2ÈMES JOURNÉES FRANCO-QUÉBECOISES

SANTÉ MENTALE ET DOULEUR

31 MAI & 1er JUIN 2018

THÈMES :
- Recherche
- Autisme
- TDA/H
- Addiction
- Dépression
- ...

Bases neurophysiologiques utiles au traitement de la douleur en santé mentale

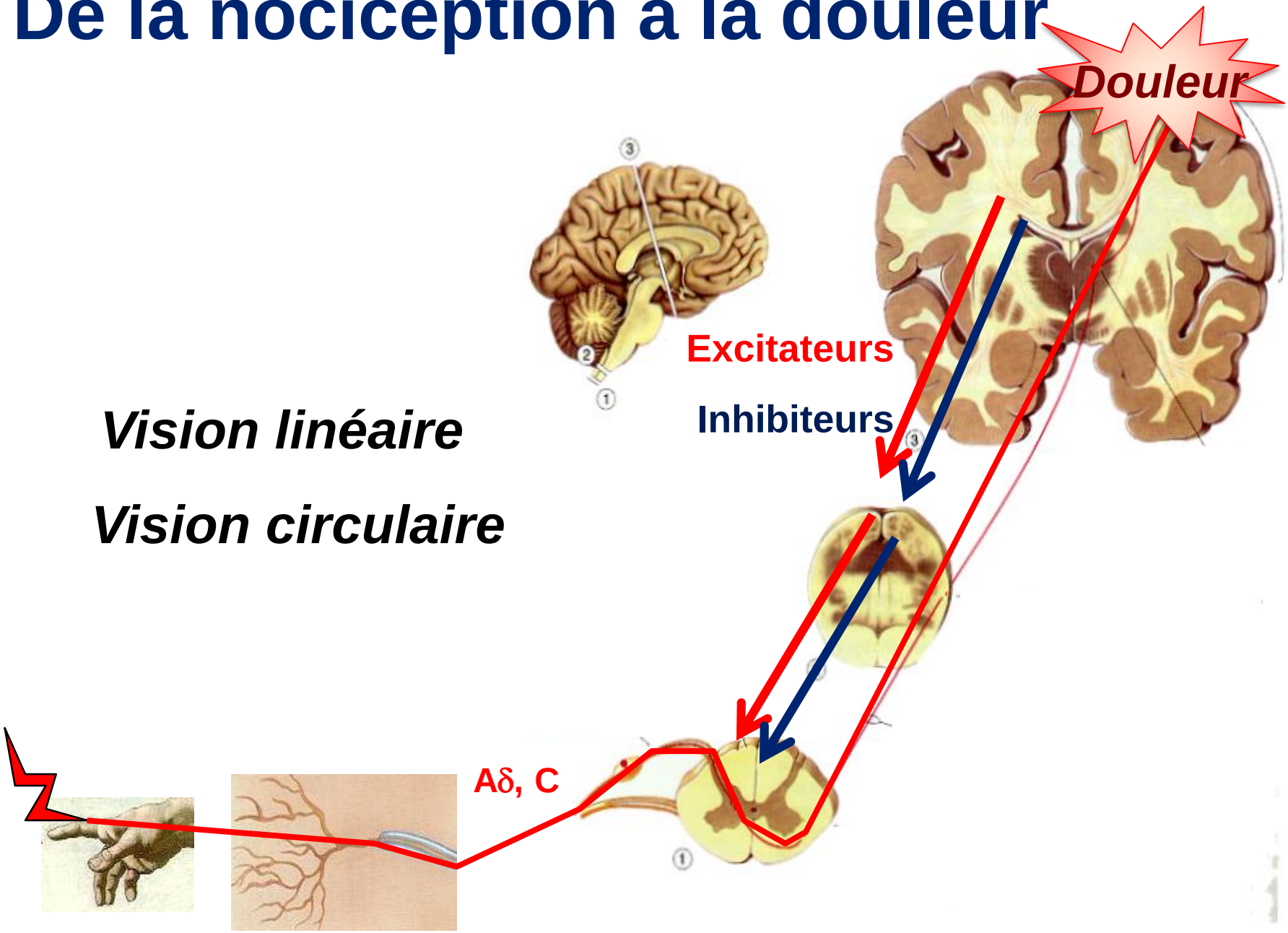
Serge Marchand, Ph.D.

CENTRE DE RECHERCHE CHUS

Fonds de recherche Santé Québec

UNIVERSITÉ DE SHERBROOKE

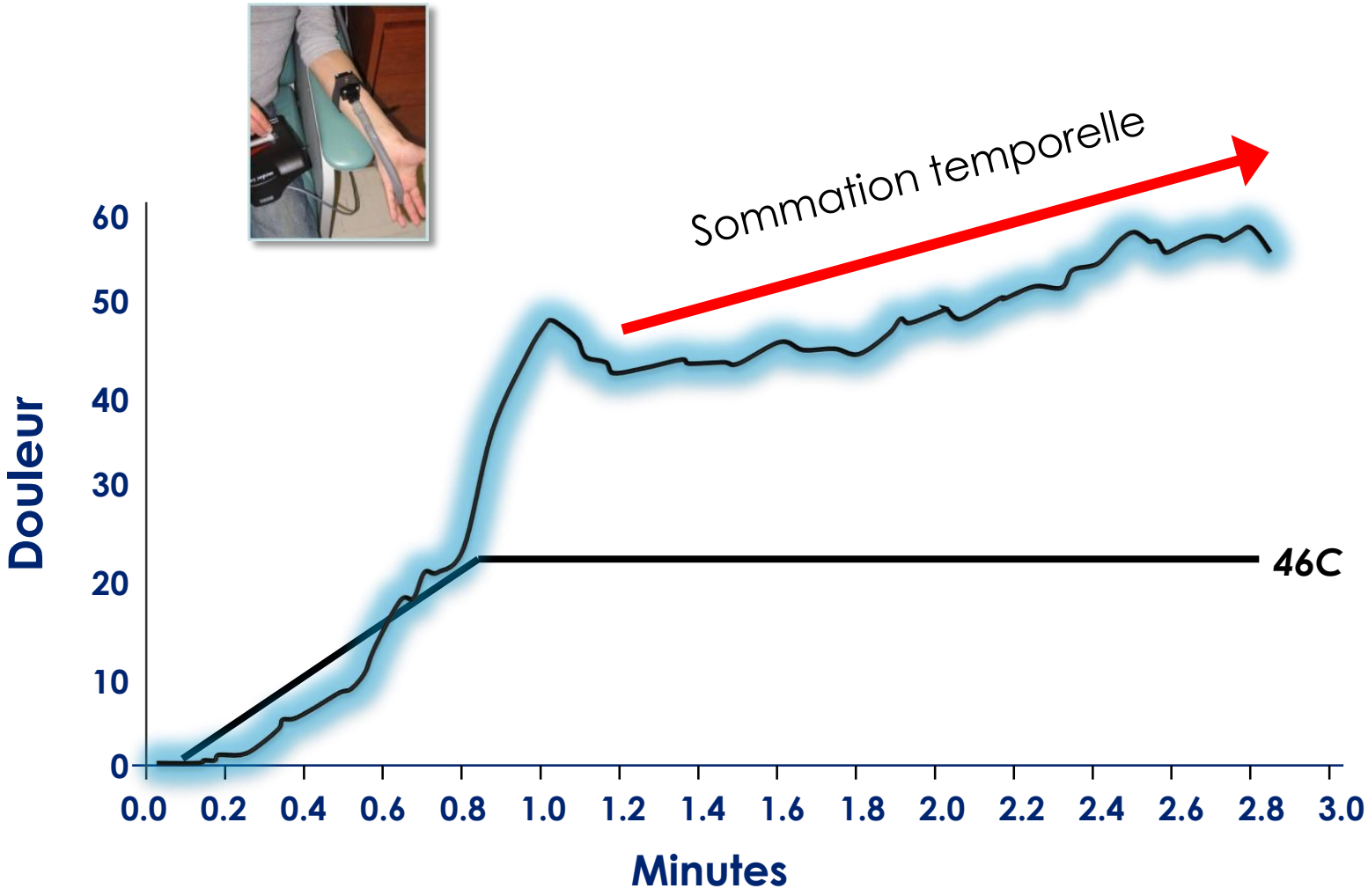
De la nociception à la douleur



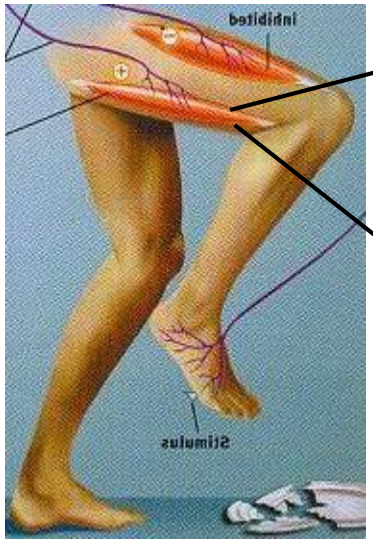
Vision linéaire

Vision circulaire

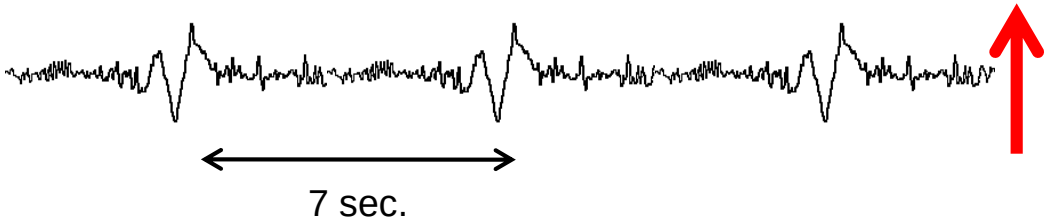
Mécanismes excitateurs
Sensibilisation centrale



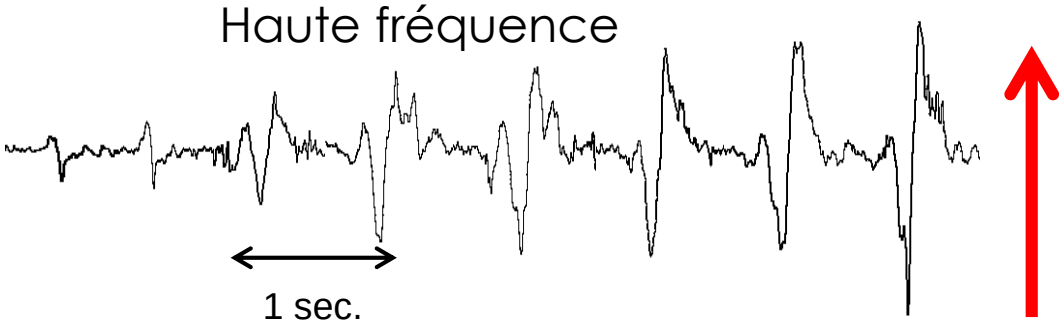
Sommation temporelle reflexe spinal : Système excitateur



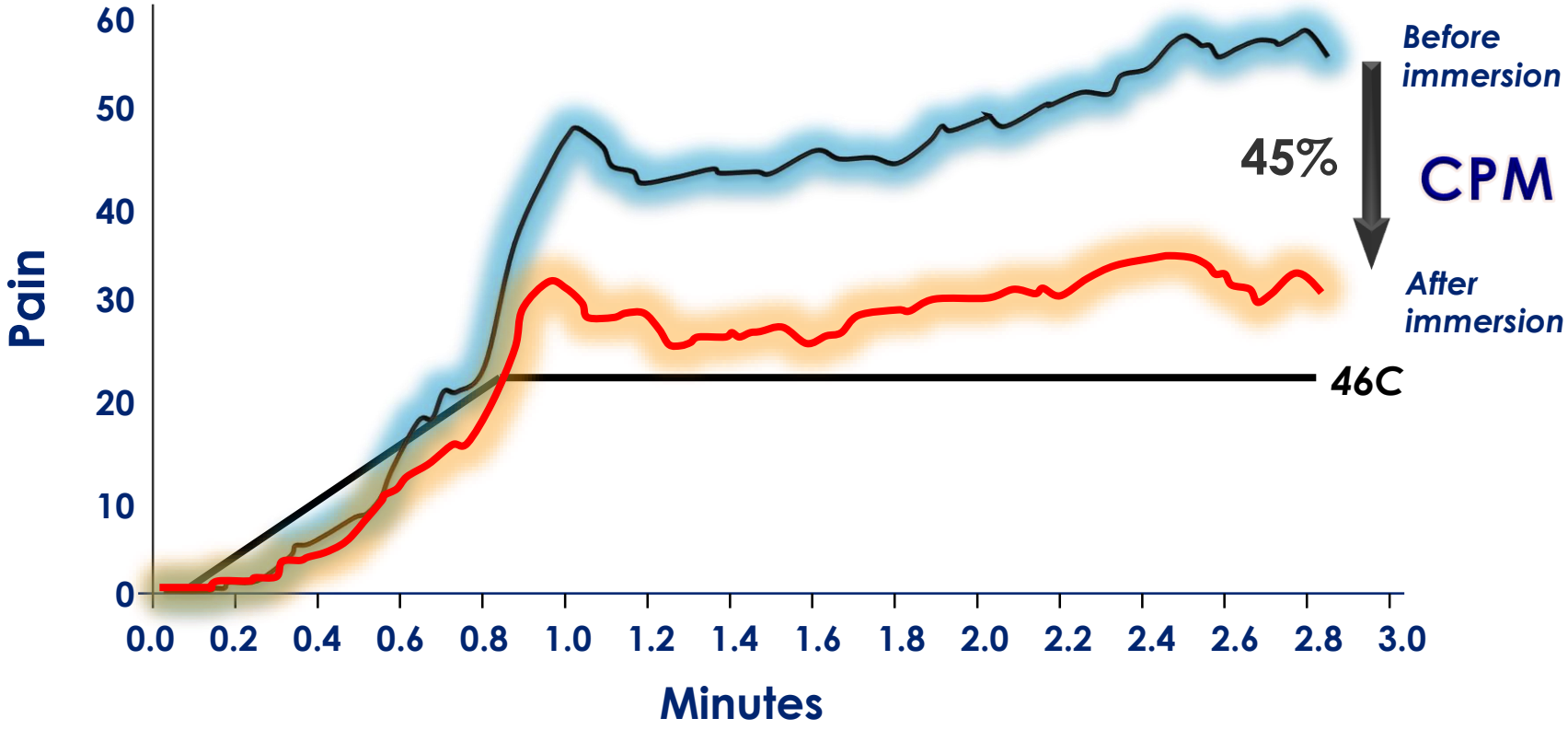
Basse fréquence



Haute fréquence



Système Inhibiteur: Conditioned Pain Modulation



PAIN

Pain facilitation and pain inhibition during conditioned pain modulation in fibromyalgia and in healthy controls

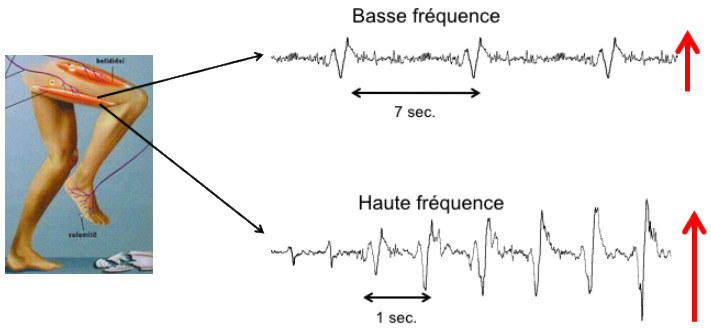
Stéphane Potvin[a,b], Serge Marchand[c,d,*]

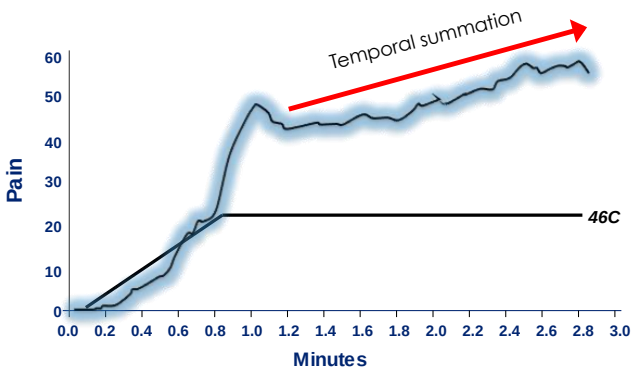
Pourcentage de sujets sains qui présentent une inhibition suite au CPM

Santé Mentale et douleur
Quels mécanismes?

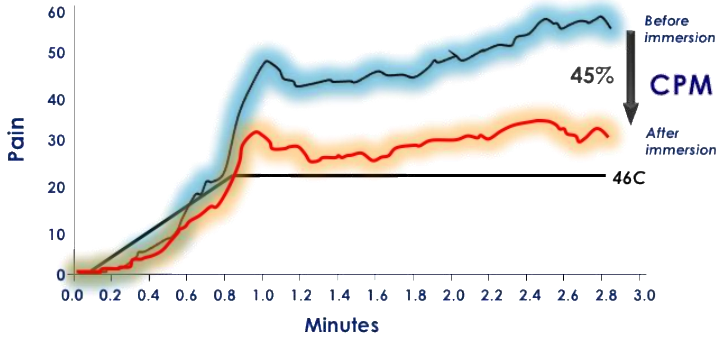
Mécanismes de la douleur

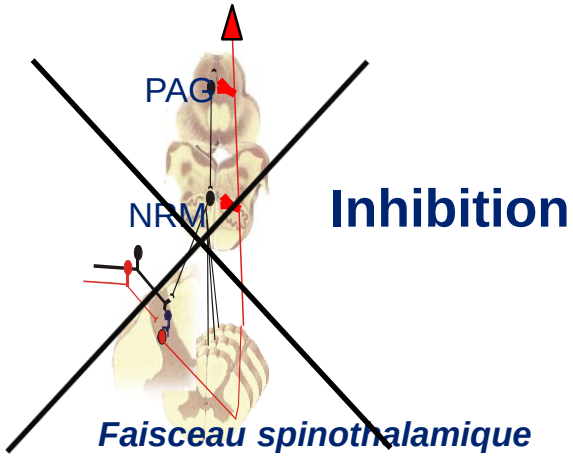
Augmentation des mécanismes excitateurs



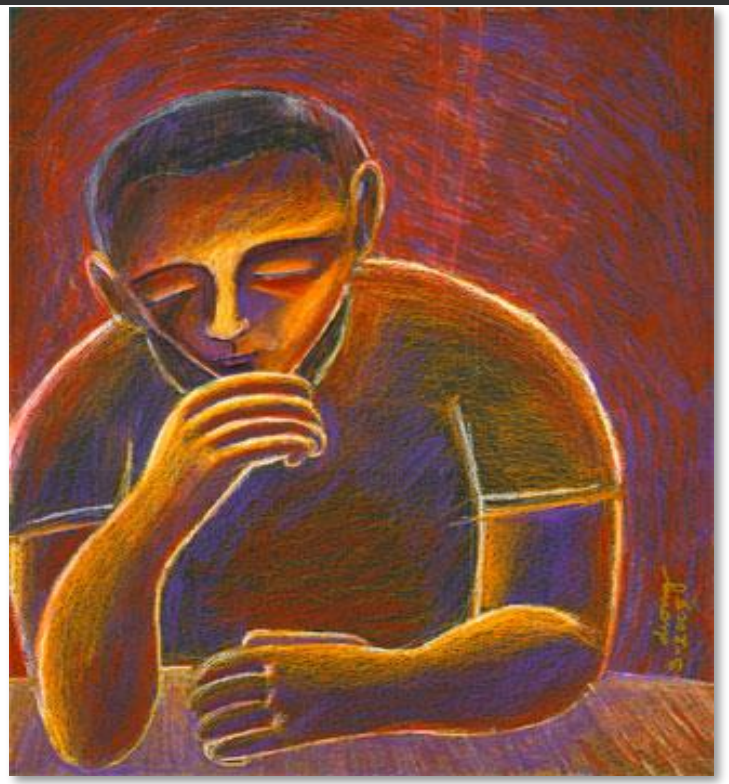


Réduction des mécanismes inhibiteurs





Dépression et mécanismes excitateurs



Neuropharmacology 62 (2012) 63–77

Contents lists available at SciVerse ScienceDirect

Neuropharmacology

journal homepage: www.elsevier.com/locate/neuropharm

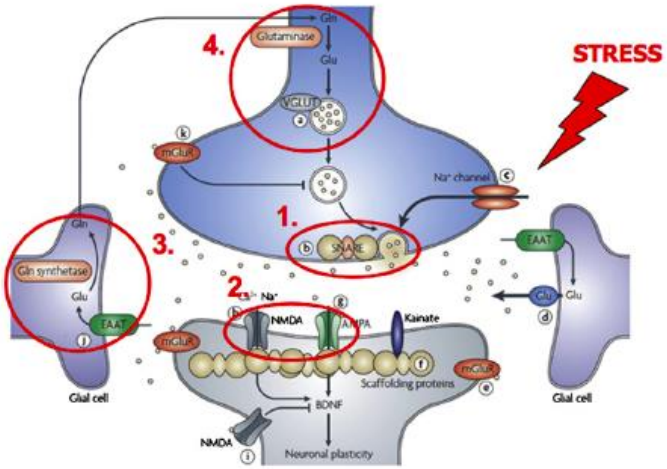
Review

Towards a glutamate hypothesis of depression
An emerging frontier of neuropsychopharmacology for mood disorders

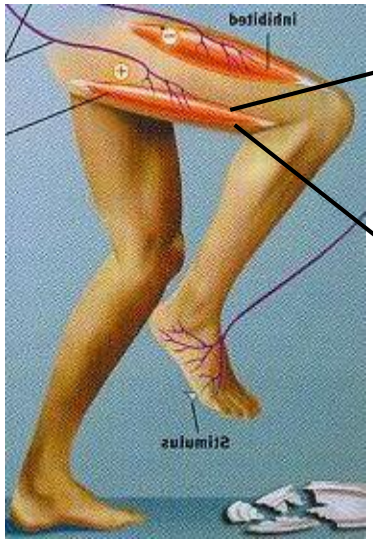
Gerard Sanacora [a], Giulia Treccani [b], Maurizio Popoli [b,*]

Un changement de paradigme des monoamines vers une neuroplasticité glutaminergique.

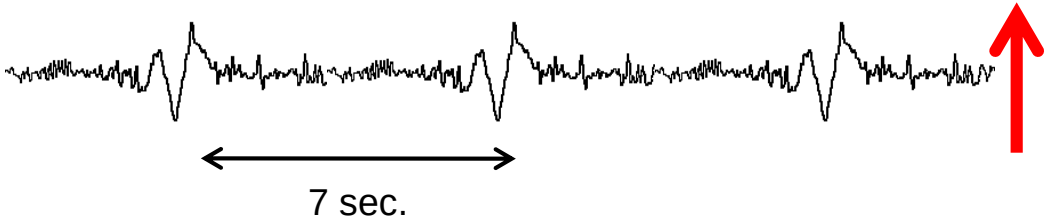
Potentiel pour le développement de nouvelles approches thérapeutiques!



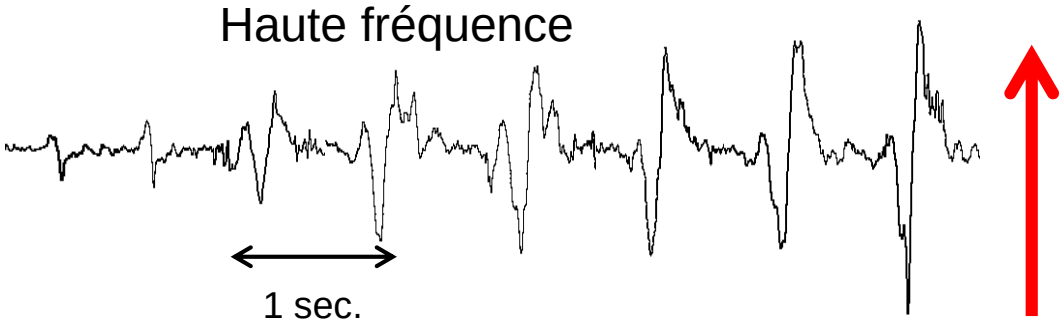
Sommation temporelle
Hypothèse système excitateurs



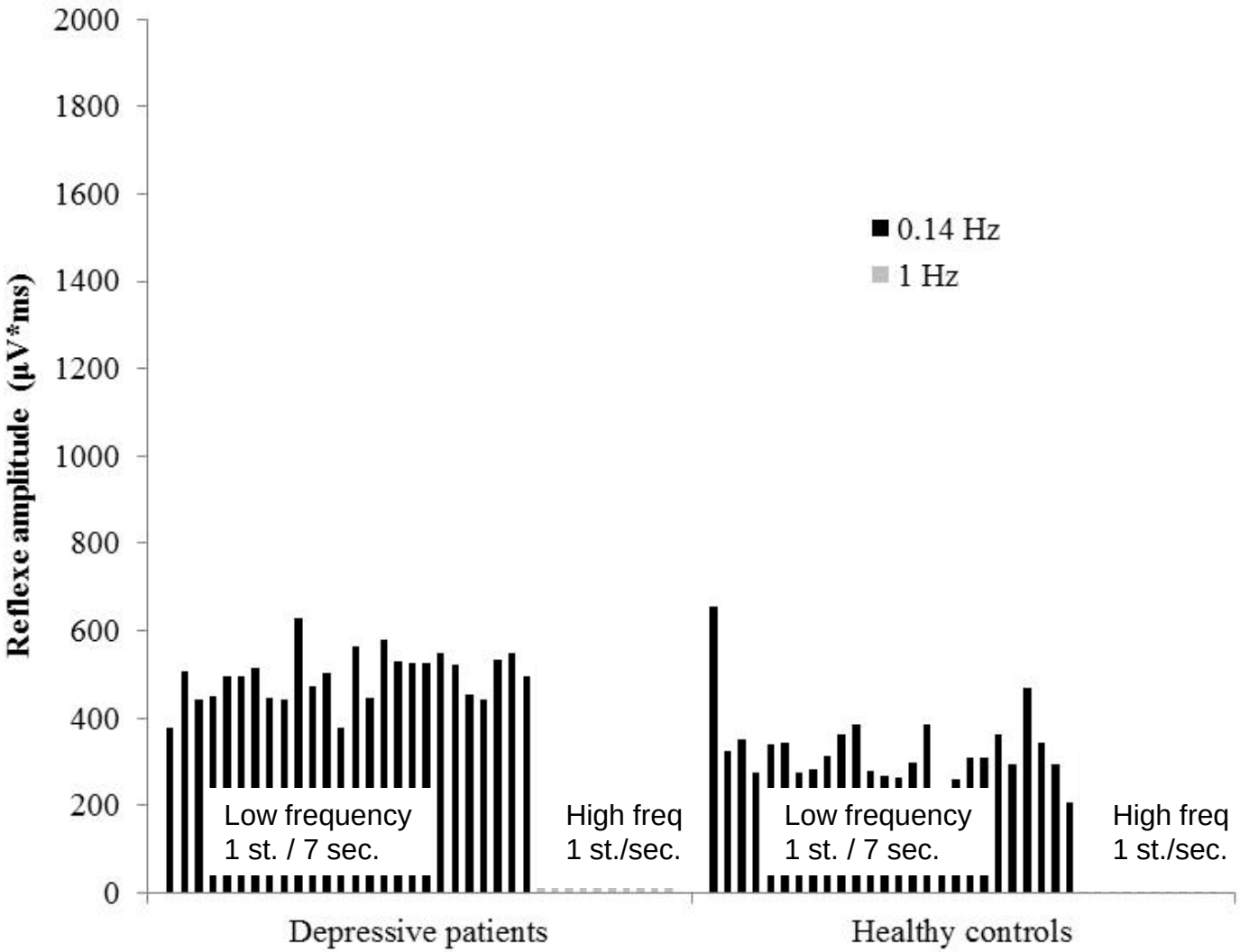
Basse fréquence



Haute fréquence



Mécanismes excitateurs et dépression



Tikasz et al. 'Increased spinal pain sensitization in major depressive disorder: A pilot study', *Psychiatry Res*, 2016

Schizophrénie et mécanismes excitateurs

Serge Marchand, Ph.D.

Case Report

Case Reports in Psychiatry
Volume 2016, Article ID 8702483, 3 pages

Markedly Reduced Thermal Pain Perception in a Schizoaffective Patient with Tardive Dyskinesia

Stéphane Potvin,[1,2] Emmanuel Stip,[2,3] and Serge Marchand[4]

Case of a female patient with schizoaffective disorder, who displayed markedly reduced pain perception during an experimental heat pain paradigm. Compared to a large group of healthy volunteers that we tested in 3 previous studies using the same psychophysical procedure, the experimental temperature required to induce moderate pain was radically increased in this patient (z-score = 3.6).

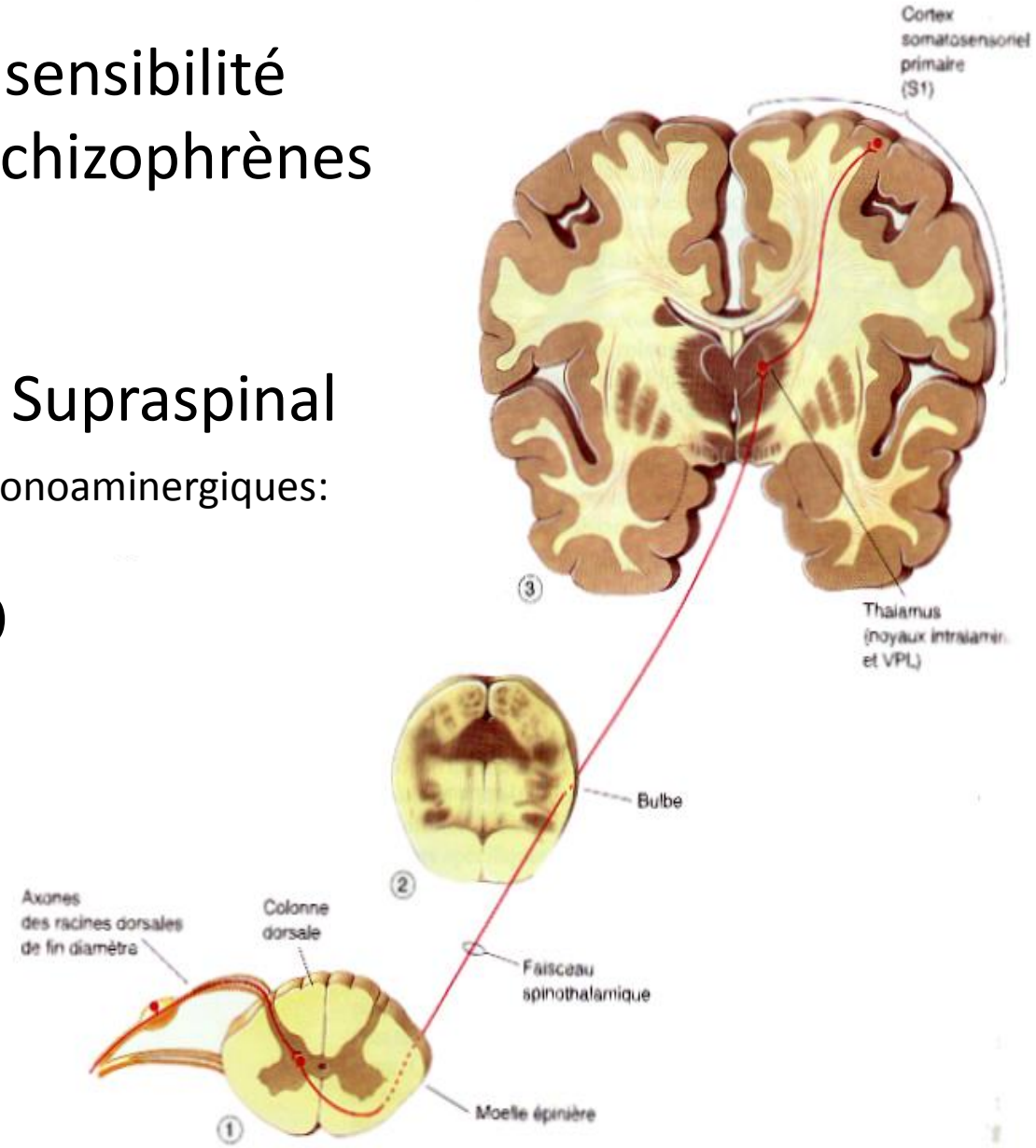
Hypoalgésie existe, mais ce sont des cas rares!
Présente un risque de ne pas identifier des problèmes de santé!

Apparence d'insensibilité chez les patients schizophrènes

Supraspinal

- Augmentation des systèmes monoaminergiques:
- 5HT, NA, DA, …

?



Spinal

- Diminution du système glutamate (récepteurs NMDA)
- Mécanismes excitateurs réduits

Pharmacological Reports 66 (2014) 343–352

Contents lists available at ScienceDirect

Pharmacological Reports

journal homepage: www.elsevier.com/locate/pharep

Review article

Glutamate and modeling of schizophrenia symptoms: Review of our Findings: 1990–2014

Pascual Ángel Gargiulo [a,b,c,*], Adriana Inés Landa De Gargiulo [a,b,c]

Modèles pré-cliniques de schizophrénie par des antagonistes NMDA et blocage des autorécepteurs glutamate.

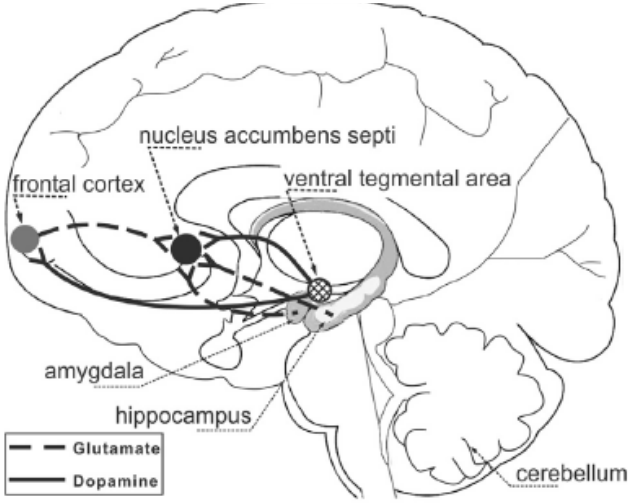


Fig. 7. Brain structures involved in schizophrenia schematically represented. Meso-cortico-limbic dopaminergic system is represented here by an unbroken line, and dashed lines represent the glutamatergic corticostriatal projections. A problem in the interplay of both systems is here proposed as the base of schizophrenia. We proposed that early stages of the illness could be attributed to a deficiency of glutamate neurotransmission [24–29].

Pain Medicine

Pain Medicine 2012; *: **–**
Wiley Periodicals, Inc.

Pain Perception in Schizophrenia: Evidence of a Specific Pain Response Profile

Mylène Lévesque, BSc,* Stéphane Potvin, PhD,‡ Serge Marchand, PhD,* Emmanuel Stip, MD, MSc,§¶ Sylvain Grignon, MD, PhD,† Lalonde Pierre, MD,§ Olivier Lipp, MD,§ and Philippe Goffaux, PhD*

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Available online at www.sciencedirect.com

ScienceDirect

Journal of Psychiatric Research 42 (2008) 1010–1016

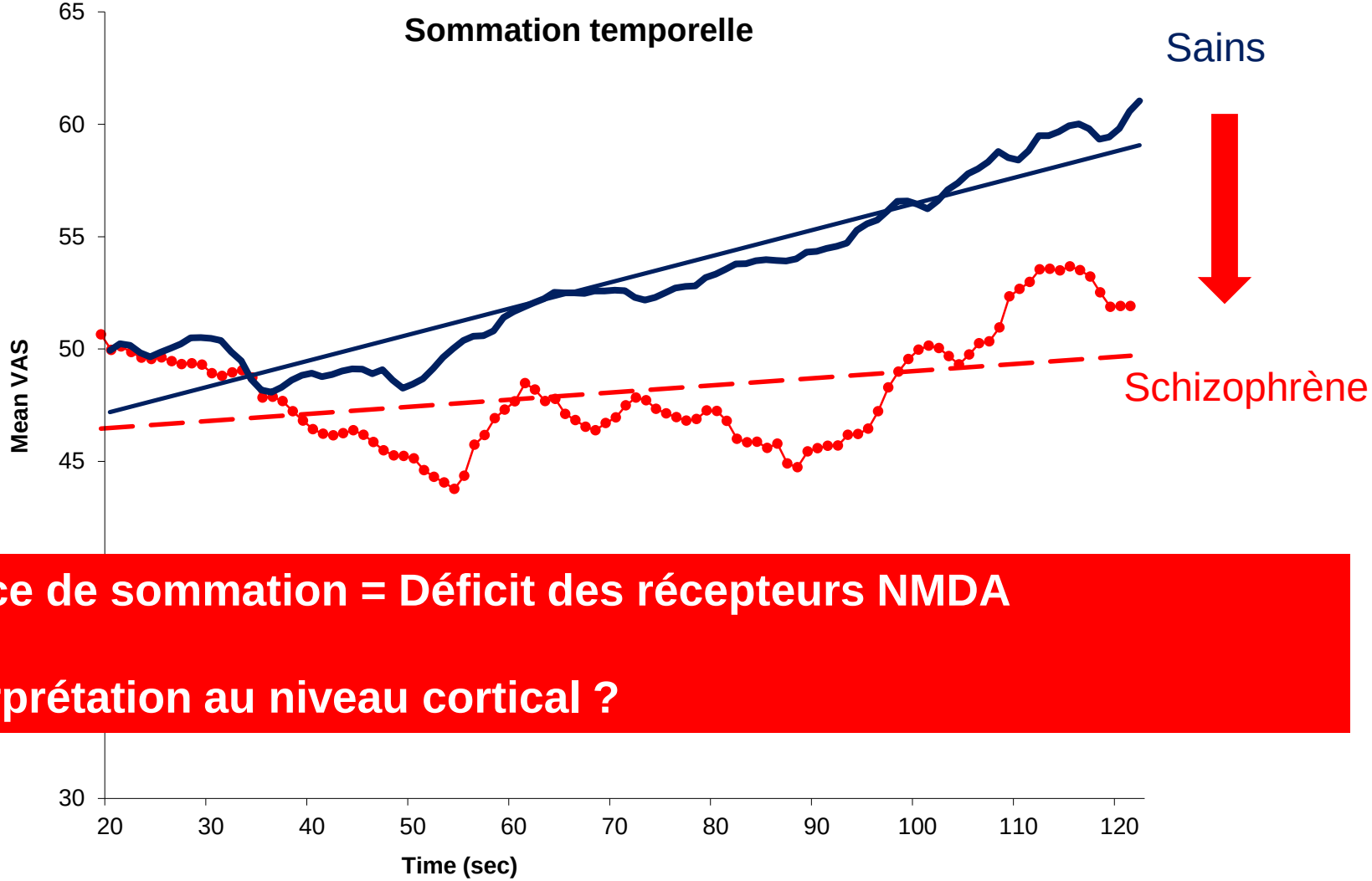
JOURNAL OF PSYCHIATRIC RESEARCH

www.elsevier.com/locate/jpsychires

Pain perception in schizophrenia: No changes in diffuse noxious inhibitory controls (DNIC) but a lack of pain sensitization

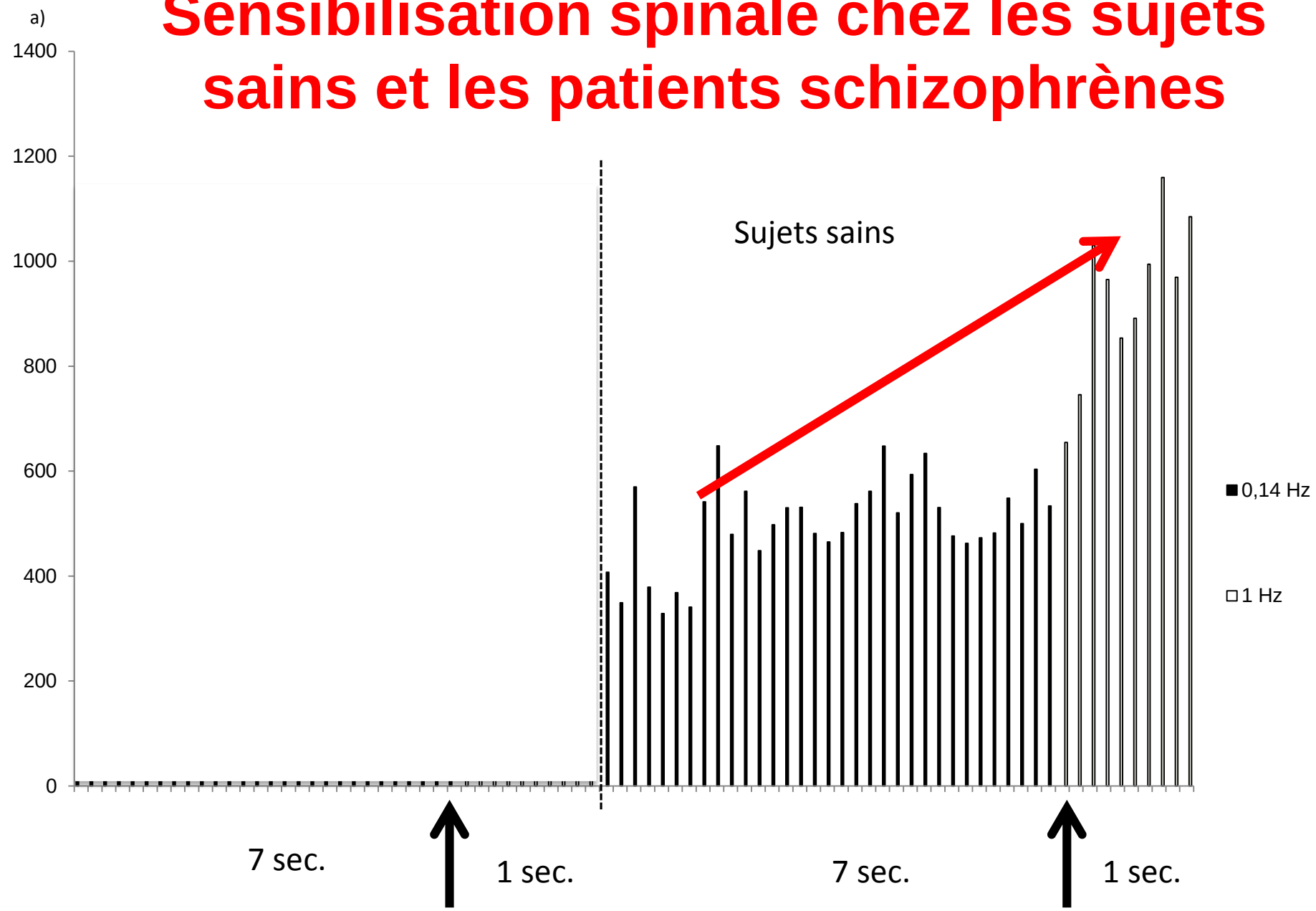
Stéphane Potvin [a,b], Emmanuel Stip [a,c], Adrien Tempier [a], Tania Pampoulova [a], Lahcen Aït Bentaleb [c], Pierre Lalonde [c], Olivier Lipp [c], Philippe Goffaux [b], Serge Marchand [b,*]

Sommation temporelle



Absence de sommation = Déficit des récepteurs NMDA
ou
Réinterprétation au niveau cortical ?

Sensibilisation spinale chez les sujets sains et les patients schizophrènes



Serge Marchand, Ph.D.

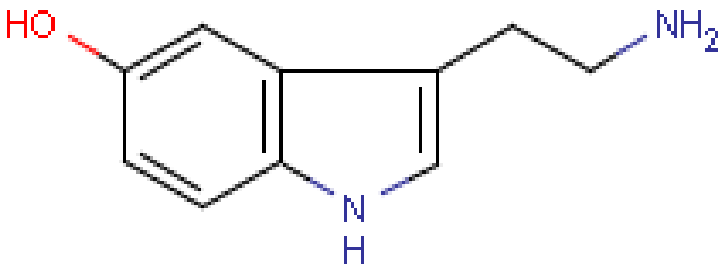
Levesque M, Potvin S, Marchand S *et al.*: Pain Perception in Schizophrenia: Evidence of a Specific Pain Response Profile*. Pain Med*, (2012).

Troubles de l'humeur et mécanismes inhibiteurs

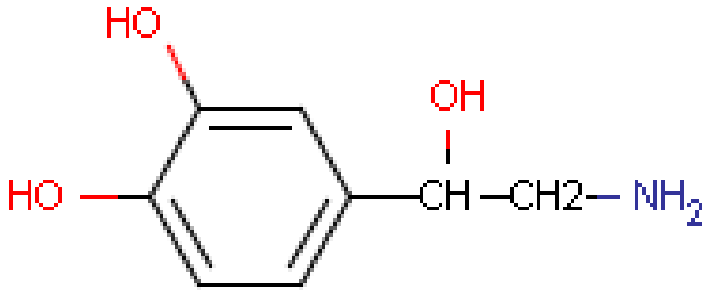
Dépression majeure et douleur

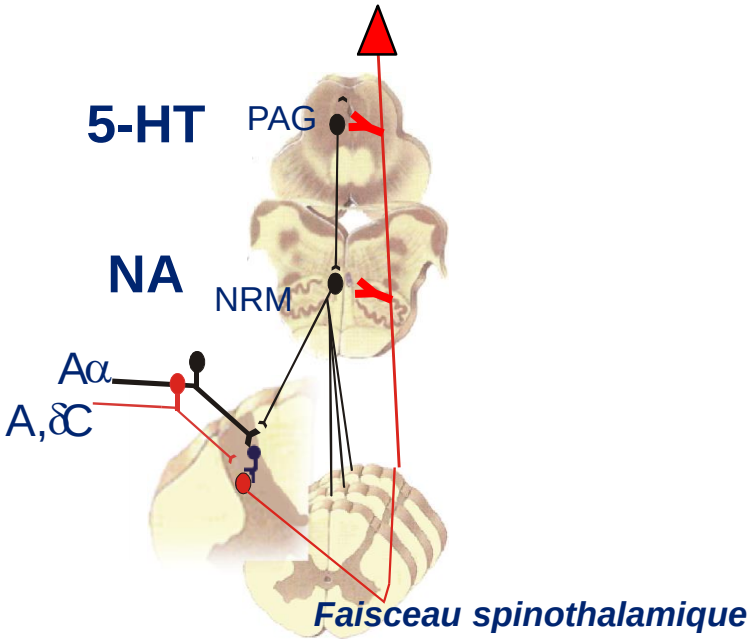
Neurotransmetteurs susceptibles d'être liés à la dépression et aux système inhibiteur

5-HT



NA



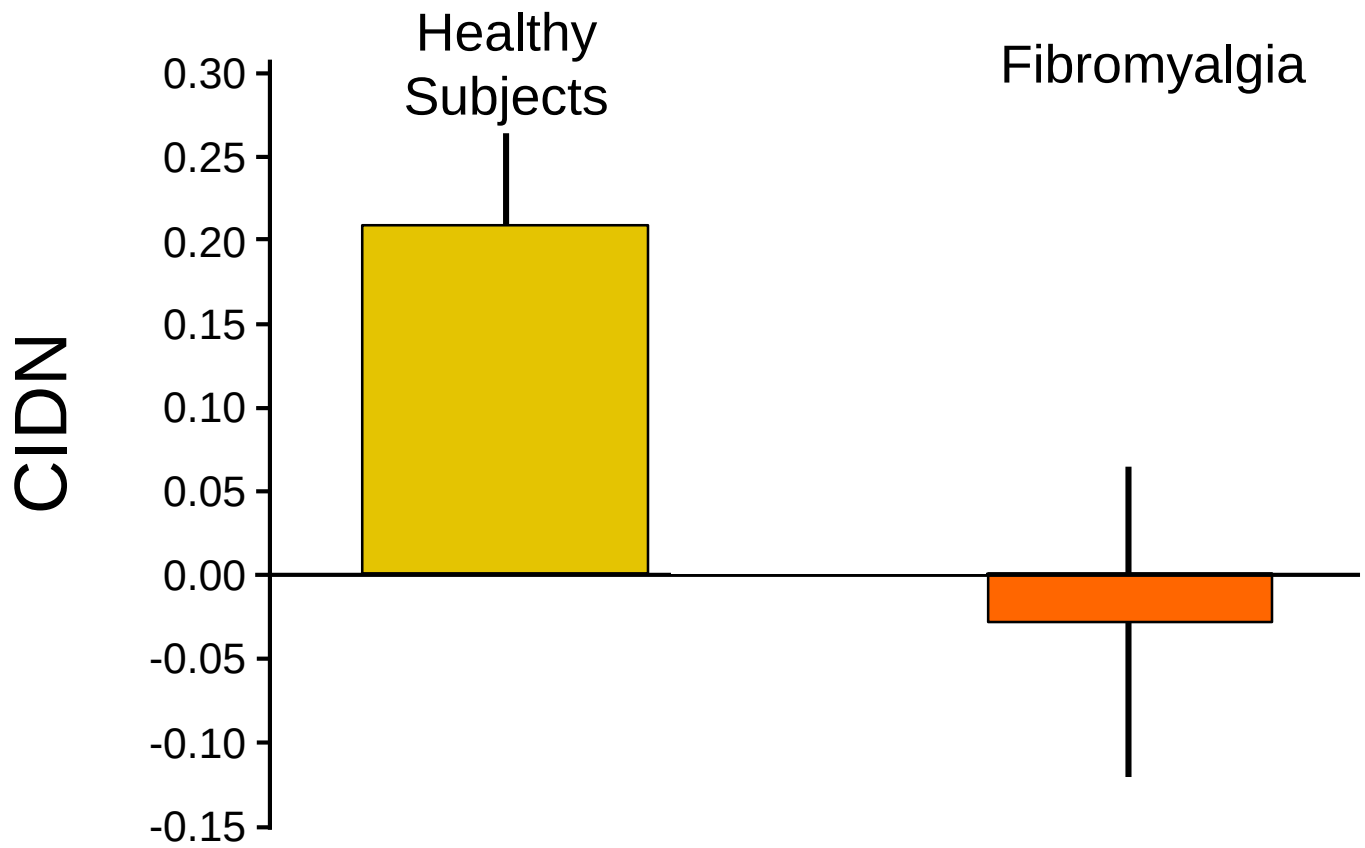


CIDN

Pain Inhibition Is Deficient in Chronic Widespread Pain but Normal in Major Depressive Disorder

Edith Normand, MSc; Stéphane Potvin, PhD; Isabelle Gaumond, PhD; Guylaine Cloutier, MD; Jean-François Corbin, MD; and Serge Marchand, PhD

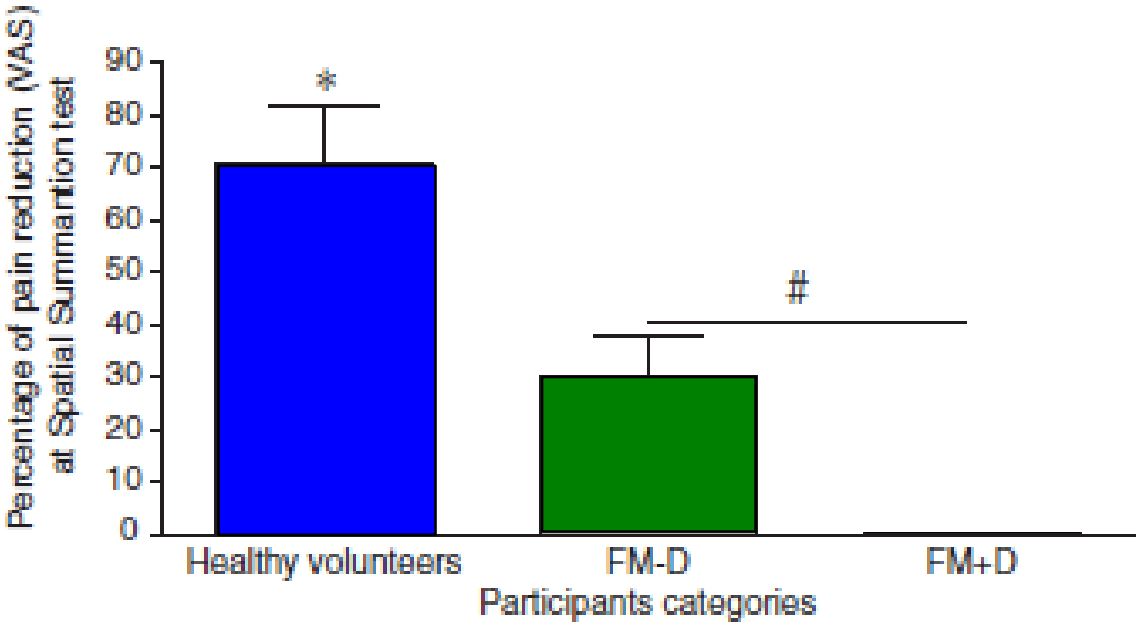
J Clin Psychiatry 2011;72(2):219–224



The Deficit of Pain Inhibition in Fibromyalgia is More Pronounced in Patients With Comorbid Depressive Symptoms

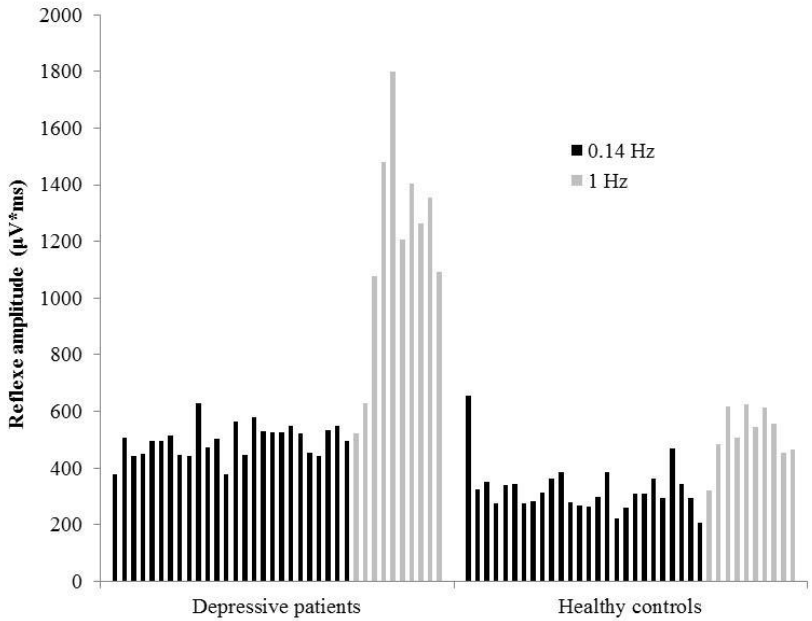
Juliana Barcellos de Souza, PhD, Stéphane Potvin, PhD,* Philippe Goffaux, PhD,* Jacques Charest, PhD,† and Serge Marchand, PhD*†*

The Clinical Journal of Pain: 25 (2): 123-127, 2009



Dépression majeure et douleur

Augmentation de la sommation temporelle au niveau spinal: Effet glutaminergique?



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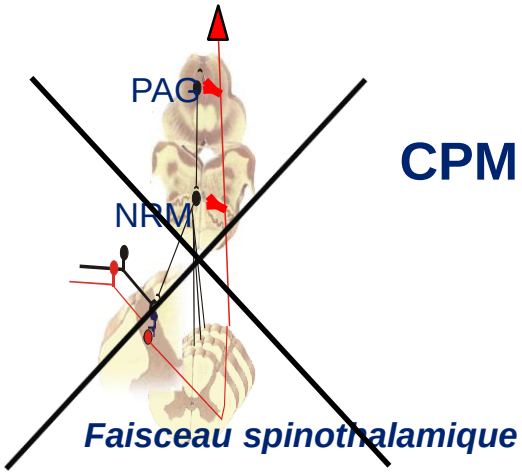
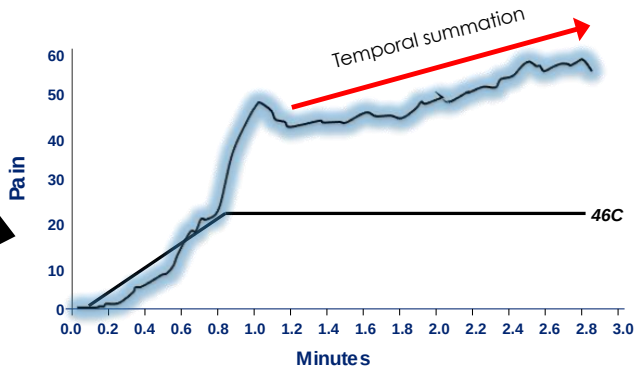


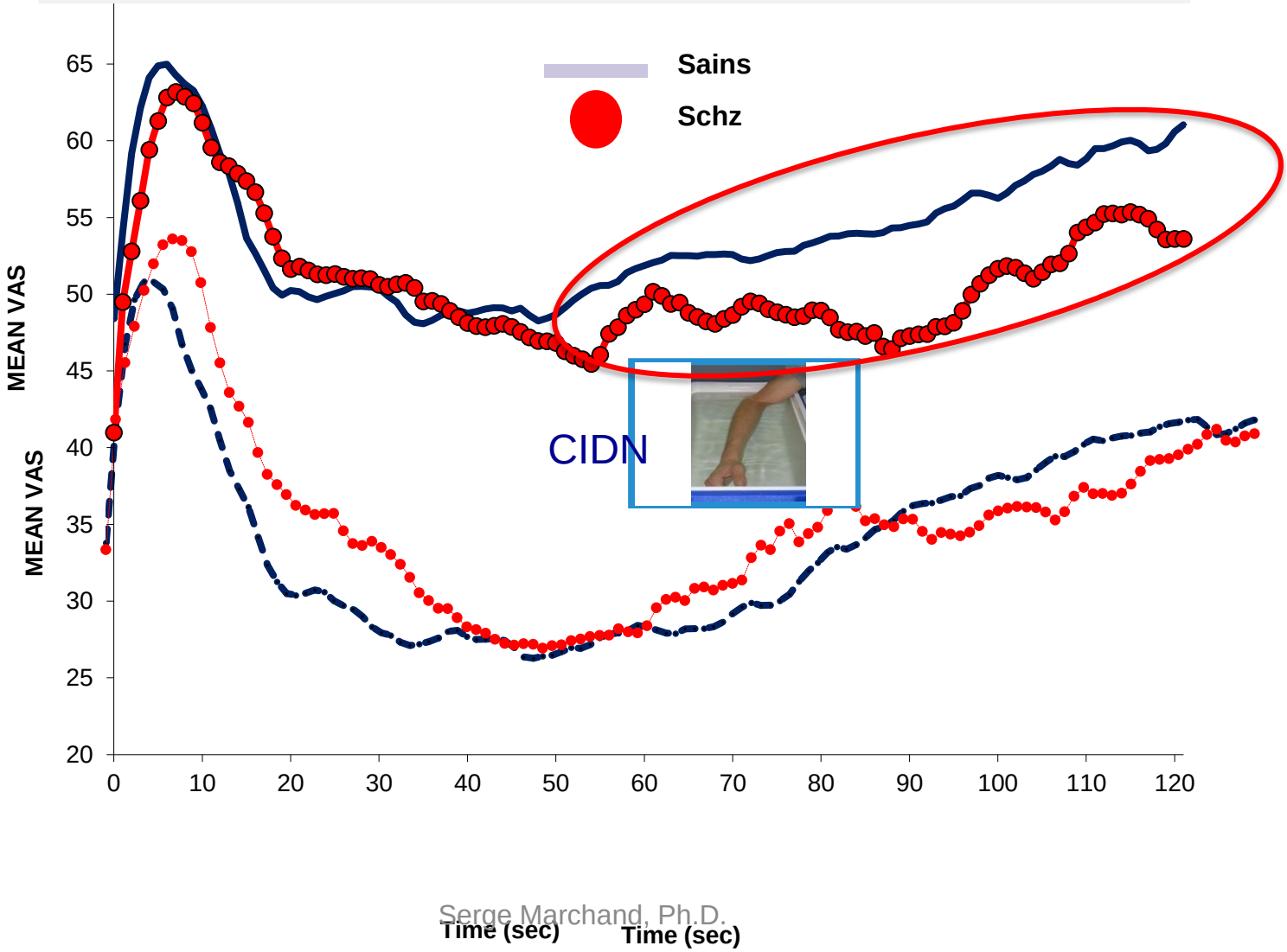


Serge Marcotte, PhD

Schizophrénie et mécanismes inhibiteurs

CIDN: schizophrènes =sujets sains

Donc, CIDN comparable aux sujets sains !



Modulation par les centres supérieurs

Systèmes endogènes de contrôle de la douleur

Niveau cortical

Contrôle des centres supérieurs

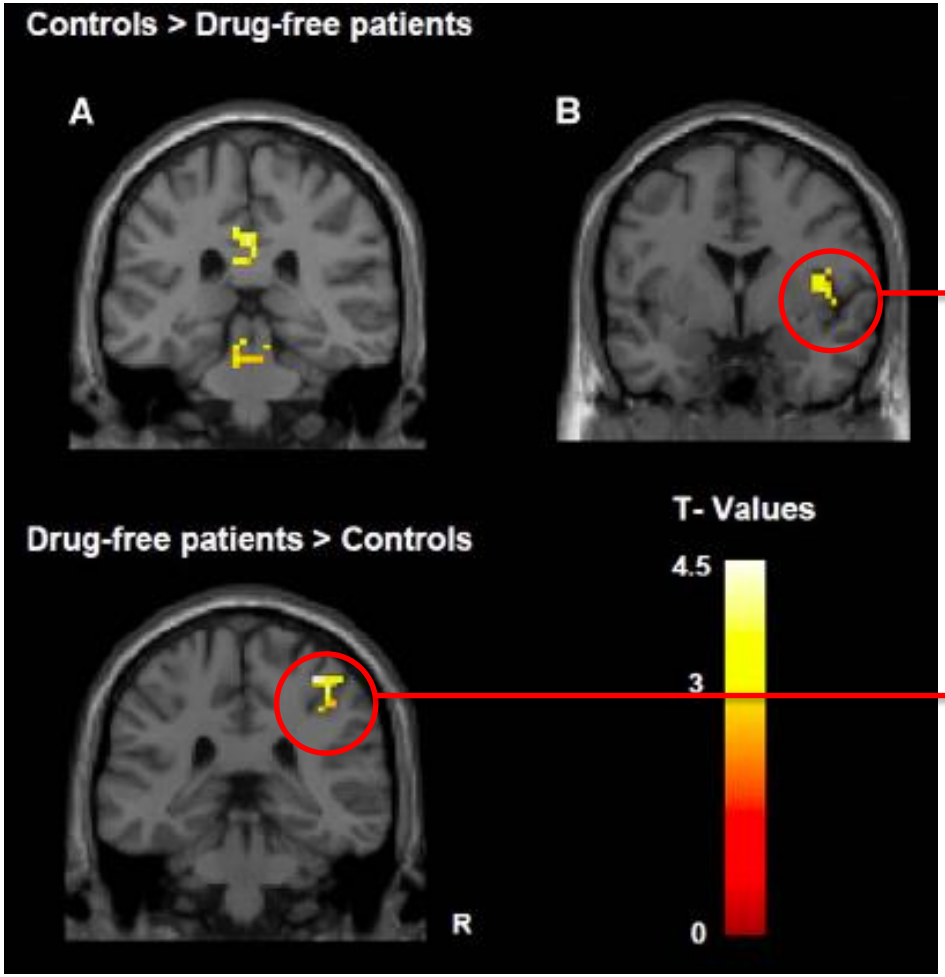
Douleur, schizophrénie et centres supérieurs

Serge Marchand, Ph.D.

Functional magnetic resonance imaging response to experimental pain in drug-free patients with schizophrenia

Camilo de la Fuente-Sandoval[a,b], Rafael Favila[c], Diana Gómez-Martin[d], Francisco Pellicer[e], Ariel Graff-Guerrero[f,*]

Psychiatry Research: Neuroimaging 183 (2010) 99–104



Diminution de l'activité de l'insula
Composante affective

Augmentation de l'activité de cortex somatosensoriel (S1)
Composante sensorielle

Plus de douleur, moins de réponses affectives !

Autime et Douleur

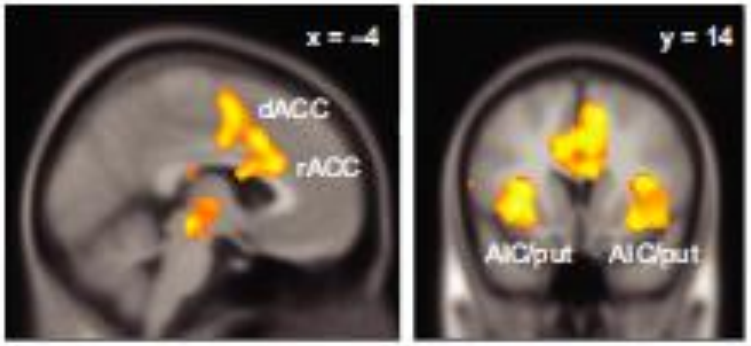
Serge Marchand, Ph.D.

Heightened brain response to pain anticipation in high-functioning adults with autism spectrum disorder

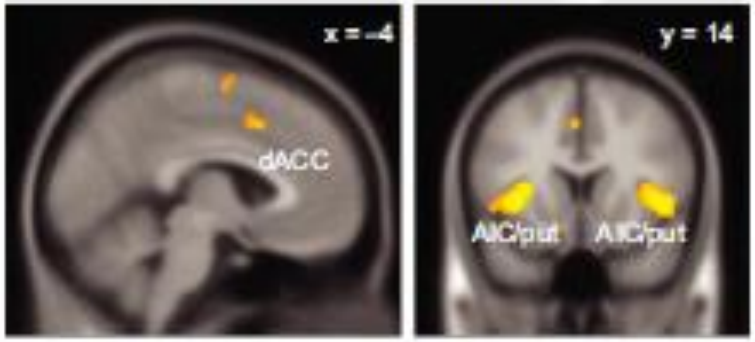
European Journal of Neuroscience, Vol. 47, pp. 592–601, 2018

Xiaosi Gu,[1] Thomas J. Zhou,[2,3] Evdokia Anagnostou,[4] Latha Soorya,[5] Alexander Kolevzon,[6,7] Patrick R. Hof[7,8,9] and Jin Fan[2,6,7,8,9]

A ASD: stimulation cue-related neural activity



B HC: stimulation cue-related neural activity



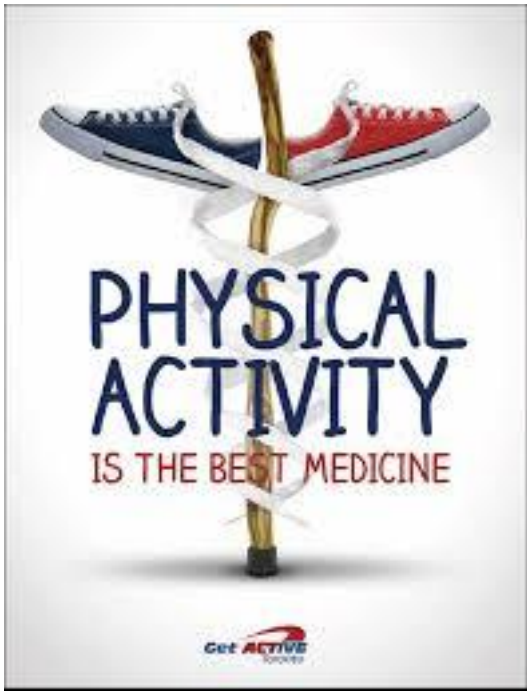
Activité Physique et Douleur

Self-reported Physical Activity Predicts Pain Inhibitory and Facilitatory Function

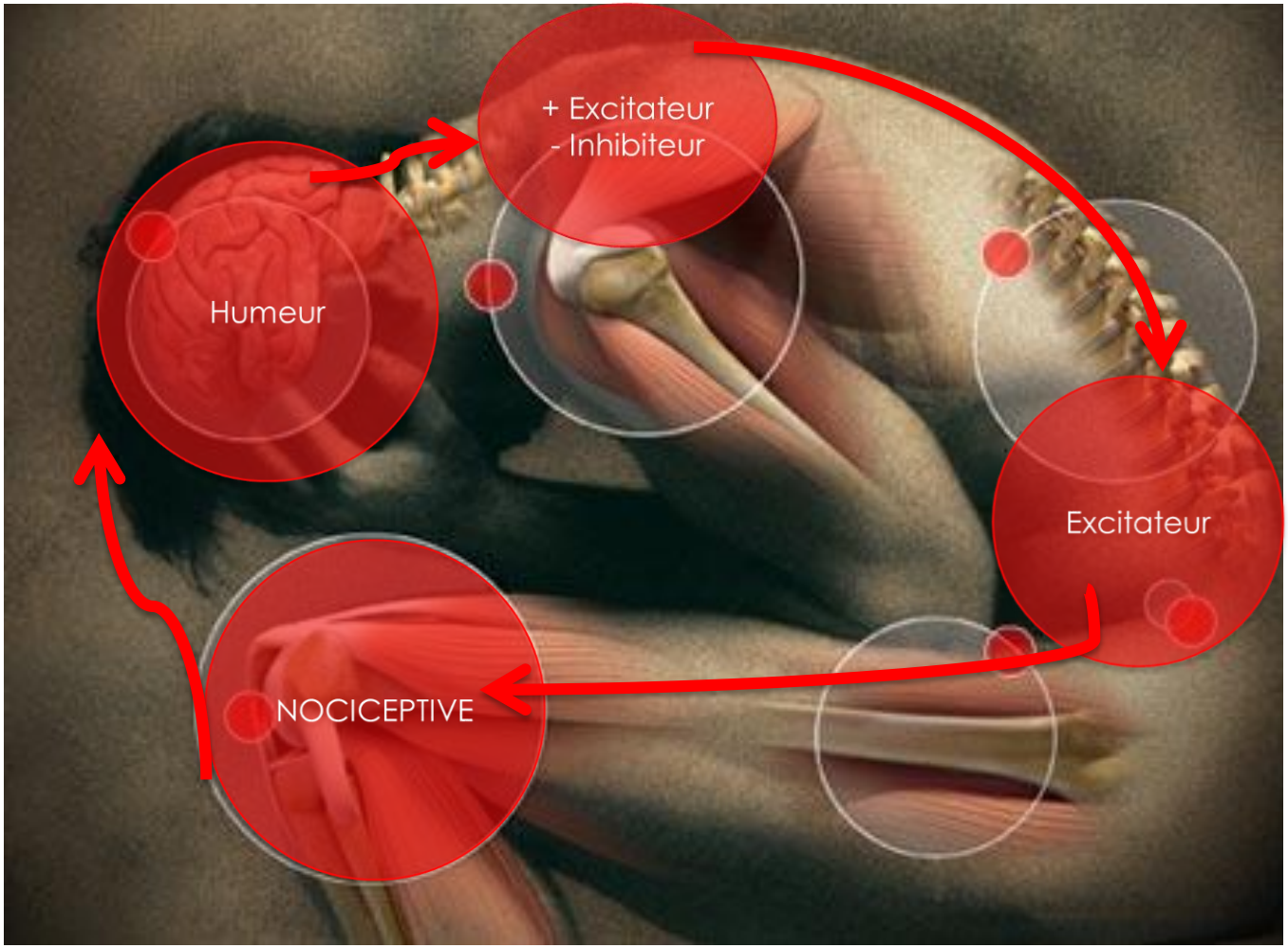
KELLY M. NAUGLE and JOSEPH L. RILEY 3RD

Pain Research and Intervention Center of Excellence, University of Florida, Gainsville, FL

L'augmentation de l'efficacité des systèmes inhibiteurs (CPM) et la réduction de la sensibilisation centrale (TS) sont corrélés avec l'activité physique !

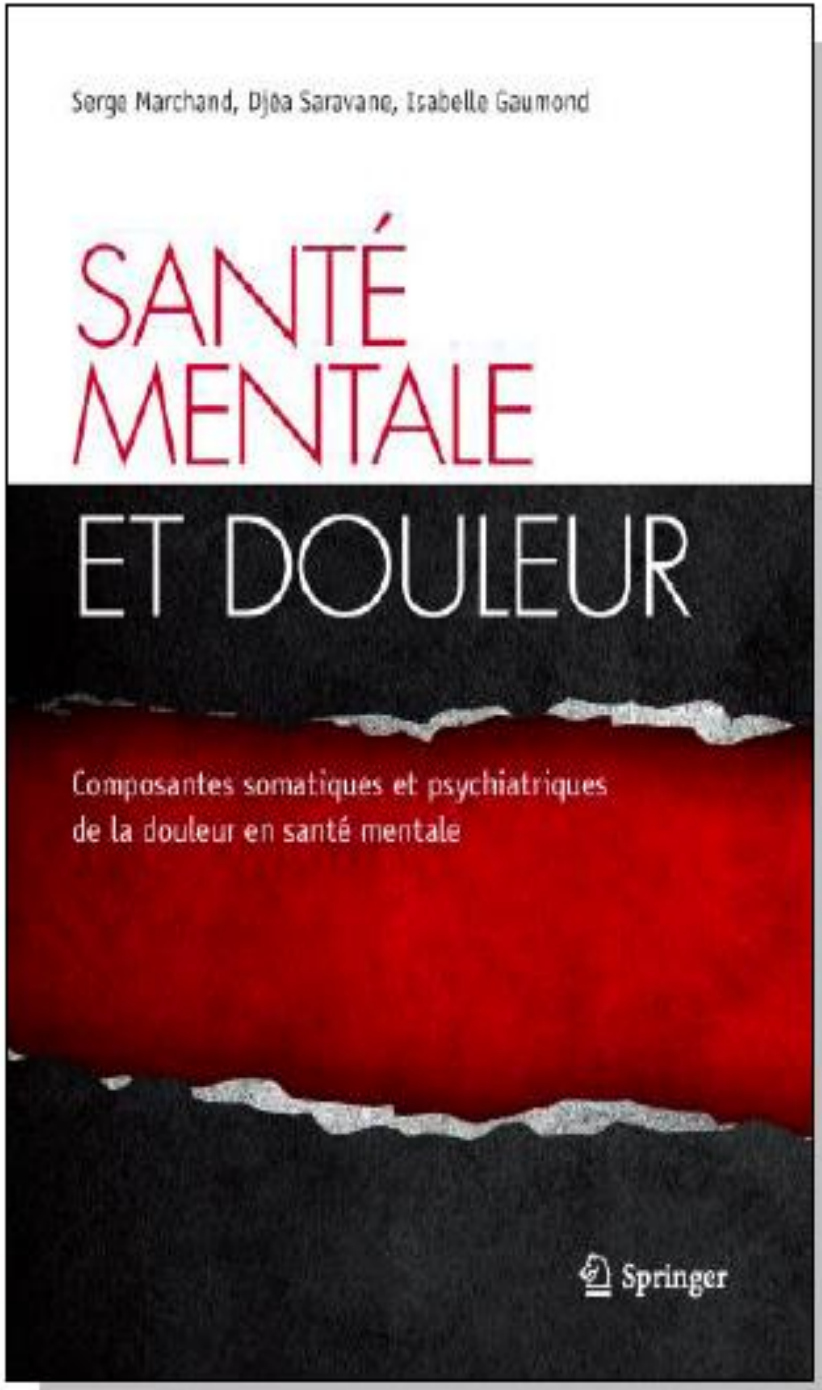


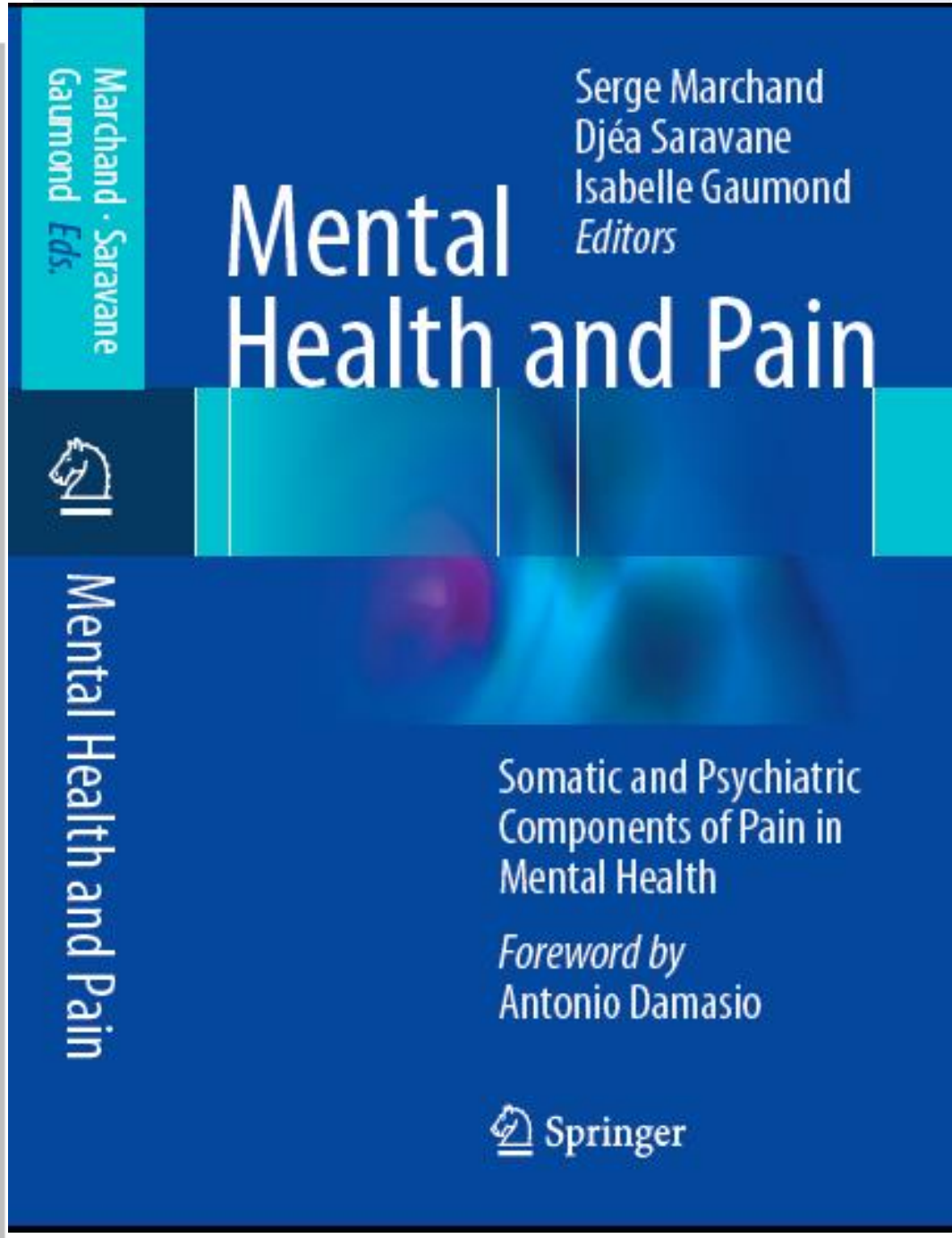
Santé Mentale et Douleur
Mécanismes excitateurs ou inhibiteurs ?

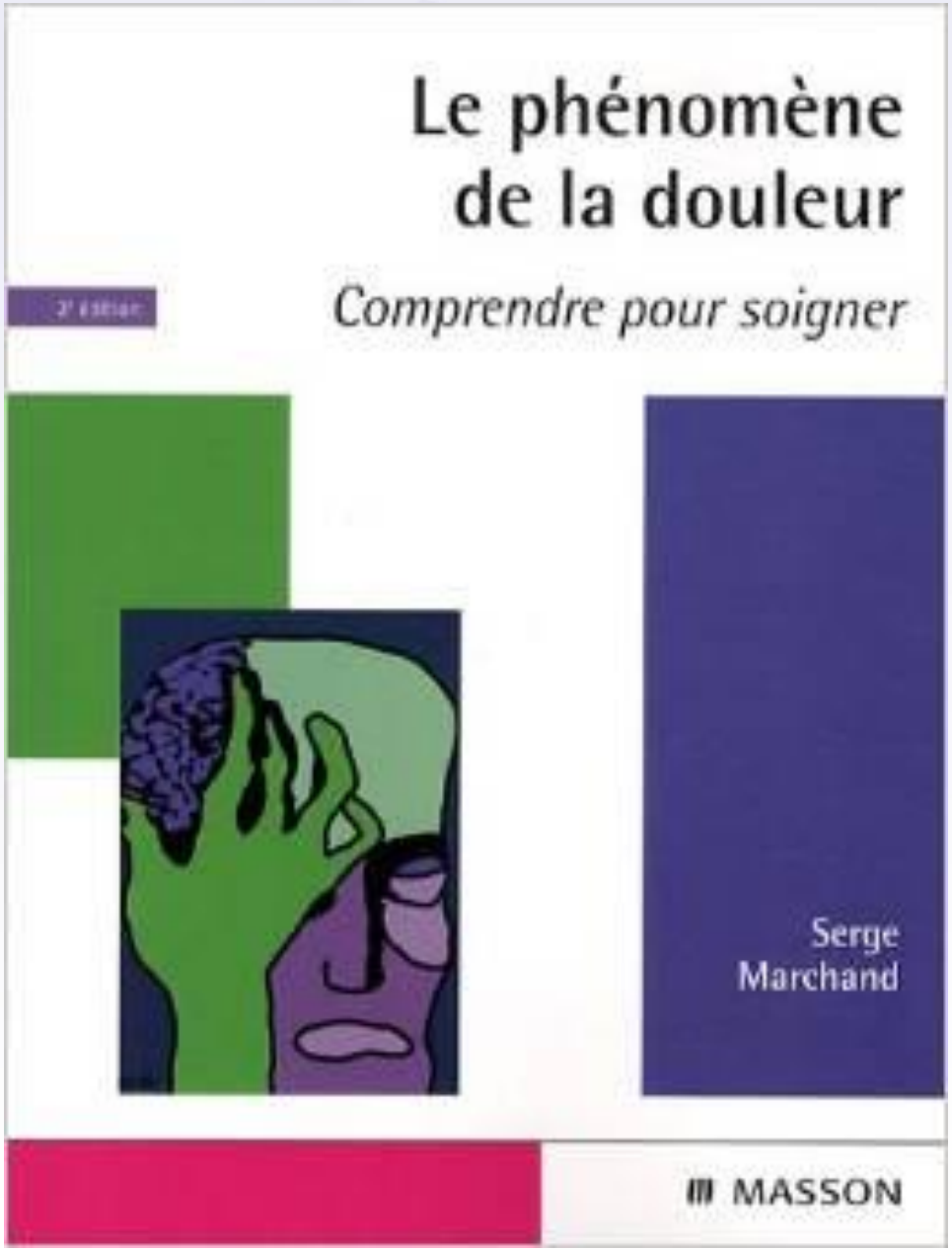


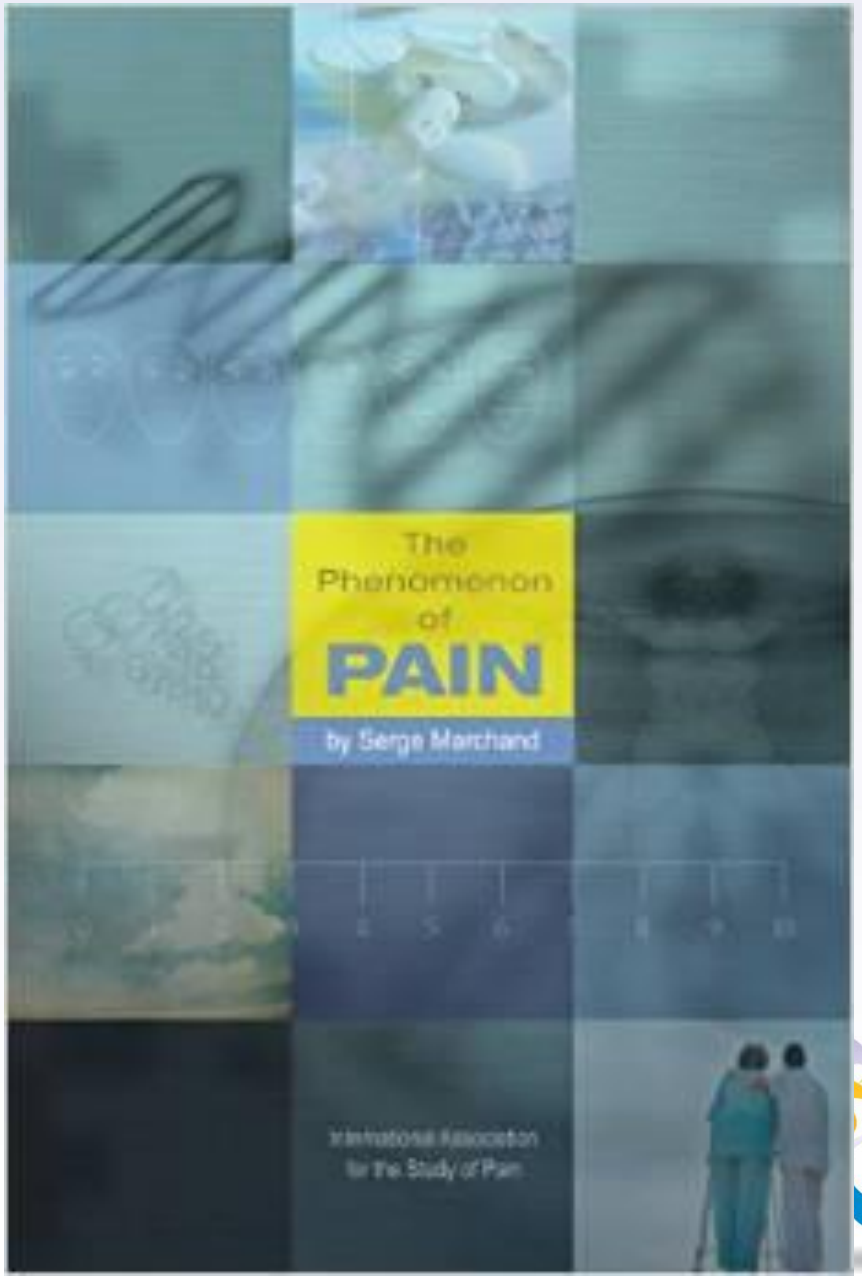
Apprendre à reconnaitre le mécanisme responsable de la douleur permet de mieux cibler le traitement

- Troubles de l'humeur:
  - Il semble que ce soit plus le système excitateur qui soit suractivé dans la dépression (anticonvulsivants?)
  - Douleur + Dépression = réduction système inhibiteur (antidépresseurs?)
- Schizophrénie:
  - Mécanismes excitateurs :
    - spinaux= normaux; perception= augmentée: Mécanismes corticaux
      - Antipsychotiques ?
  - Mécanismes inhibiteur:
    - Semblent fonctionner normalement
      - Favoriser anticonvulsivants versus antidépresseurs ?
- Autisme et douleur:
    - Changement dans l'activité corticale associé à la douleur et à la reconnaissance de celle-ci chez une autre personne !
  - Approches non-pharmacologiques


Serge Marchand, Djéa Saravane, Isabelle Gaumond
SANTÉ MENTALE ET DOULEUR
Composantes somatiques et psychiatriques de la douleur en santé mentale
Springer


Marchand · Saravane Gaumond Eds.
Mental Health and Pain
Serge Marchand
Djéa Saravane
Isabelle Gaumond
Editors
Mental Health and Pain
Somatic and Psychiatric Components of Pain in Mental Health
Foreword by
Antonio Damasio
Springer


Le phénomène
de la douleur
Comprendre pour soigner
Serge
Marchand
MASSON


The
Phenomenon
of
PAIN
by Serge Marchand

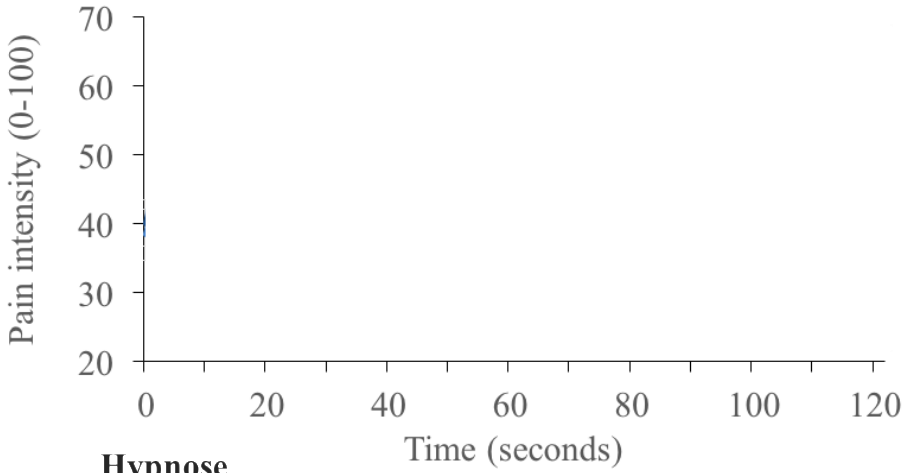
Sex differences in analgesia induced by conditioned pain modulation, hypnosis and placebo treatments

Janie Damien[1,2], Guillaume Léonard[1,3], Philippe Chalaye[1,2], Serge Marchand[1,2]

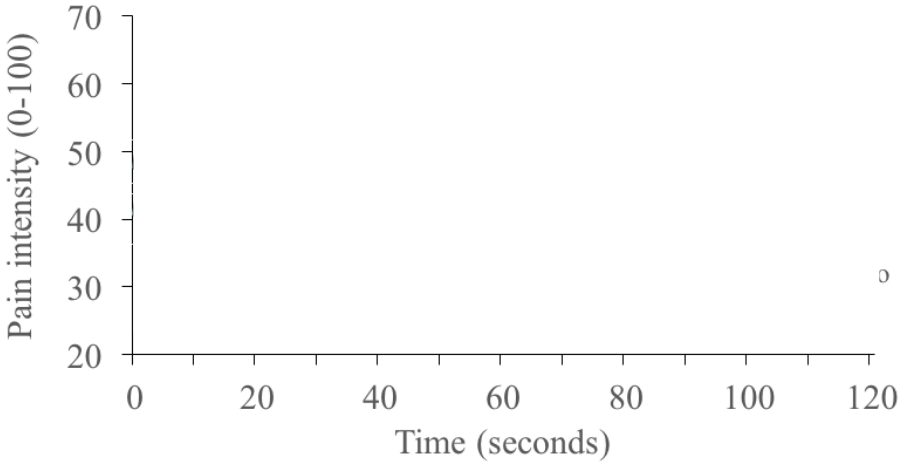
[1] Université de Sherbrooke, Faculté de médecine et des sciences de la santé, Sherbrooke, Québec, Canada; [2] Centre de recherche du CHUS, Sherbrooke, Québec, Canada [3] Centre de recherche sur le vieillissement, Institut universitaire de Gériatrie de Sherbrooke, Sherbrooke, Québec, Canada.

Canadian Pain Society, Montreal Mai 2018

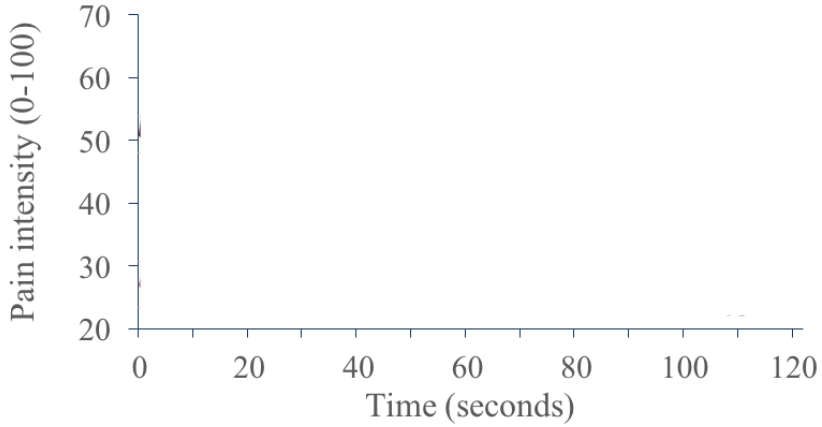
Contrôle Inhibiteur (immersion bras opposé)



Placebo



Hypnose



- L'hypnose est supérieure au CPM
- L'effet analgésique de l'hypnose ne semble pas lié au CPM ou au placebo !

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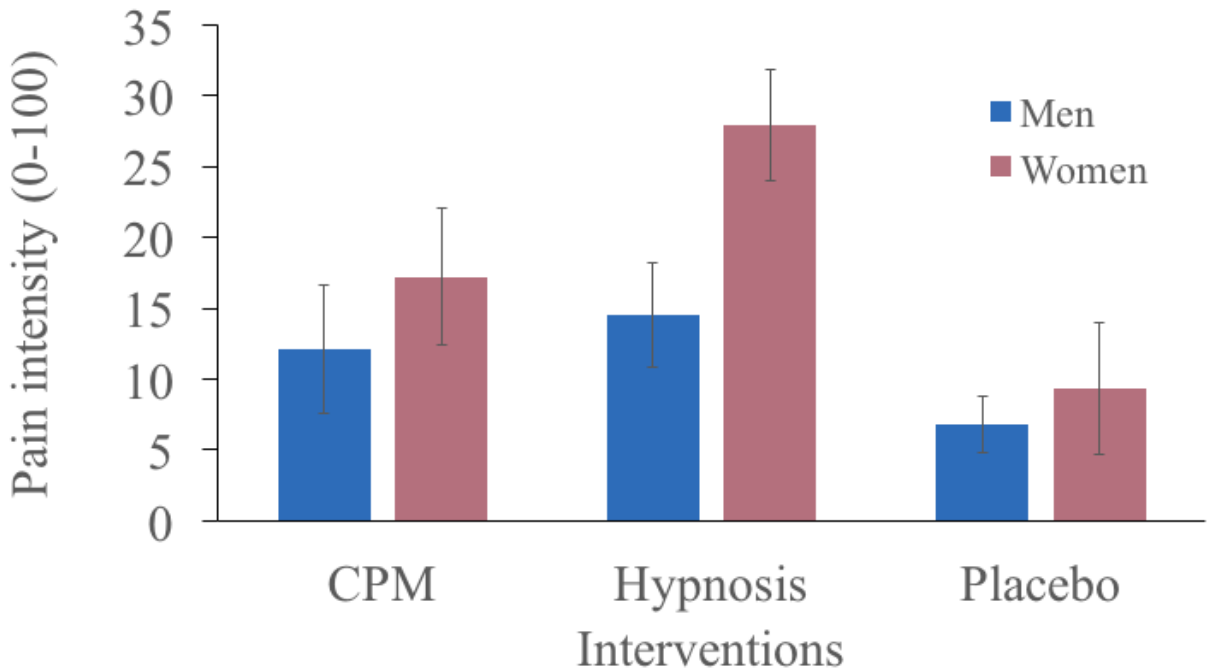
Figure 5. Sex differences in mean pain inhibition across treatment modalities.