



**Karolinska
Institutet**

Långvarig smärta

*Senaste nytt från svensk och
internationell hjärnforskning*

Karin Jensen

Docent

Forskargrupperledare

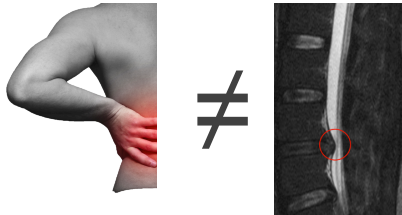
Institutionen för klinisk neurovetenskap

Karolinska Institutet, Stockholm

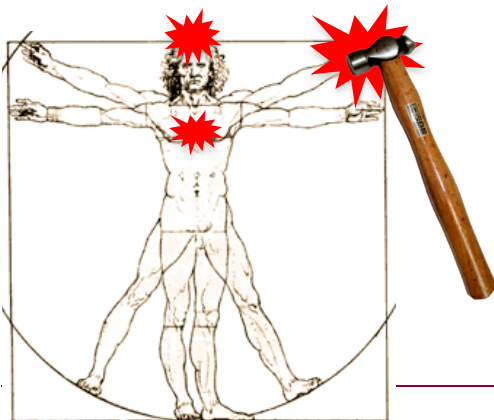
Varför studera hjärnan vid smärta?



Upplevelsen av smärta skapas i hjärnan



Objektiva kroppsmätningar stämmer dåligt med smärta

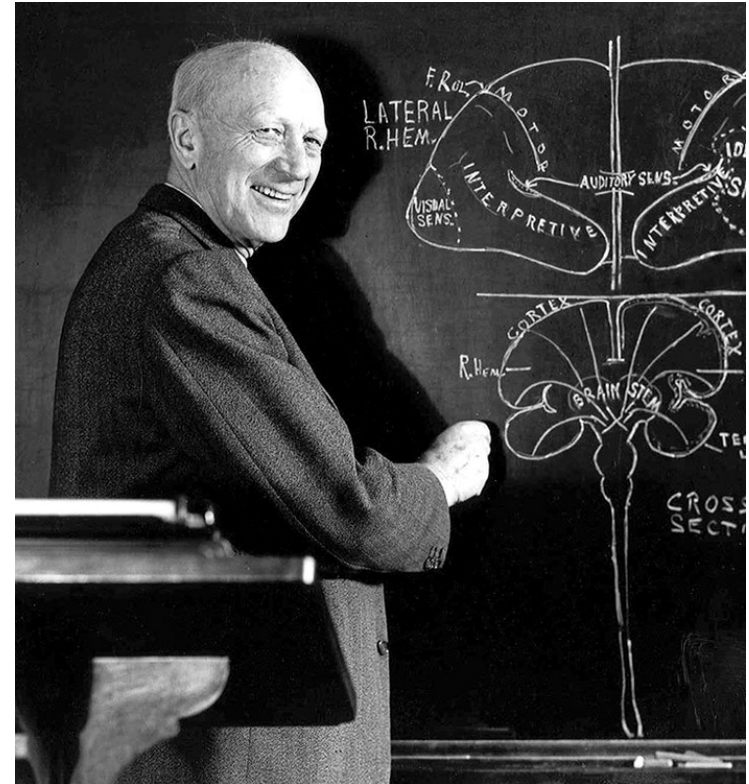


Smärtsignalen kopplas om i CNS; modulering

Så studerades hjärnan förr



Phineas Gage 1848

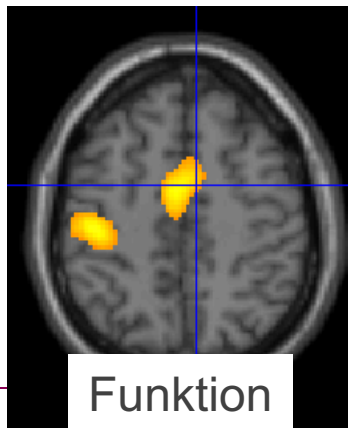


Wilder Graves Penfield 1937

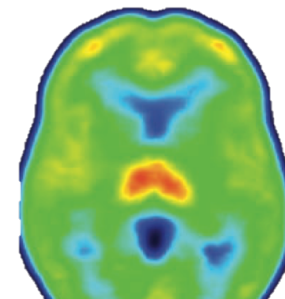
Så studeras hjärnan idag



Struktur



Funktion



Bindning

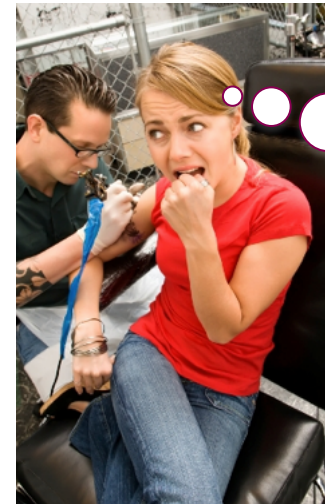
Smärta består av flera delar



Sensorisk



Affektiv



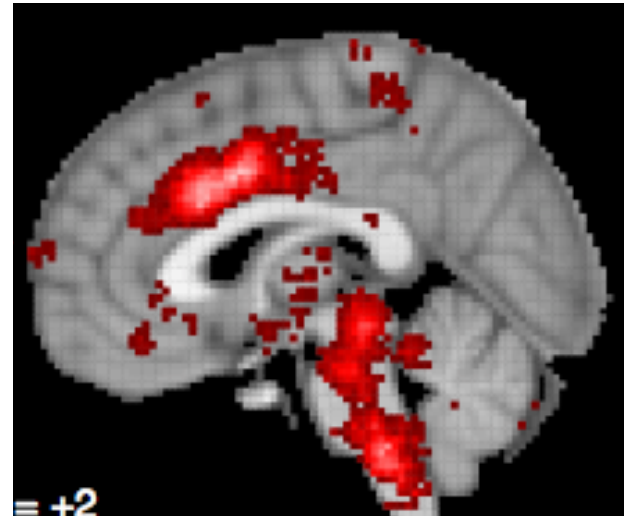
Kognitiv

Om fem
minuter
är det
över

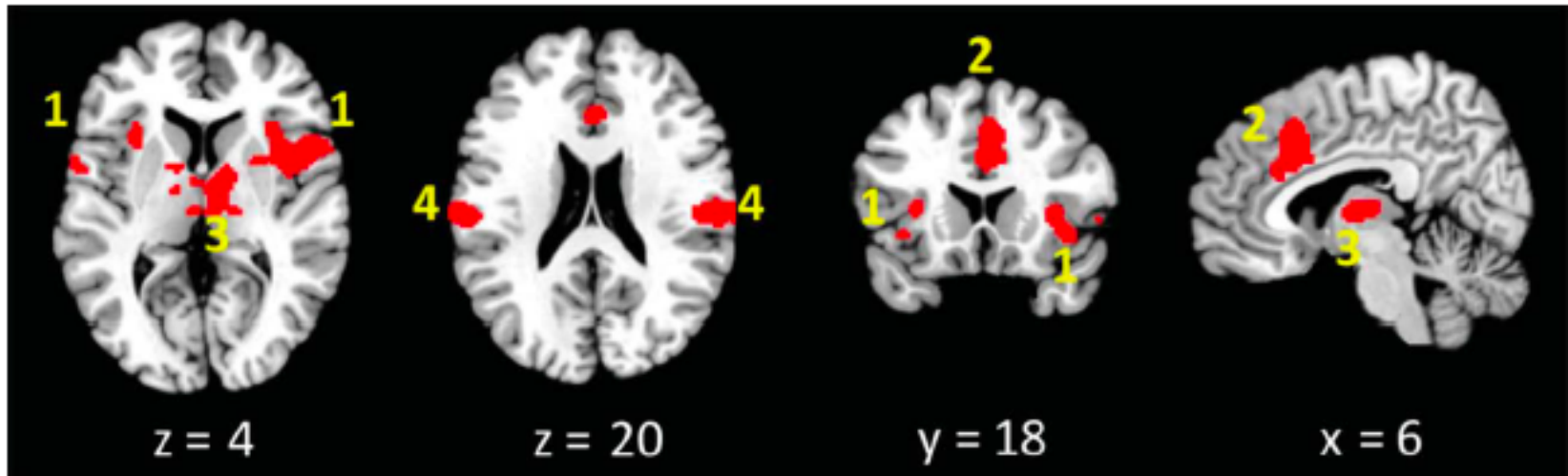
Melzack & Casey, 1968
The Skin Senses

Smärta består av flera delar

“The pain matrix”



Meta-analys 1990 - 2014



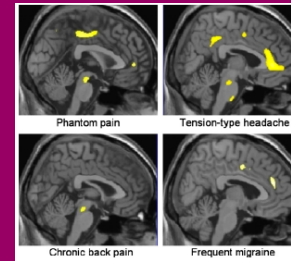
Jensen et al. 2016 PAIN

Klinisk smärta



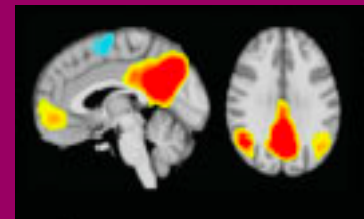
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Hjärnans struktur.....



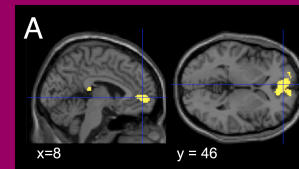
*Rodriguez-Raecke et al.
2009 J Neurosci*

Hjärnans aktivitet under vila ...



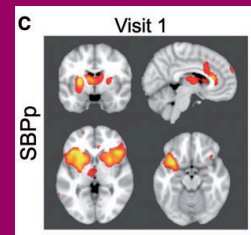
*Baliki et al.
2008 J Neurosci*

Smärtbroms



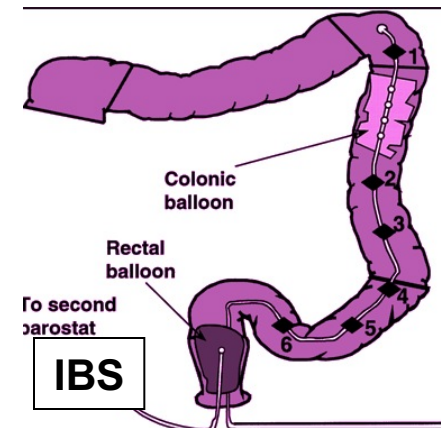
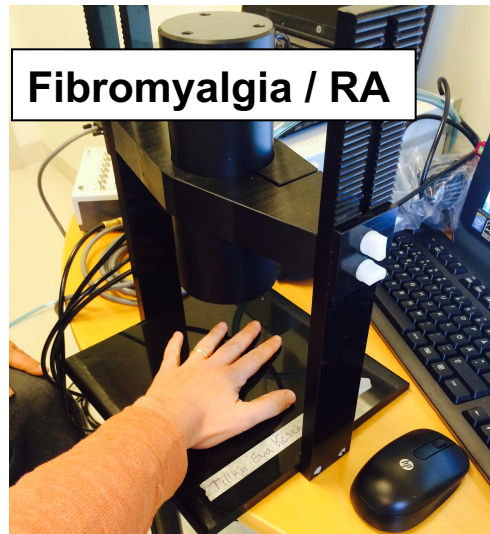
*Jensen et al.
2009 Pain*

Andra smärtområden

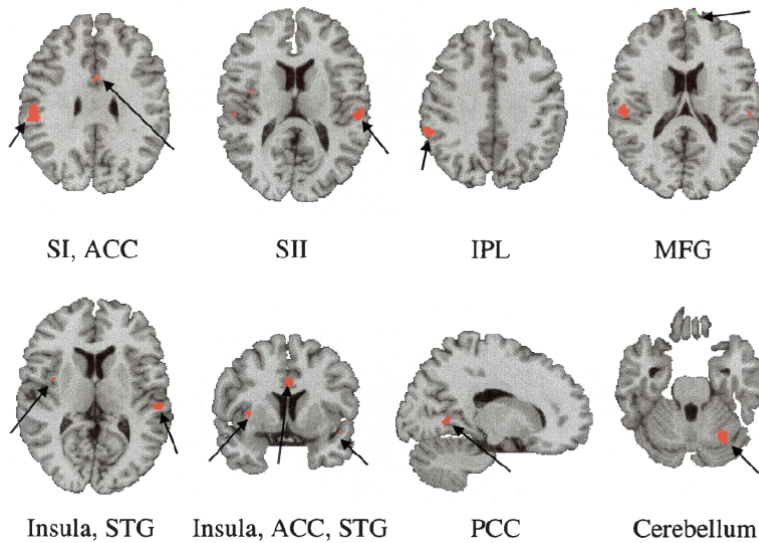


*Hashmi et al.
2013 Brain*

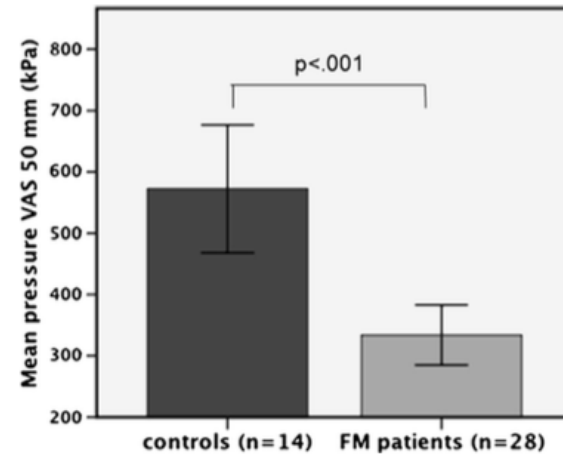
Experimentell stimulering av smärta



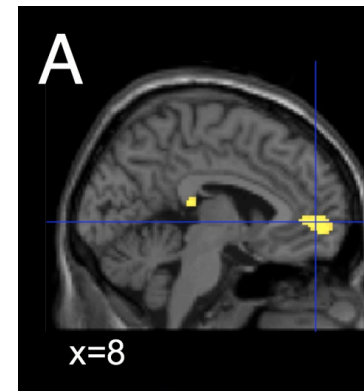
Ökat inflöde av smärtsignaler / Minskad inhibition



Gracely et al. 2002, Arth & Rheum

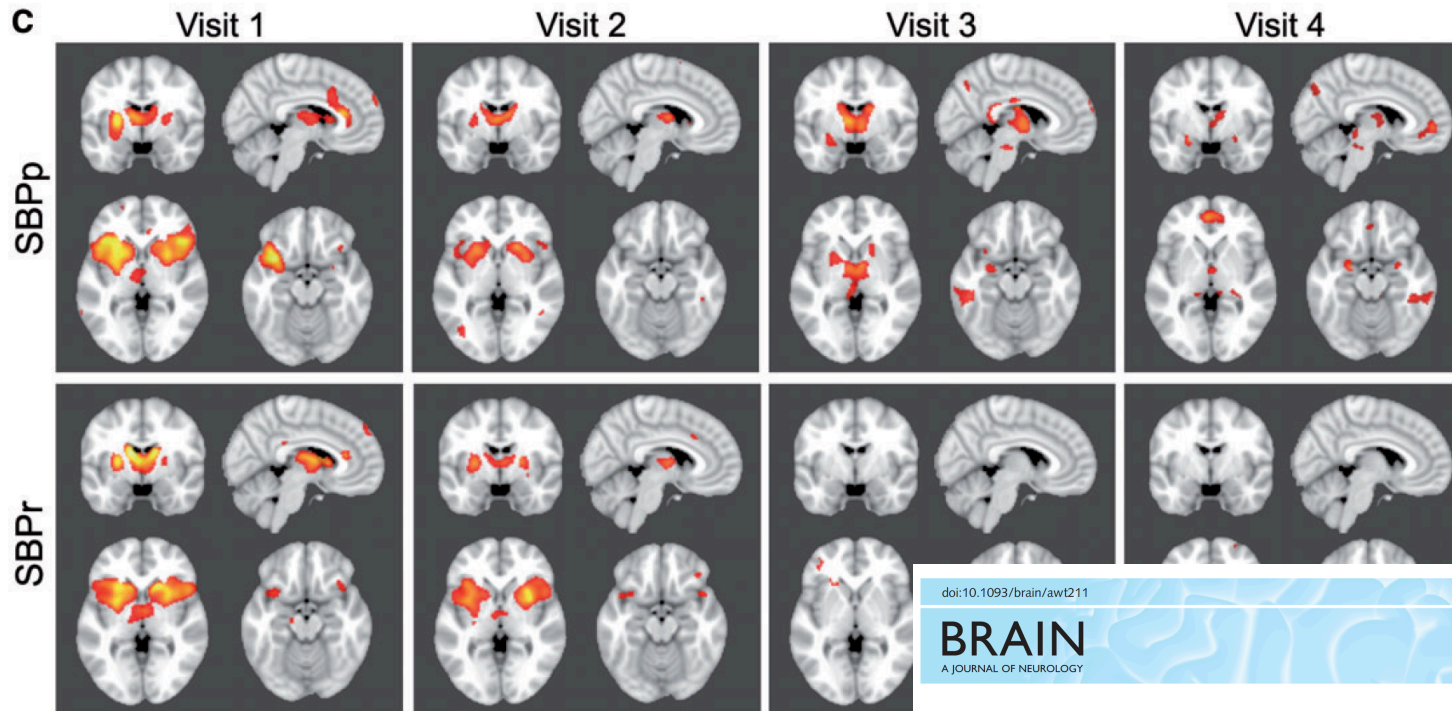


Jensen et al. 2009 Pain



Jensen et al. 2009 Pain

Transition från akut till långvarig smärta



doi:10.1093/brain/awt211

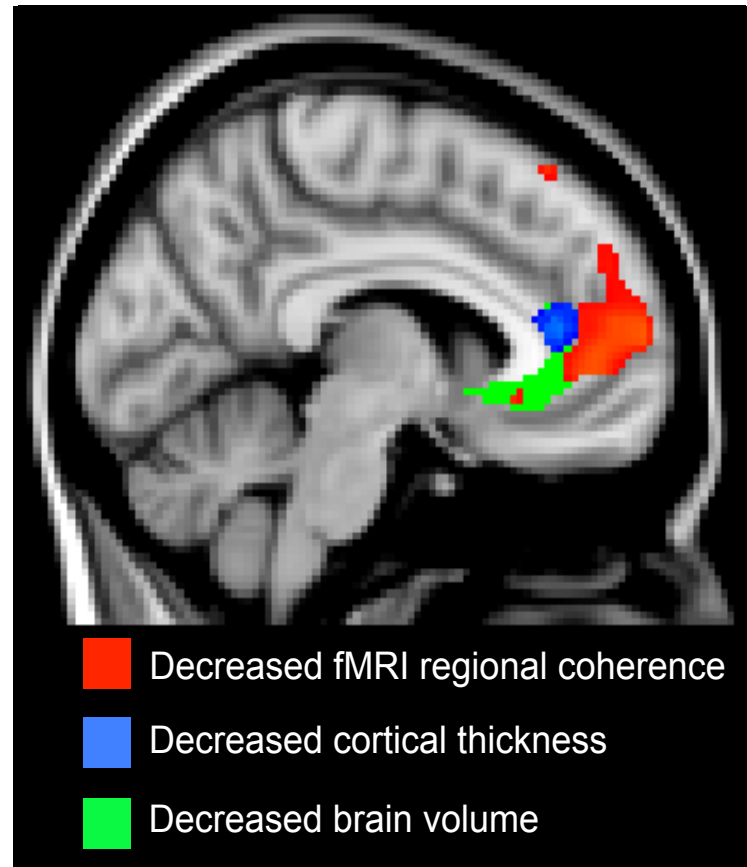
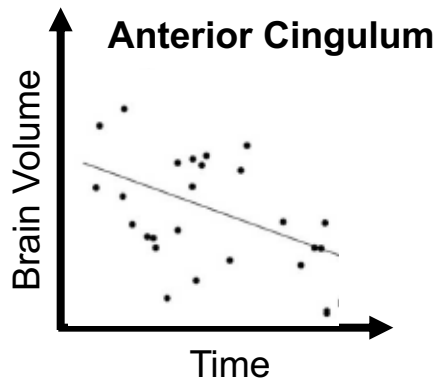
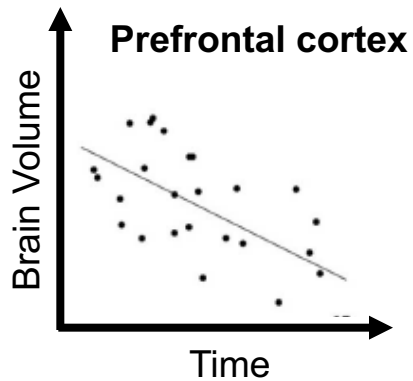
Brain 2013; 136; 2751–2768 | 2751

BRAIN
A JOURNAL OF NEUROLOGY

Shape shifting pain: chronification of back pain shifts brain representation from nociceptive to emotional circuits

Javeria A. Hashmi,¹ Marwan N. Baliki,¹ Lejian Huang,¹ Alex T. Baria,¹ Souraya Torbey,¹ Kristina M. Hermann,¹ Thomas J. Schnitzer² and A. Vania Apkarian^{1,3,*}

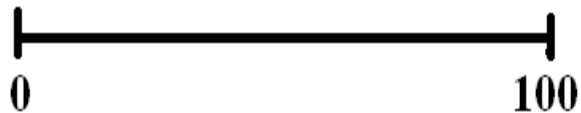
Förändringar över tid



Jensen et al. 2013 Arth Rheum

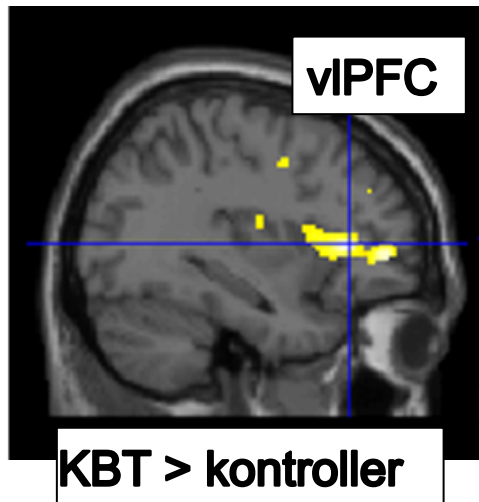
fMRI före och efter KBT

PATIENT GLOBAL IMPRESSION OF CHANGE
(PGIC)

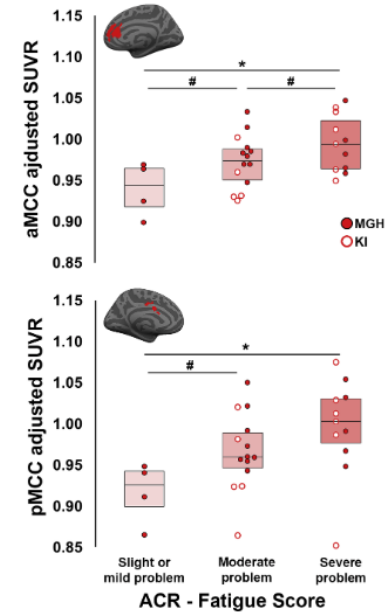
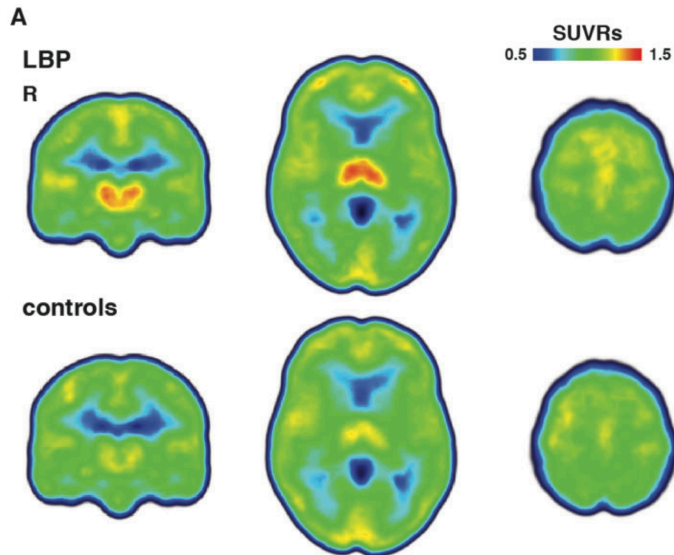


KBT gav bättre klinisk förbättring än kontrollgruppen
($p=0.01$).

VAS bättre i båda grupper ($p=0.001$).
Ingen skillnad mellan grupper ($p=0.825$).



Gliacellsaktivering vid långvarig smärta



Evidence for brain glial activation in chronic pain patients

Marco L. Loggia,^{1,2*} Daniel B. Chonde,¹ Oluwaseun Akeju,² Grace Arabasz,¹ Ciprian Catana,¹ Robert R. Edwards,^{1,4} Elena Hill,⁵ Shirley Hsu,¹ David Izquierdo-Garcia,¹ Ru-Rong Ji,^{2,6} Misha Riley,¹ Ajay D. Wasan,^{2,4,7} Nicole R. Zürcher,¹ Daniel S. Albrecht,¹ Mark G. Vangel,¹ Bruce R. Rosen,^{1,8} Vitaly Napadow^{1,4,9} and Jacob M. Hooker¹

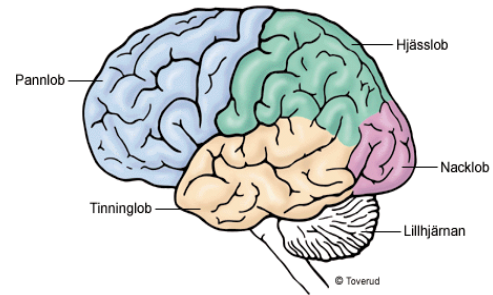


Brain glial activation in fibromyalgia – A multi-site positron emission tomography investigation

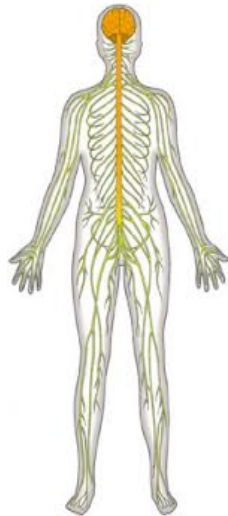
Daniel S. Albrecht^{1*}, Anton Forsberg^{1,4}, Angelica Sandström^{1,5}, Courtney Bergan⁶, Diana Kadoch^{1,7}, Ekaterina Protsenko¹, Jon Lampa¹, Yvonne C. Lee^{1,2}, Caroline Olgart Höglund¹, Ciprian Catana¹, Simon Cervenka¹, Oluwaseun Akeju¹, Mats Lekander^{1,3}, George Cohen¹, Christer Hallidin¹, Norman Taylor¹, Minhae Kim¹, Jacob M. Hooker¹, Robert R. Edwards¹, Vitaly Napadow^{1,4,9}, Eva Kosik^{1,4,8,9}, Marco L. Loggia^{1,2,3}

Loggia et al. Brain 2015

Albrecht et al. BBI 2019



Nervsystem



Immunsystem



Har vi en lögndetektor?



Loggia et al. PAIN 2011

The NEW ENGLAND JOURNAL of MEDICINE

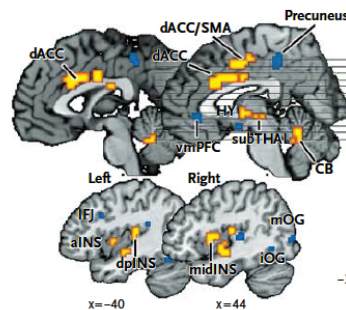
ORIGINAL ARTICLE

An fMRI-Based Neurologic Signature of Physical Pain

Tor D. Wager, Ph.D., Lauren Y. Atlas, Ph.D., Martin A. Lindquist, Ph.D.,
Mathieu Roy, Ph.D., Choong-Wan Woo, M.A., and Ethan Cross, Ph.D.

ABSTRACT

A Pain-Predictive Signature Pattern



Wager et al. 2013

Är detta framtiden?





CONSENSUS STATEMENT

OPEN

Brain imaging tests for chronic pain: medical, legal and ethical issues and recommendations

*Karen D. Davis^{1,2,3}, Herta Flor⁴, Henry T. Greely⁵, Gian Domenico Iannetti⁶,
Sean Mackey⁷, Markus Ploner⁸, Amanda Pustilnik^{9,10}, Irene Tracey¹¹, Rolf-Detlef Treede¹²
and Tor D. Wager^{13,14}*

fMRI hos de som inte kan känna smärta

Letters

RESEARCH LETTER

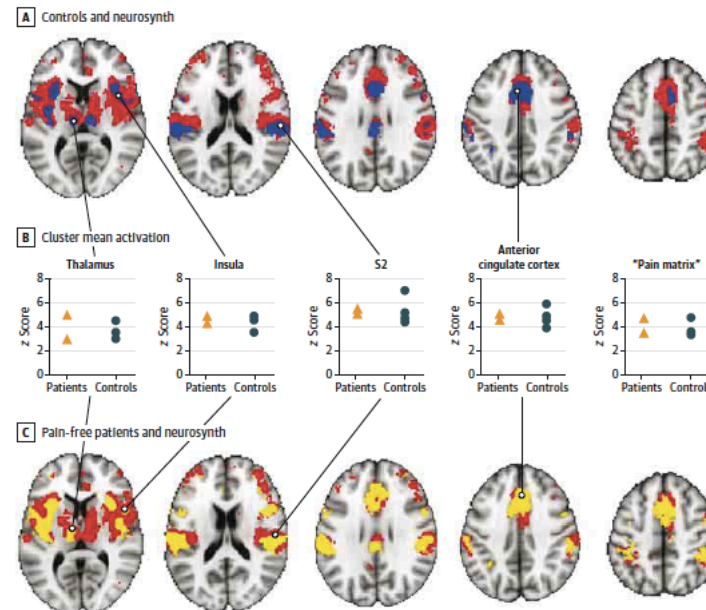
The "Pain Matrix" in Pain-Free Individuals

Human functional imaging provides a correlative picture of brain activity during pain. A particular set of central nervous system structures (eg, the anterior cingulate cortex, thalamus, and insula) consistently respond to transient nociceptive stimuli causing pain. Activation of this so-called *pain matrix* or *pain signature* has been related to perceived pain intensity, and is now considered a neural signature of pain. This signature remains pervasive in functional magnetic resonance imaging (fMRI) studies across different settings and specific interpretations. For most likely interpretations, the pain matrix requires ruling out alternative sensory stimuli and a history of noxious mechanical stimuli.

Editorial page 628

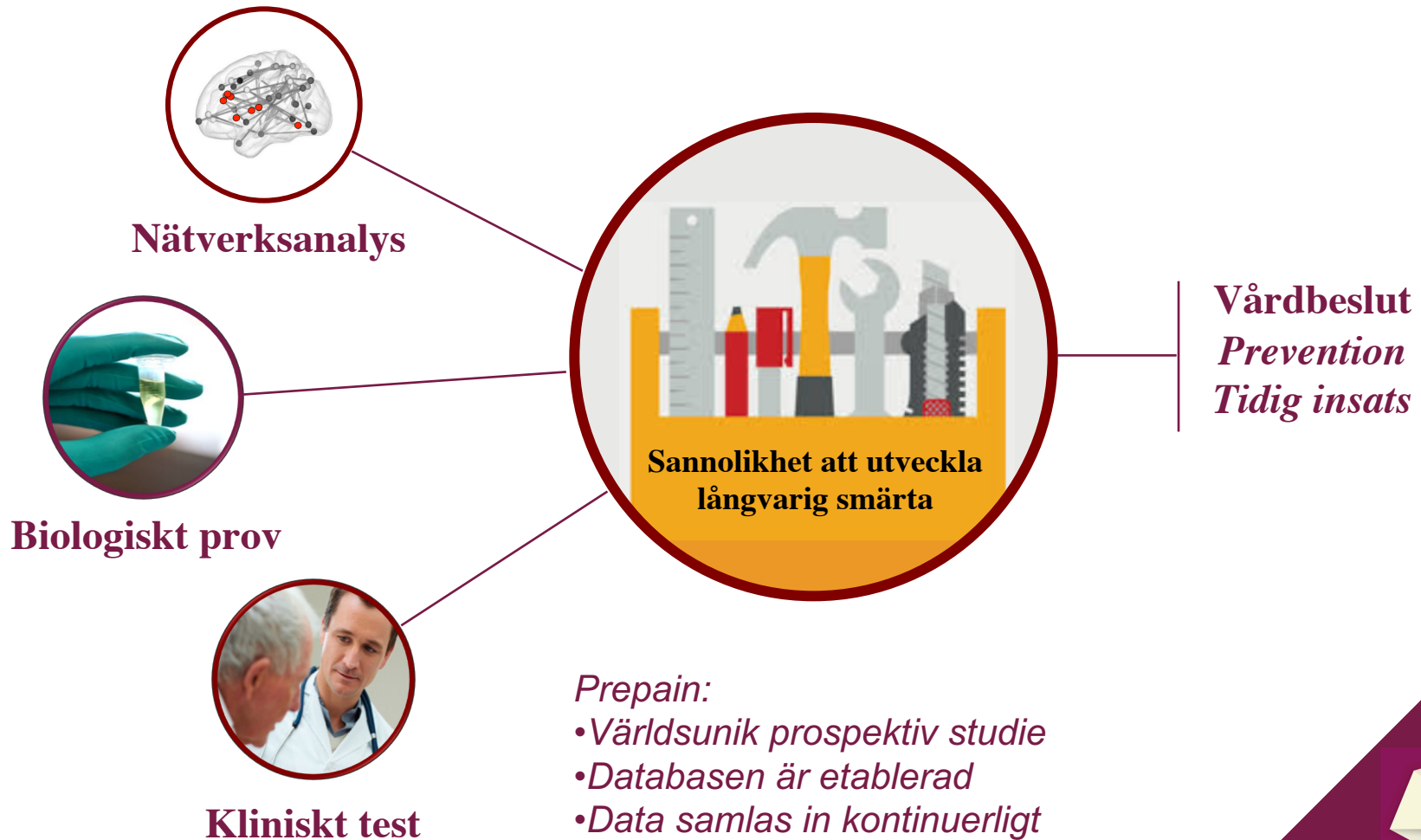
ceived pain intensity, and is now considered a neural signature of pain. This signature remains pervasive in functional magnetic resonance imaging (fMRI) studies across different settings and specific interpretations. For most likely interpretations, the pain matrix requires ruling out alternative sensory stimuli and a history of noxious mechanical stimuli.

Figure. Pain Matrix Activation in Pain-Free People

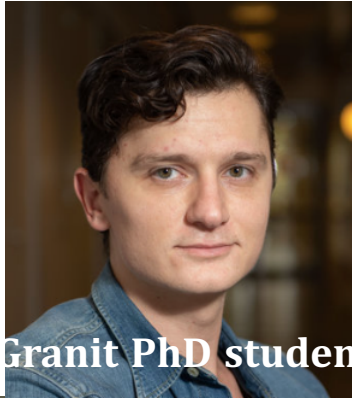


Salomons et al. 2016 JAMA Neurology

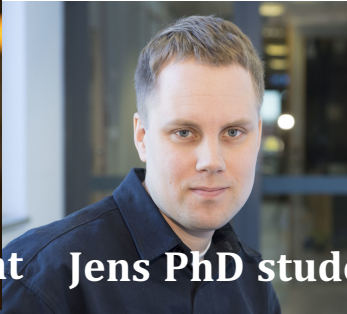
Framtidsvisioner



Tack!



Granit PhD student



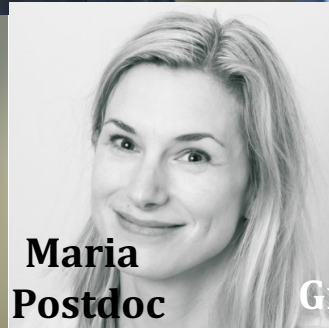
Jens PhD student



Amanda
MD student



Moa PhD student



Maria
Postdoc



Alexander
MD student



Svensson Kosek Jensen



En generös donation från familjen Lundblad har möjliggjort denna forskning