Tactical Rehabilitation

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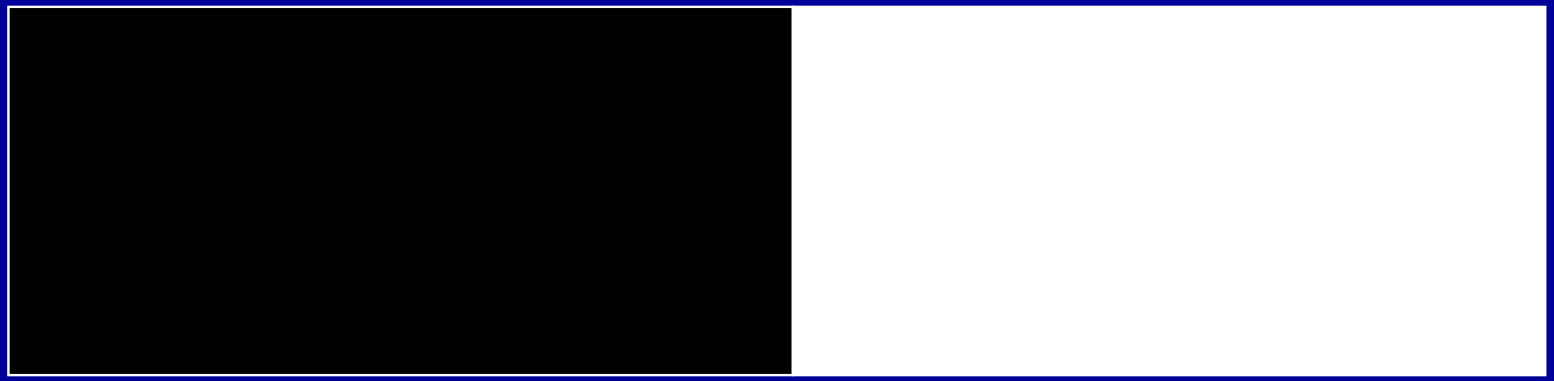
OTTAWA FIRE SERVICES
SERVICE DES INCENDIES D'OTTAWA
Protecting Our Nation's Capital With Pride
Protéger notre capitale nationale avec fierté


SAFETY
McBRIDE
4761

UNSAFETY OFFICER



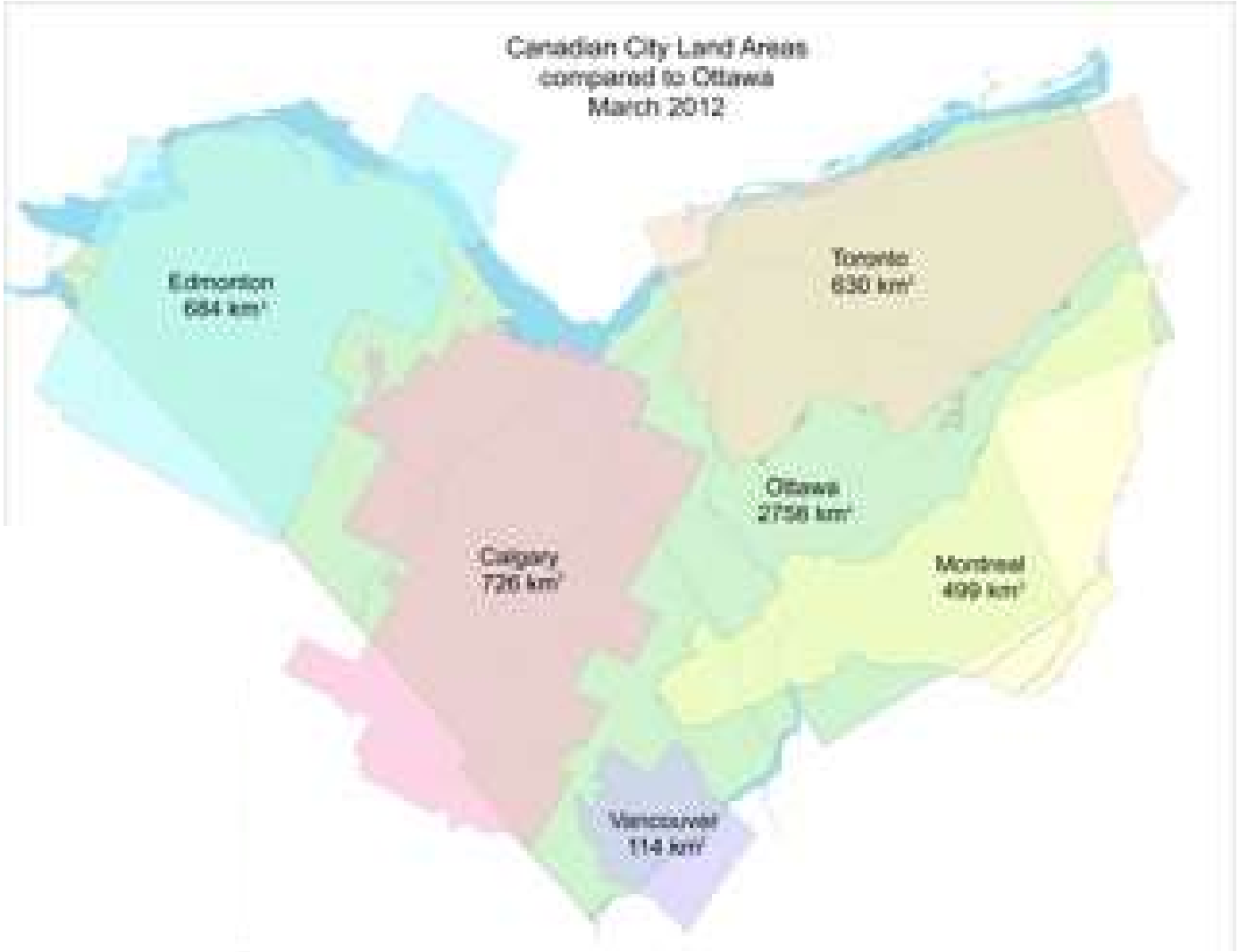
SAFETY OFFICER

UNSAFETY OFFICER

DANGEROUS

SAFETY OFFICER


North Pole
Norwegian Sea
Norway
Polar Ice
Greenland Sea
UK
Russia
Arctic Ocean
Ellesmere Island
Alert
Kalaallit Nunaat
(Grønland)
(Denmark)
Iceland
Bering Strait
North Magnetic Pole
Arctic Circle
Beaufort Sea
Banks I
Resolute
Baffin Bay
Arctic Circle
Alaska
(USA)
Inuvik
Victoria Island
Baffin Island
Davis Strait
Dawson
Great Bear Lake
Gjoa Haven
Yukon Territory
Mackenzie River
Iqaluit
Whitehorse
Northwest Territories
Nunavut
Labrador Sea
Atlantic Ocean
Baker Lake
Yellowknife
Ungava Bay
Newfoundland and Labrador
Fort Nelson
Great Slave Lake
CANADA
Nain
British Columbia
Prince George
Fort McMurray
Churchill
Hudson Bay
Churchill Falls
St John's
Pacific
Alberta
Edmonton
Saskatchewan
Manitoba
L Winnipeg
Saint-Pierre et Miquelon (France)
Vancouver
Fraser River
Kamloops
Calgary
Saskatoon
Sandy Lake
James Bay
Quebec
Prince Edward Island
Charlottetown
Victoria
Ocean
Regina
Winnipeg
Thunder Bay
Ontario
New Brunswick
Nova Scotia
Halifax
Fredericton
United States of America
Lake Superior
Ottawa
Toronto
Lake Michigan
Huron
Lake Ontario
Lake Erie
Atlantic Ocean



Vancouver 114km^2
Montreal 499km^2
Toronto 630km^2
Edmonton 684km^2
Calgary 726km^2
Total 2653km^2
Ottawa 2758km^2

- ✪ **950 Professional Fire Fighters**
- ✪ **450 Volunteer Fire Fighters**
- ✪ **45 Stations**

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Tactical

Rehabilitation


COMPLEX MISSION
Critical Technology
Critical Risk Management
Critical Human Relations & Activities

HRO
High Reliability Organization

- A high reliability organization is an organization that has succeeded in avoiding catastrophes in an environment where normal accidents can be expected due to risk factors and complexity.

Developments In Rehabilitation

Rehabilitation

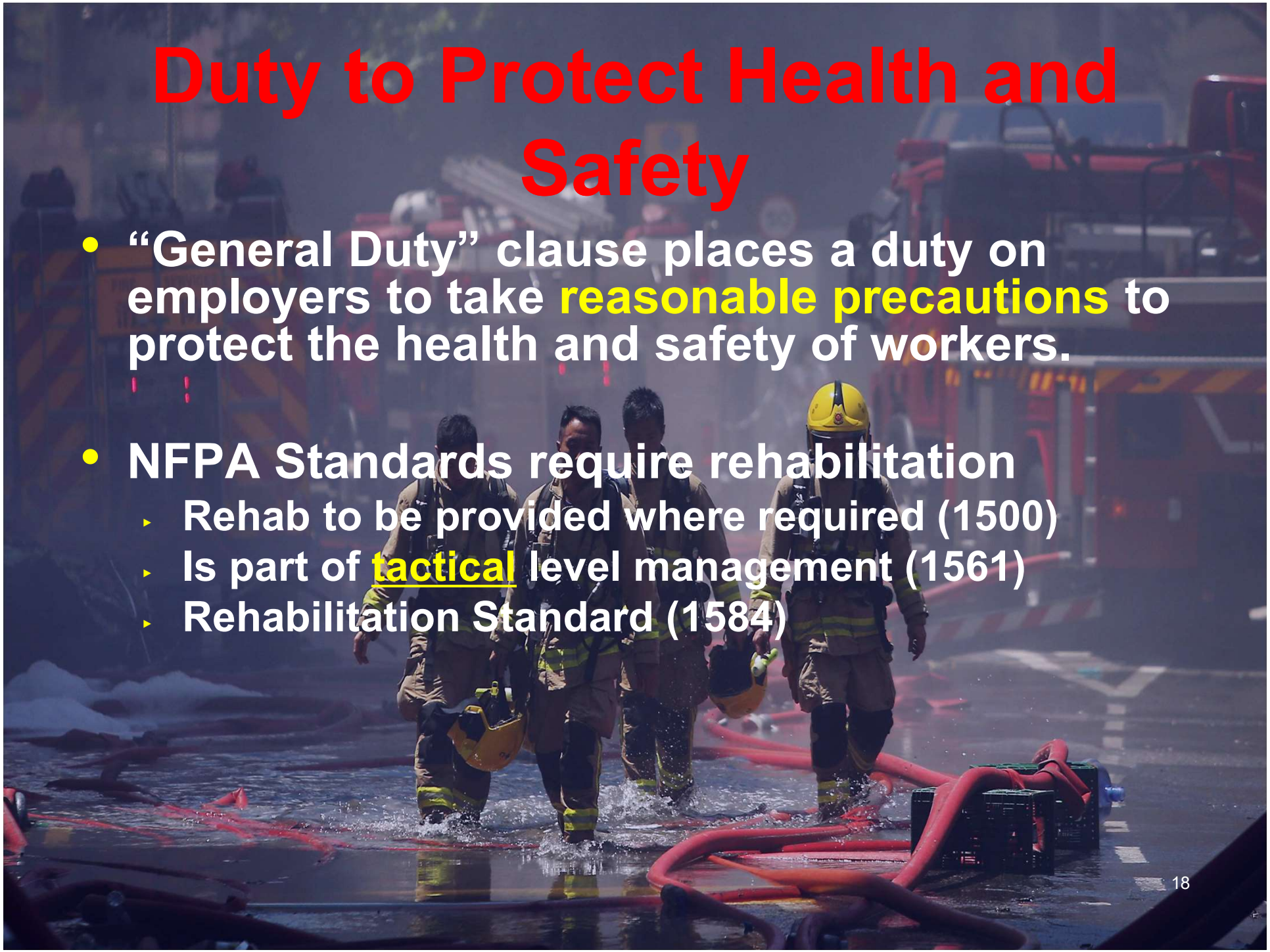
What Do These Professions Have in Common?

- Paramedics
- Police Officers
- Firefighters


The Potential for...
HEAT STRESS


Why Is This Important to You?

Duty to Protect Health and Safety



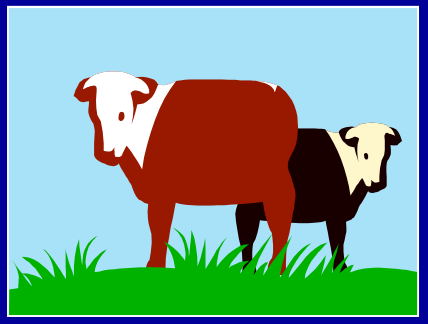
- "General Duty" clause places a duty on employers to take reasonable precautions to protect the health and safety of workers.
- NFPA Standards require rehabilitation
  - Rehab to be provided where required (1500)
  - Is part of tactical level management (1561)
  - Rehabilitation Standard (1584)

Benefits of Providing Rehabilitation

- Will protect ESW health and safety
- Can maximize cumulative work times
- Provide better customer service
- Is the right thing to do
- Will protect department against potential liability

Firefighter Dies in Training

- **Recruit firefighter** Andrew Waybright **collapsed** during a training exercise in **extreme heat**
- Civilians stopped to help - offered to call 911
- Were "shooed" away by Academy personnel and told recruit was "played out"
- **Pronounced dead** at hospital - temperature was 42°C (107.4°F)



Maryland Parents Sue County Over Son's Death During Firefighter Training

- Waybright's parents suing for $1 million
- Training Officer alleged to be "an untrained leader, for failing to provide hydration, failure to carry basic first aid, and failure to inform recruits of the exercise session".
- Failed to meet duty "to provide training exercises in a reasonable and safe manner such that they did not endanger the health of the recruits".

Ontario Bakery Worker Dies

- **Weston Bakeries** charged by MOL
- **Failure to Provide** a Heat Stress Management Program
- **Fined $240,000.00**


Firefighting is
Hot, Strenuous Work

Tactical Operations
Hot, Strenuous Work

- Extremely high temperatures
- Little opportunity to cool our bodies through normal sweating
- Moderate to heavy work generates metabolic heat
- Tactical PPE makes it difficult to dissipate heat and can result in heat stress

Heat Stress Factors

- Air temperature
- Humidity
- Radiant heat
- Air movement
- Physical demands of work
- Clothing, material, construction and use
- Physical fitness and body composition
- Psychological/Perception

Defining "REHAB"

Rehab Is:

- **An intervention designed to mitigate against the physical, physiological, and emotional stress of firefighting in order to improve performance and decrease the likelihood of on scene injury or death.**

Controls to Minimize Heat Stress

- Relief from climate/conditions
- Fluid intake (hydration)
- “Active Cooling”/or warming
- Replacement of electrolytes/calories
- Rest/Work rotation
- Medical monitoring
- Member Accountability!!!

What We Do Now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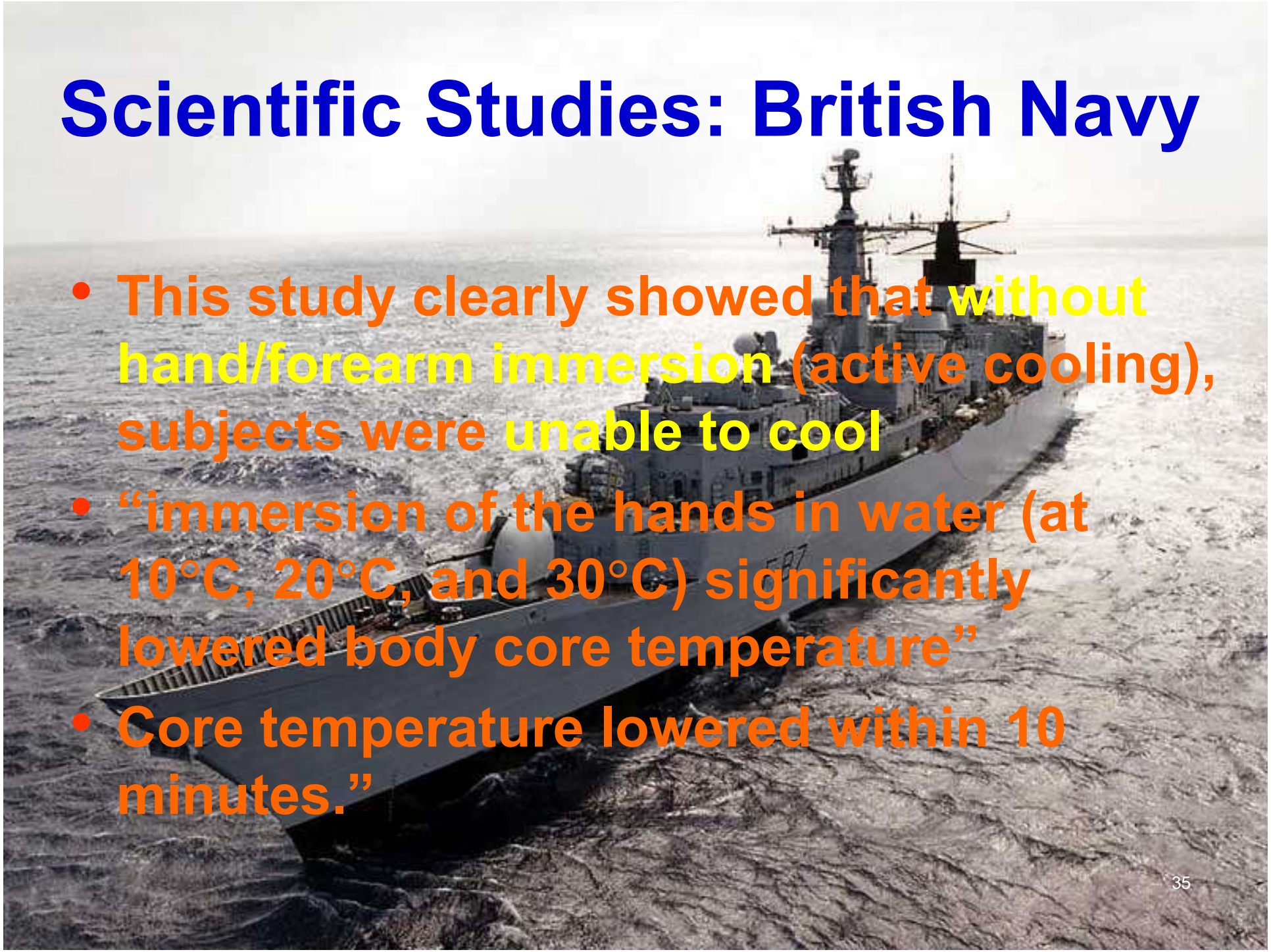
Scientific Study: Making the Connection

Heat to Heart

- Firefighting stresses the heart
  - Generates heat build-up
  - Fluid loss through sweating
- Stroke volume is decreased - heart stress is increased - Denise Smith, Chicago IL
- Core temperature rise -stresses the heart
- Blood “thickens” increases heart stress
- Need to provide effective rehabilitation to minimize potential for loss

Scientific Studies: British Navy



- This study clearly showed that without hand/forearm immersion (active cooling), subjects were unable to cool
- "immersion of the hands in water (at 10°C, 20°C, and 30°C) significantly lowered body core temperature"
- Core temperature lowered within 10 minutes."

Defense Research and Development Canada (2002)

- Workplace Safety and Insurance Board of Ontario funded study on the "Heat Stress of Wearing Firefighting Protective Clothing:
- Defining the Problem and Creating Solutions"
  - Tom M. McLellan, Ph.D.

DRDC Passive Cooling

- Defense Research and Development Canada (DRDC) studied the effects of heat stress on firefighters while wearing full PPE and simulating moderate to hard work on a treadmill
- Several conclusions from this study are pertinent to all of us in emergency response*

*The Management of Heat Stress for the Fire Fighter
Dr. Tom McLellan and Glen Selkirk
Defence R & D Canada – Toronto, External client Report ECR 2004-051

DRDC Passive Cooling

- Will not alleviate heat stress
- Core temperatures continue to rise following moderate or heavy work during a 30 minute rest even though heart rates continued to decrease
- Heart rate recovery and subjective feelings of comfort cannot be used to determine when it is safe to return to work

Active Cooling Is More Effective

- Advocates the use of forearm immersion as the most effective cooling strategy to be used in firefighter rehabilitation
- Can effectively double the duration time that each firefighter will be able to continue to work and remain encapsulated when combined with full hydration

IMS OPERATIONAL PLAN BRIEFING

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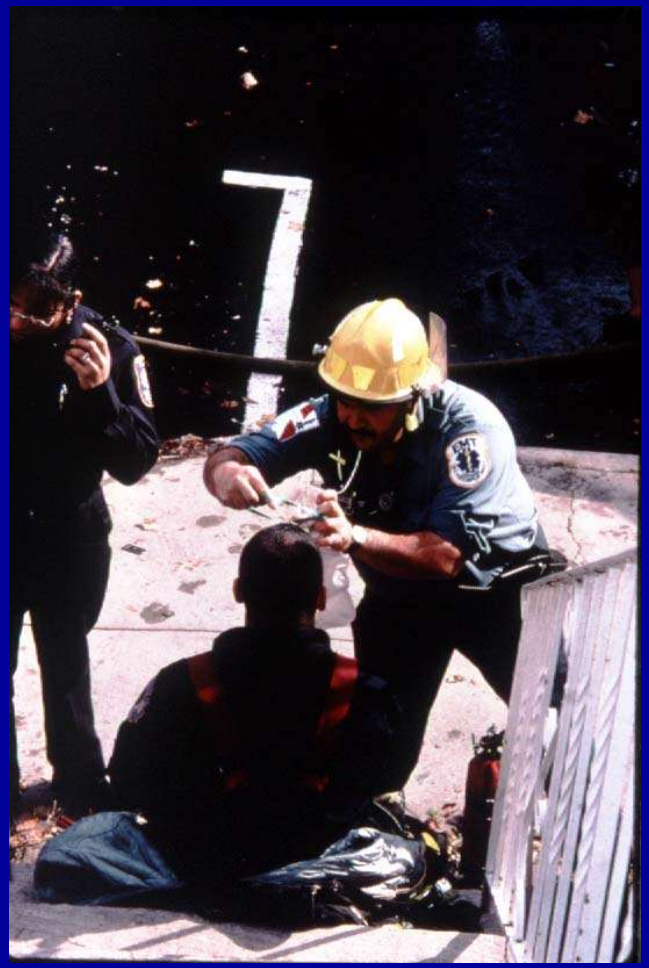
What is your model and scale?

The 6 R's of Comprehensive Rehabilitation

- Rest
- Re-hydration
- Restoration
  - Active Cooling/Heating
- Rx/Medical Monitoring
- Refueling
- Relief

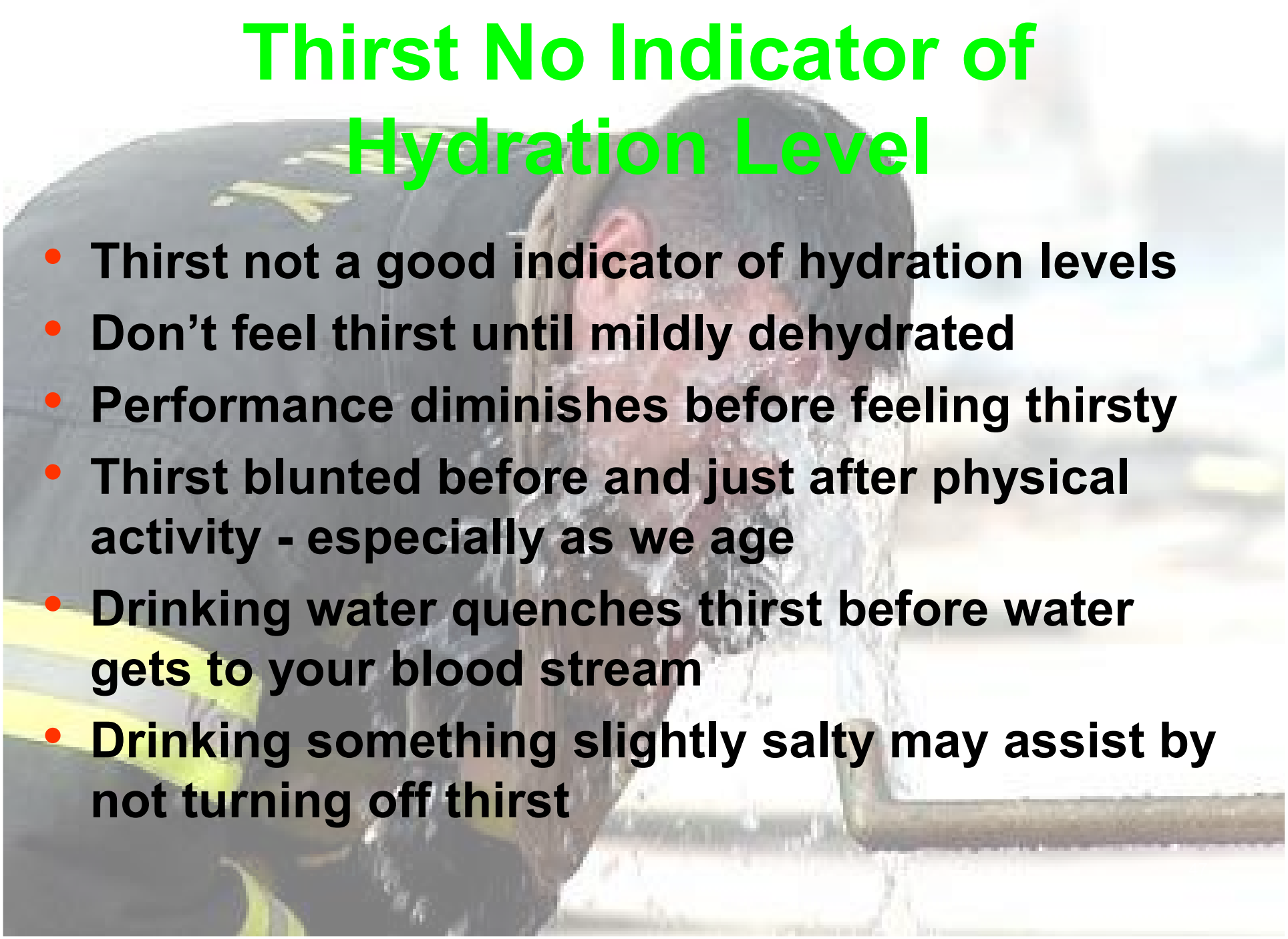



Rest
Include removal of stressors
Out of contaminated areas
Comfortable place to sit
Away from noise
Away from decisions

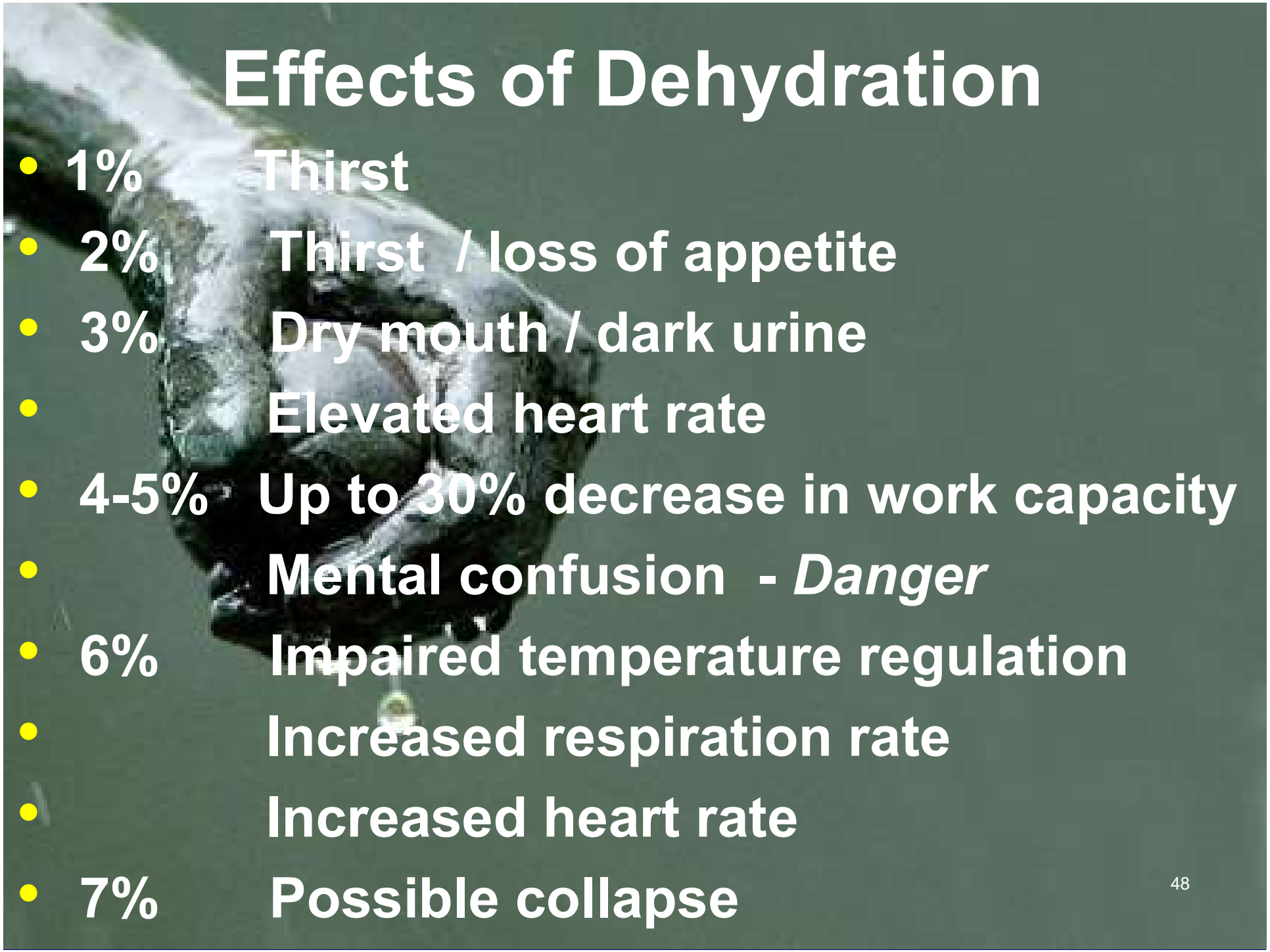
Re-hydration

- Need to replace Water
- Sports drinks may be used when working for an hour or more
  - electrolytes
  - carbohydrates
- Helps maximize water and calorie absorption

Thirst No Indicator of Hydration Level



- Thirst not a good indicator of hydration levels
- Don’t feel thirst until mildly dehydrated
- Performance diminishes before feeling thirsty
- Thirst blunted before and just after physical activity - especially as we age
- Drinking water quenches thirst before water gets to your blood stream
- Drinking something slightly salty may assist by not turning off thirst



Effects of Dehydration

- 1% Thirst
- 2% Thirst / loss of appetite
- 3% Dry mouth / dark urine
- Elevated heart rate
- 4-5% Up to 30% decrease in work capacity
- Mental confusion - *Danger*
- 6% Impaired temperature regulation
- Increased respiration rate
- Increased heart rate
- 7% Possible collapse

Osmolarity

- Osmolarity is total concentration of solute particles (electrolytes, sugars, proteins etc.) in water
- Higher Osmolarity (soda pop) causes water to leave blood into stomach to dilute drink
- Low Osmolarity drinks leave stomach quickly and diffuse through the cells - especially when sodium and carbs present

Joy Koenig M.D. "Proper Hydration", The Survival Doctor, Volume 3, Number 2

Tactical Rehabilitation

Characteristics of Beverages Commonly Used for Rehy				
Beverage	Sugar Concentration	Sodium	Potassium	Osmolarity
Gatorade	6%	110mg	25mg	280-360
Coca-Cola	11%	9.2mg	trace	600-715
Sprite	10.20%	28mg	trace	695
Cranberry Juice	15%	10mg	61mg	890
Orange Juice	11.80%	2.7mg	510mg	690
Water	----	low	low	10-20

* Serving Size 240 ml or 8 fluid ounces.

Firefighter Hydration (NFPA 1584)

- Pre-incident hydration
  - 180-240 ml (6-8 oz.)/6hours in addition to liquids consumed with meals
  - 500 ml (16 oz.) within 2 hours of scheduled event/training exercise
- On-Scene hydration
  - Consume fluids to satisfy thirst
  - .5 L (16 oz.) is a good Post-incident hydration
  - Continue to hydrate throughout the Incident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Restoration/ Core Temperature Stabilization Through *Forearm Immersion*

- Lowers core temperature quickly
- Not affected by environment
- Easy to use
- Portable


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BT63
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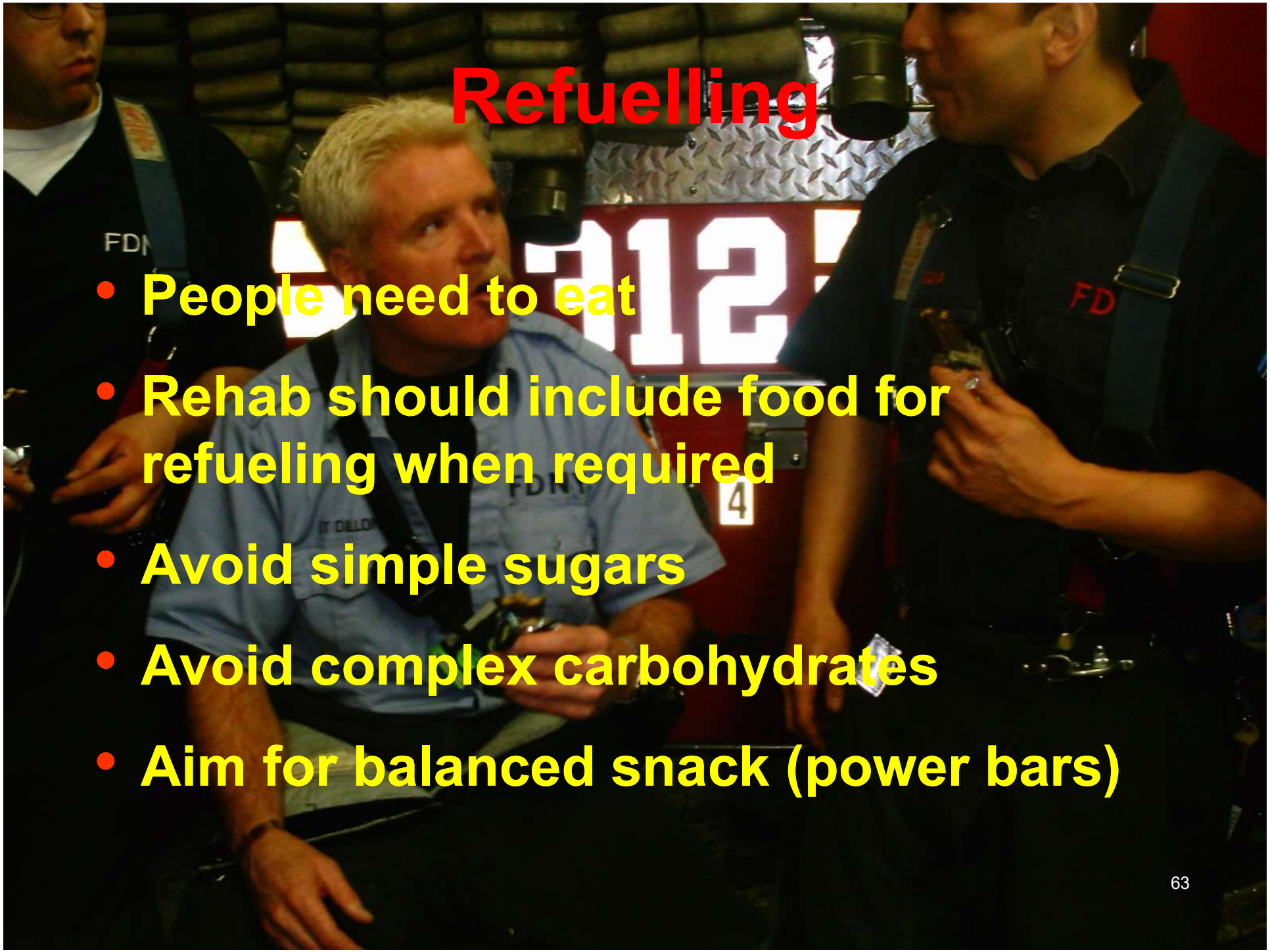
AMBULANCE
PARAMEDIC
4169
EMERGENCY
911
URGENCE
AMBULANCE
PARAMEDIC

RX: Medical Monitoring ✪

- Core Temperature
- Heart Rate
- Blood Pressure
- Pupils
- Conscious/alertness



Refuelling

- People need to eat
- Rehab should include food for refueling when required
- Avoid simple sugars
- Avoid complex carbohydrates
- Aim for balanced snack (power bars)


À la carte
Large scale events require a greater selection of balanced nourishment

Relief
from Extreme Climatic Conditions

- Heat
- Sunlight
- Humidity
- Rain/Snow
- Wind
- Cold

Beating the Heat

The Active Cooling Implementation Strategy

- **If resources are available, active cooling with forearm immersion should be used after each cylinder use**

Beating the Heat

The Active Cooling Implementation Strategy

- **Even where resources are not available, active cooling with forearm immersion *MUST* be used after use of two cylinders**

Beating the Heat

The Active Cooling Implementation Strategy

- **Following this initial rehabilitation (after 2nd bottle), firefighters should use active cooling with forearm submersion after EACH cylinder use**

EXPENDABILITY

KIRK, SPOCK, MCCOY, AND ENSIGN RICKY ARE BEAMING DOWN TO THE PLANET. GUESS WHO'S NOT COMING BACK.


THANK YOU!
Peter.McBride@Ottawa.ca


FIRE - INCENDIE