rate
- State-of-the-Art Through-Suit Connector Maintains Immersion Suit Integrity

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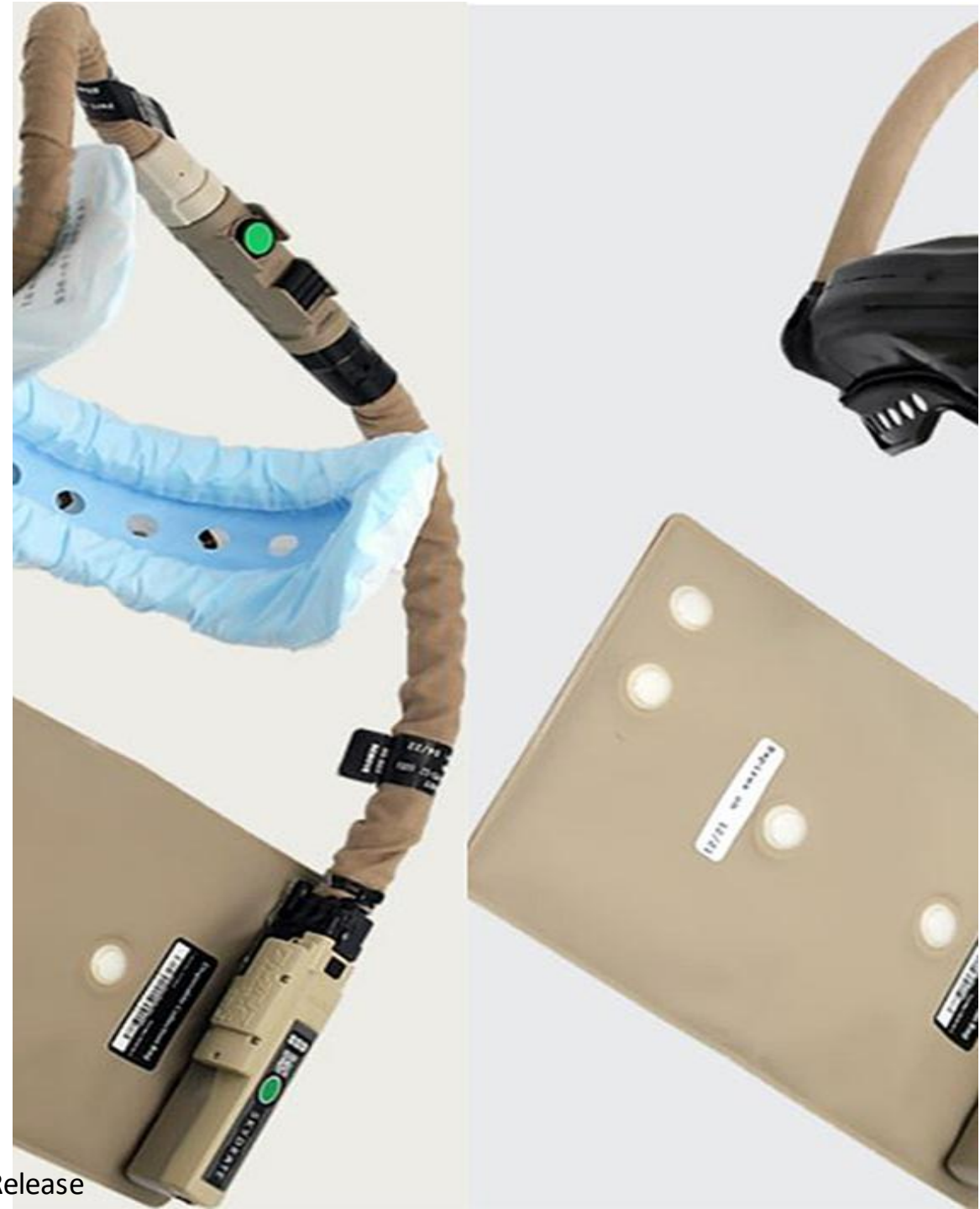
Skydrate

3rd Generation

Extended Wear Bladder Relief

- Hands-Free, Eyes-Free, Automatic Bladder Relief System
- Decreases Distractions From the Task At Hand
- *Allows*
  - *Increased Hydration*
  - *Increased Situation Awareness*
  - *Optimized Physical & Cognitive Performance*



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The Goal is Warfighter Readiness

- Hydrated Individuals are Sharper and More Lethal
- We Optimize Physical & Cognitive Readiness By Facilitating Hydration

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The Warfighter "should be focused on taking the fight to the enemy, not on whether their bladder relief device is going to work or be comfortable to use."

-Maj Nikki Yogi, USAF F-35A pilot

Thank You!

OMNI DEFENSE TECH

For More Information:

Tel. 1(802) 497-2253
http://www.Omni-Defense

Kelly VandenBossche, Ph.D
KVandenBossche@OmniMedicalSys.com