

## Presentation 3 – Dane Cook

### **Pain sensitivity in Gulf veterans with medically unexplained musculoskeletal pain**

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### **The Problem**

- **Unexplained muscle pain is a serious problem for many Gulf veterans (GVs)**
  - 4<sup>th</sup> most frequently reported symptom (IOM report, 1996)
  - Reported twice as frequently in GV's than non-GV's (Kang et al., 2000)
  - Serious adverse consequences on the veteran's personal and professional lives (Kang et al., 2000)

### **The Problem**

- Numerous studies have been conducted describing the problem
- Little research aimed at determining the cause
  - There is a need for research aimed at understanding the causes of unexplained pain in GV's

### **Previous Research**

- **Civilians with Fibromyalgia:**
  - More sensitive to experimental pain
    - (Cook et al., 2004; Kosek et al., 1996; Lautenbacher et al., 1994)
  - Lack normal inhibition of pain
    - (Kosek, Hansson, 1997; Lautenbacher, Rollman, 1997; Staud et al., 2003b)
  - Exaggerated brain responses to sensory stimuli
    - (Cook et al., 2004; Gracely et al., 2002)
  - Enhanced pain during exercise and increased pain sensitivity following exercise
    - (Mengshoel et al., 1995; Vierck, Jr. et al., 2001)

## Purpose

- **Comprehensively assess pain:**
  - Look at different dimensions of pain (intensity & affective)
  - Look at experimental and naturally occurring pain
    - Natural muscle pain, heat, pressure
  - Examine pain pre and post exercise
- **Test potential mechanism:**
  - immune system and pain (**in progress**)

## Hypotheses

- **GVs with medically unexplained muscle pain will:**
  - Be more sensitive to painful stimuli pre and post exercise compared to healthy GV's
  - Have increased sensitivity to painful stimuli following exercise
  - Show a positive relationship between the immune system and pain (**in progress**)

## Method

- **N = 34 participants**
  - n= 14 GV's with unexplained muscle pain
    - Pain in muscle and joints (more than one body quadrant)
    - > 3 months
    - Intense severity
  - n= 20 healthy GV's without pain
- **Testing to occur on 2 separate days**
  - Maximal exercise and pain testing
  - Submaximal exercise testing, pain testing and blood sampling

## Method

- **Experimental Procedures:**
  - Psychophysical pain assessment
  - Exercise @ 70% of peak oxygen consumption for 30 minutes followed by 5 minute active recovery
  - Psychophysical pain assessment

### Method

- **Psychophysical Pain Assessment:**
  - Heat pain thresholds – thenar eminence non-dominant hand
  - Pressure pain thresholds – second digit of dominant index and middle fingers
  - Supra-threshold pressure pain ratings
  - Supra-threshold heat pain rating (volar forearm)
    - Descriptor Differential Scales

### Method

- **Descriptor Differential Scales**
  - Based on psychophysics of cross-modality matching
  - Assess both intensity and affective pain dimensions
  - Several descriptors presented in random fashion
  - Ratings across a 21-point continuum
  - Similar to ratio scaling procedures (curve estimation)
  - Provides a measure of internal consistency

### Descriptor Differential Scales

Faint

I

Moderate

I

Intense

I

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Unpleasant

A

Distressing

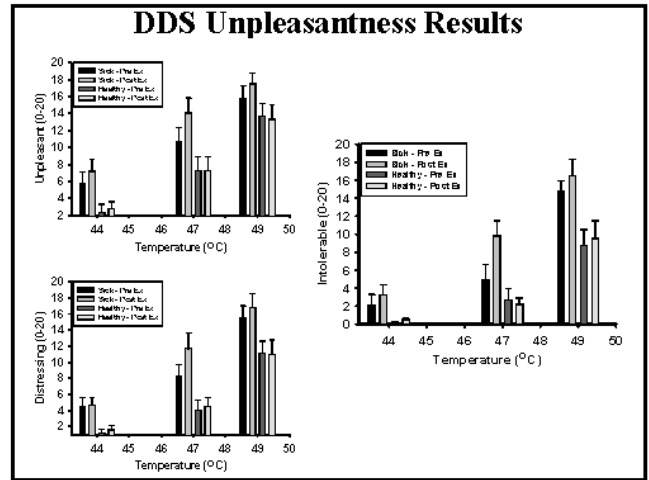
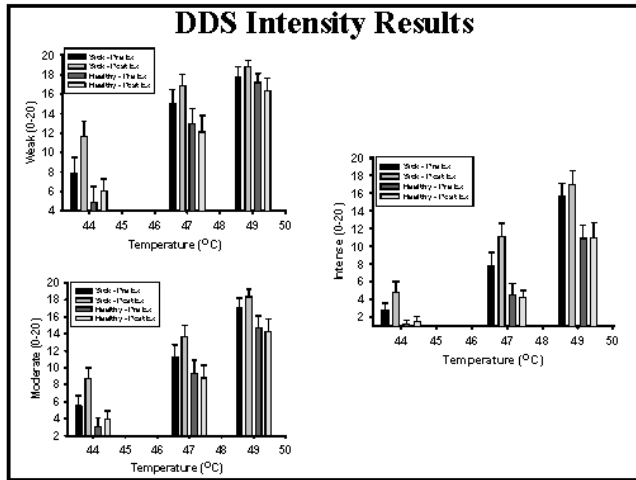
A

Intolerable

A

### Results

	Sick GVs (n=14)	Healthy GVs (n=20)
Age (yrs)	39.0 ± 7.1	40.4 ± 7.9
Height (cm)	176.5 ± 8.3	168.4 ± 28
Weight (kg)	96.0 ± 24.7	90.4 ± 13.9
HR (b min <sup>-1</sup> )	74.0 ± 12.0	65.0 ± 8.0
SBP (mmHg)	117.4 ± 9.1	117.6 ± 10.6
DBP (mmHg)	74.8 ± 6.7	77.5 ± 6.8
Peak VO <sub>2</sub> (mlkg.min <sup>-1</sup> )	28.7 ± 7.5	32.1 ± 8.2
Submax VO <sub>2</sub> (mlkg.min <sup>-1</sup> )	17.8 ± 4.4	21.9 ± 5.3
% peak VO <sub>2</sub>	63.0 ± 0.06	68.0 ± 0.03
HPT (°C) Pre Ex	43.7 ± 4.2	44.2 ± 3.2
HPT (°C) Post Ex	44.2 ± 3.8	45.0 ± 2.7
PPT (sec) Pre Ex	31.0 ± 31.8	46.0 ± 40.1
PPT (sec) Post Ex	38.8 ± 44.5	49.5 ± 37.3



## Discussion of preliminary findings

- **GVs with medically unexplained musculoskeletal pain:**
  - Are more sensitive to experimental pain stimuli than healthy GVs
  - Describe experimental pain stimuli as more intense and more unpleasant following 30 minutes of moderately intense submaximal exercise
  - Surprisingly, healthy GVs did not exhibit an exercise-induced analgesic response

## To be determined

- What is the relationship between pro-inflammatory cytokines and pain sensitivity in GVs with medically unexplained muscle pain?
- What is the relationship between naturally occurring muscle pain during exercise and pain sensitivity post exercise?
- What are the spinal and supraspinal mechanisms underlying pain sensitivity and painful symptoms in GVs with medically unexplained muscle pain?