

THE EFFECT OF PAIN ON SENSORY AND MOTOR CONTROL MECHANISMS IN HEALTHY AND RECURRENT LOW BACK PAIN PATIENTS

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LBP: A GLOBAL BURDEN

- Definitions challenge statistics¹ but LBP often is a **transient** symptom
- **24-87%** LBP patients suffer a **recurrence** within year 1²
- Prevalence of up to **20% of chronicity** has been reported³
- The effectiveness of LBP **intervention strategies is limited**
- **Increased prevalence** of persistent, disabling LBP reported recently⁴
- **Knowledge about transition** from acute to persistent pain is limited⁵
- Higher prevalence of bilateral pain and higher pain intensity persistent LBP⁶

¹ Hoy et al., 2012

² Stanton, Latimer, Maher, & Hancock, 2010

³ Meucci et al., 2015

⁴ Freburger et al., 2009

⁵ Arendt Nielsen et al 2011, Melloh et al 2011

⁶ Chanda et al 2011



There are an awful lot of things going on that need understanding and explanation, but - to put it mildly - the world is a mess.

— *Madeleine Albright* —

United States Secretary of State 1996-2001

MOTOR CONTROL ↔ PAIN

INDIVIDUAL

Reaching a goal

Motor strategies

Neuromusculoskeletal control

Planning
Coordination
Anticipation
Adaptation

**BASELINE
CONTROL VS. UNILATERAL VS. BILATERAL
+/- MUSCLE FATIGUE
+/- DOMS**



GLUT
MED

GLUT
MAX

ILIO-
COSTAL

LONGIS-
SIMUS

MULTIFI-
DUUS

MU

LO

ILIOC

LAT DORSI

IT

QL

PSOAS

OBL EXT

OBL INT

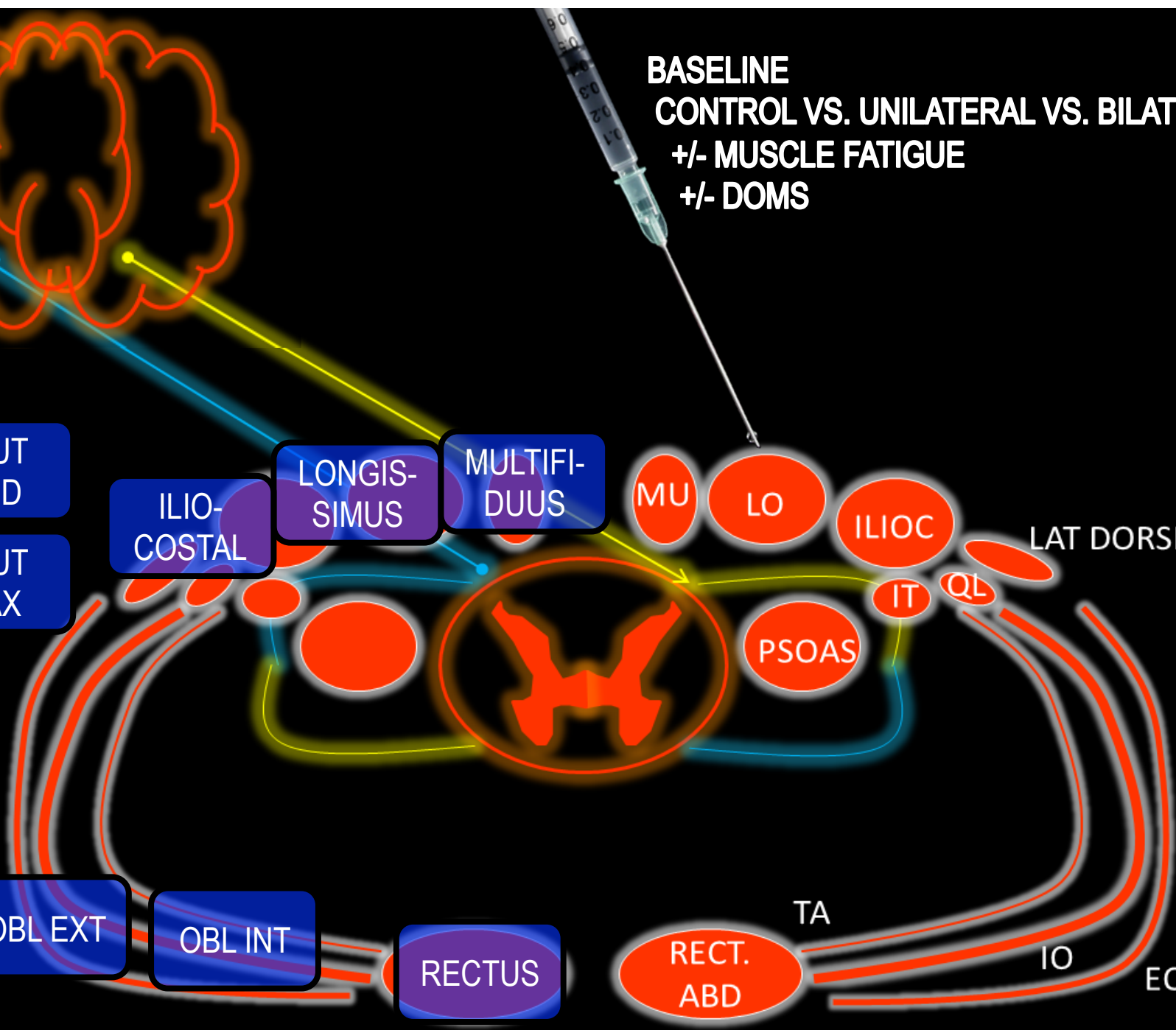
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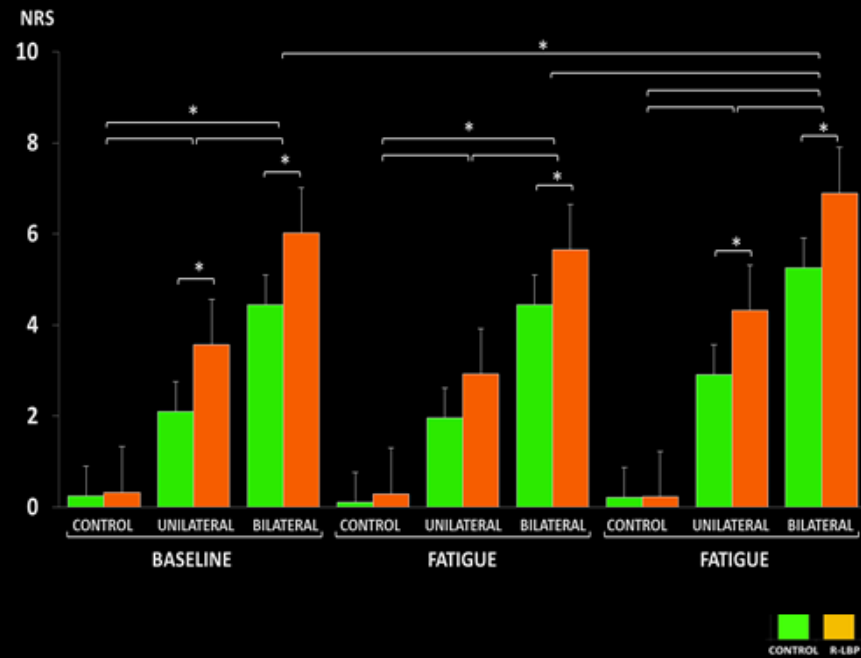
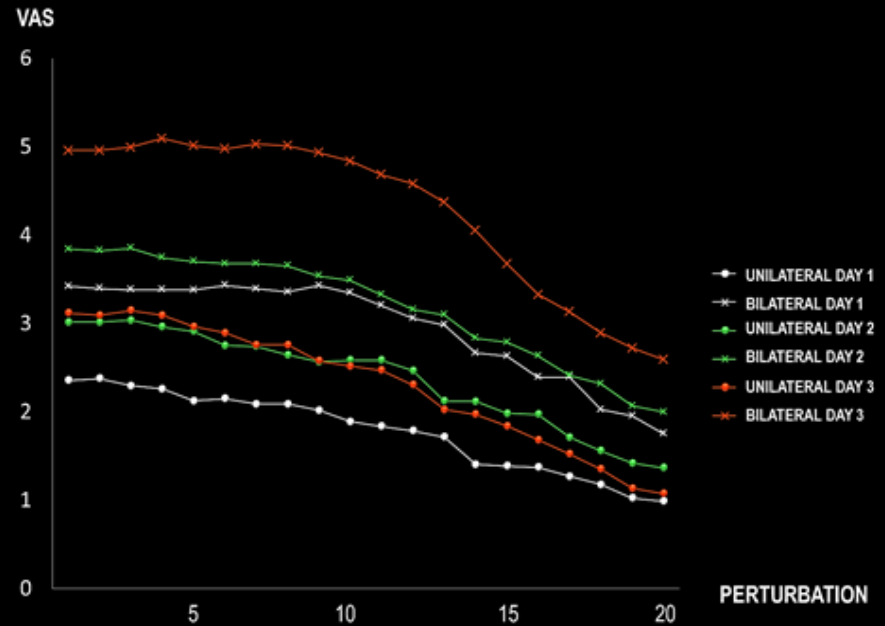


SENSORY

PAIN INTENSITY

(MEAN + SEM, N=25
CONTROL/25 R-LBP)

SPATIAL SUMMATION
LOCAL SENSITIZATION
CENTRAL SENSITIZATION

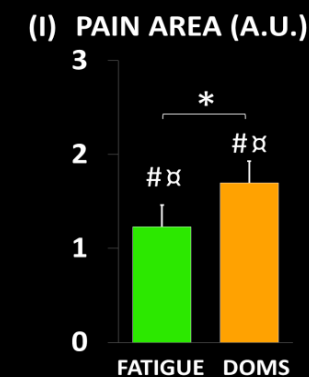
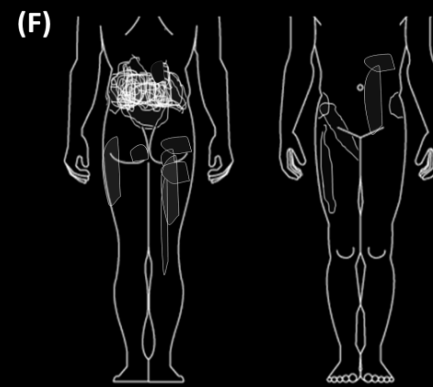
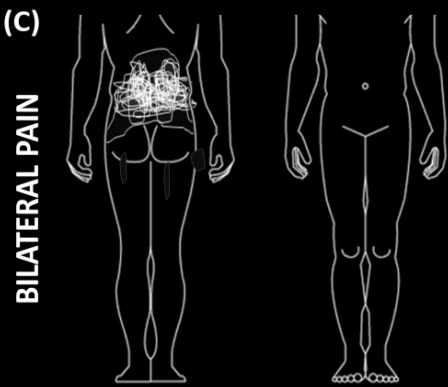
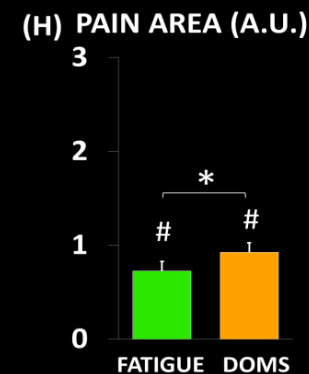
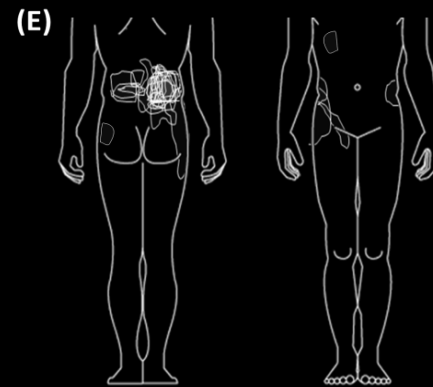
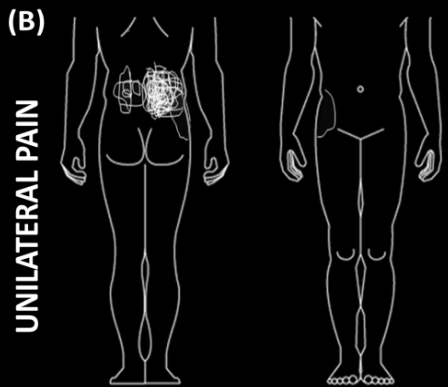
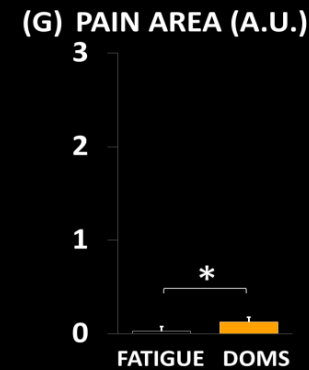
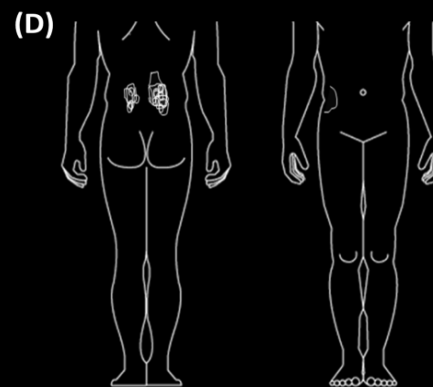
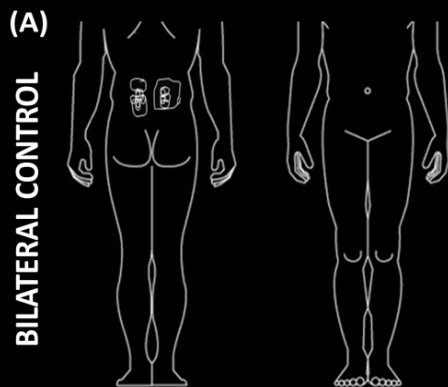
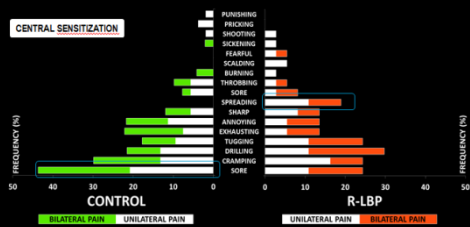


LARSEN, HIRATA & GRAVEN-NIELSEN 2015
LARSEN, HIRATA & GRAVEN-NIELSEN, UNDER PREPARATION

SENSORY

**SUPERIMPOSED
PERCEIVED
EXPERIMENTAL
PAIN AREAS
(MEAN + SEM
N=19 HEALTHY CONTROLS)**

**SPATIAL SUMMATION
PERIPHERAL SENSITIZATION
CENTRAL SENSITIZATION?**



FATIGUE

DOMS

MOTOR

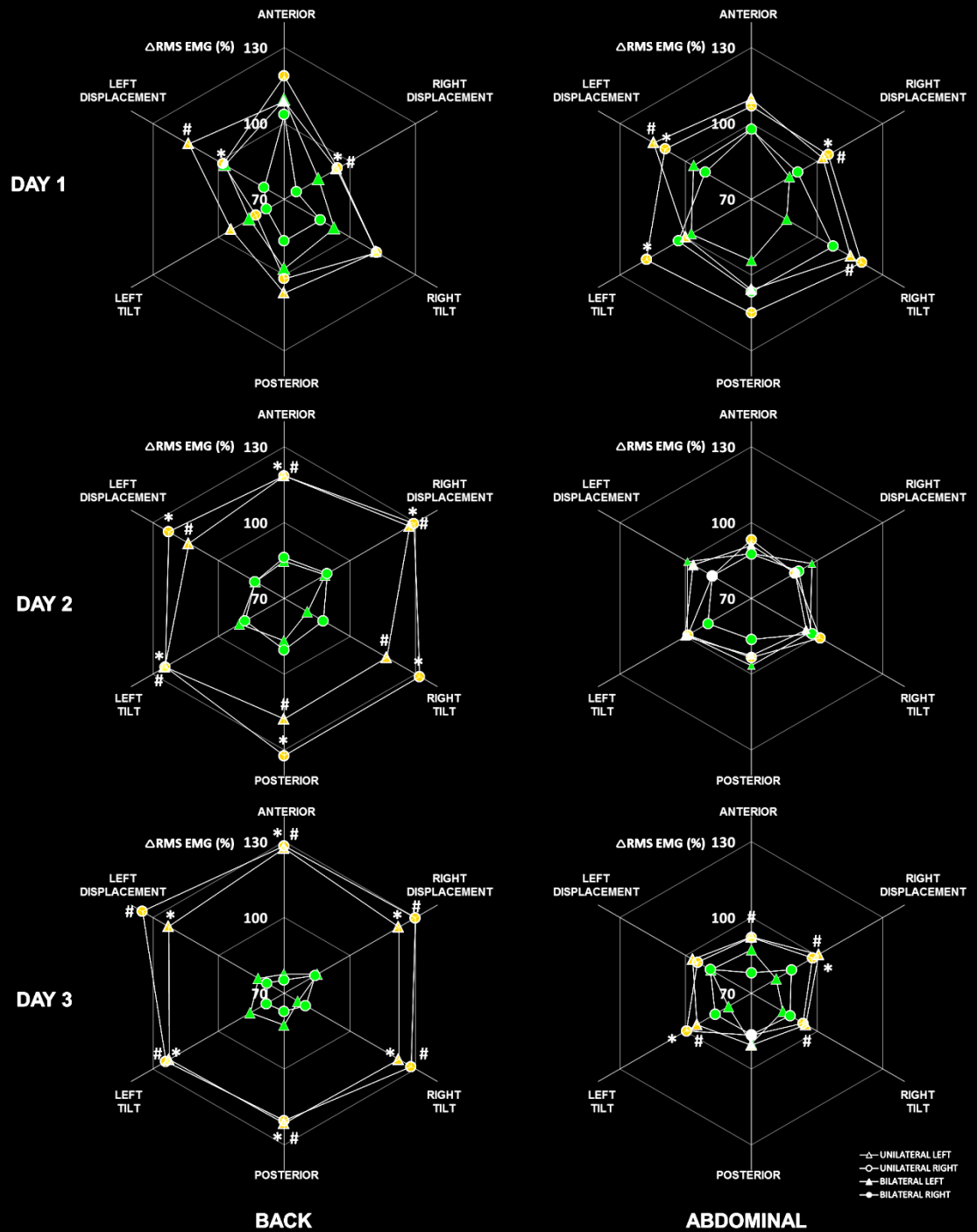
PAIN-EVOKED MUSCLE ACTIVITY CHANGES AFTER SURFACE PERTURBATION (Δ RMS EMG (%), N=19 CONTROLS)

BILATERAL VERSUS UNILATERAL PAIN MAY INCREASE TRUNK MUSCLE ACTIVITY

DOMS AGGRAVATES THE EFFECT OF BILATERAL BUT NOT UNILATERAL PAIN

REORGANIZATION?

+ REORGANIZATION, DIFFERENTIAL IMPACT OF PAIN DURING GAIT AND STAIR TASKS



CONCLUSION

- The sensory and motor impact of pain is influenced by **several parameters** including spatial summation, local tissue condition and central pain processing mechanisms and their **interaction**
- The motor impact of pain is influenced by **interaction** between individual, task-related and acute pain processing mechanisms
 - and **recurrent LBP result in manifest changes** in the nervous system that may increase pain perception during acute pain response

IMPLICATION

Recurrent low back pain patients should be examined and treated like persistent low back pain patients.... Increase the patients' knowledge, understanding and tool box to support them to take control