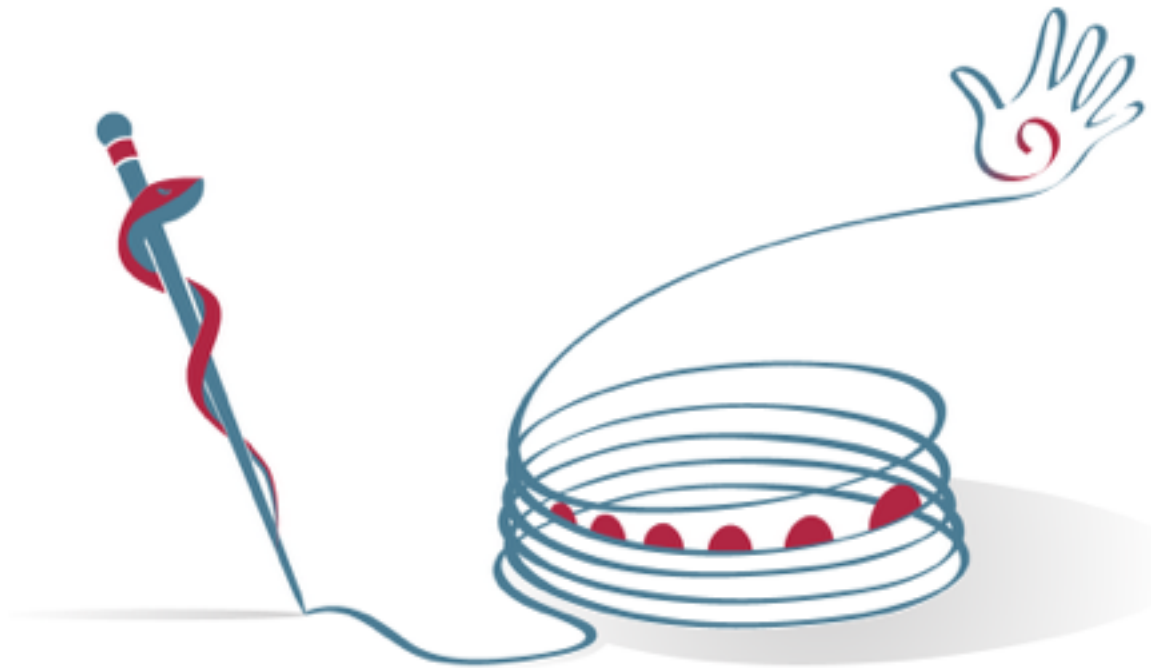
ROMA

25 26
MAGGIO

SAVE THE DATE

ROME LIFE HOTEL, VIA PALERMO 12

ROI
REGISTRO DEGLI
OSTEOPATI D'ITALIA



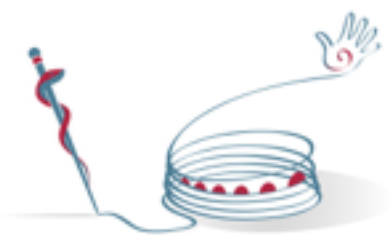
3° CONGRESSO NAZIONALE ROI

IL RUOLO DELL'OSTEOPATIA
NEL SISTEMA INTERPROFESSIONALE PER LA SALUTE DEL CITTADINO

Il ruolo del tocco nell'approccio osteopatico perinatale

Francesco Cerritelli

President C.O.ME. Collaboration | Centre for Osteopathic MEdicine Collaboration
Department of Neuroscience, Imaging and Clinical Sciences | University "G. d'Annunzio" - Chieti - Italy
Board member | Associazione medicina centrata sulla persona ONLUS
Email: fcerritelli@comecollaboration.org | Web: http://www.comecollaboration.org



Neuroscience and Biobehavioral Reviews 72 (2017) 1–9

Contents lists available at ScienceDirect

Neuroscience and Biobehavioral Reviews

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

The role of gentle touch in perinatal osteopathic manual therapy

Francis McGlone[a,e,*], Francesco Cerritelli[b,d], Susannah Walker[a], Jorge Esteves[c,d,f]

[a] Research Centre for Brain & Behaviour, School of Natural Sciences & Psychology, Liverpool John Moores University, Liverpool, L3 3AF, UK
[b] Department of Neuroscience and Imaging, University of Chieti-Pescara, Italy
[c] British School of Osteopathy, London, UK
[d] Clinical-based Human Research Department, Centre for Osteopathic Medicine Collaboration, Pescara, Italy
[e] Institute of Psychology, Health and Society, University of Liverpool, UK
[f] Instituto Piaget, Lisbon, Portugal

Touch in osteopathic care

- Touch plays a central role in osteopathic diagnosis and care and in the development of therapeutic relationships
- Little is known regarding the impact that touch is having on the patient's nervous system during osteopathic procedures and its impact on, for example, pain modulation, autonomic nervous system (ANS) function and emotional processing

. . .and beyond osteopathy

Nurture and development

Walker & McGlone 2013 for review

social and dyadic interactions in adulthood

House at al., 1988; Berscheid, 2003

Touch and development (I)

- Touch is a critical communication channel during nurturing behaviour
- Harlow (1958) and Harlow & Harlow (1962a) found that the absence of comforting touch led to long lasting psychological stress in monkeys

Touch and development (2)

Tactile nurturing interactions during the neonatal period impact the subsequent expression of adult behaviour by altering sensitivity to neuropeptides (e.g., oxytocin and arginine vasopressin)

Cushing and Kramer, 2005

- **Interestingly…in animals the type of licking-grooming behaviour targets specific body sites on the pup around the dorsal back and head/ears!!**

Perinatal care and touch

- In human infants, as in rodents, parental touch is a key regulator of physiological and behavioural arousal (Hofer 1994)
- Touch decreases stress activated cortisol production with lower levels of cortisol correlating with increased cell development in the hippocampus, impacting on both short and long-term memory function (Miles et al., 2006)
- Sharp et al (2012) found that high self-reported levels of maternal stroking reduced the negative impact of maternal depression on both physiological and behavioural indices of emotional reactivity in the infant

An epigenetic link?

- Epigenetically, the psychosocial context of the environment can modify behaviours and alter nervous, endocrine and immune function (Eskandari and Sternberg, 2002)

- Adult offspring of mothers that displayed high levels of pup licking-grooming, as the result of epigenetic programming, showed increased levels of glucocorticoid receptor expression and lower physiological responses to stress (Hellstrom et al. (2012)

- In humans, high levels of maternal stroking were associated with reduced methylation at the glucocorticoid receptor gene (Murgatroyd et al 2014)

Touch matters to growth!

first evidence in humans that gentle stroking touch has similar beneficial neurodevelopmental effects to those reported in rodents, providing a modern epigenetic interpretation of the nurture/nature debate (Murgatroyd et al, 2014)

BBC NEWS

LIKE

Volunteers are cuddling vulnerable babies

On the role of touch in osteopathy…

- We would argue that the stimulation of the skin senses during therapeutic procedures common to the field of osteopathy, has quantifiable beneficial effects on both the physiology and psychology of the individual.
- These we hypothesize are in large part due to a recently identified and characterized system of gentle-touch responsive nerves, found only in the hairy skin of the body.

Pizzolorusso et al. Chiropractic & Manual Therapies 2011, 19:15
http://chiromt.com/content/19/1/15

CHIROPRACTIC & MANUAL THERAPIES

RESEARCH Open Access

Effect of osteopathic manipulative treatment on gastrointestinal function and length of stay of preterm infants: an exploratory study

Gianfranco Pizzolorusso[1*], Patrizia Turi[1], Gina Barlafante[2], Francesco Cerritelli[1], Cinzia Renzetti[2], Vincenzo Cozzolino[2], Marianna D'Orazio[2], Paola Fusilli[3], Fabrizio Carinci[1] and Carmine D'Incecco[3]

Complementary Therapies in Medicine (2014) 22, 197–202

Available online at www.sciencedirect.com
ScienceDirect
journal homepage: www.elsevierhealth.com/journals/ctim

Do placebo effects associated with sham osteopathic procedure occur in newborns? Results of a randomized controlled trial

Marta Martelli[4,b], Lucia Cardinali[4], Gina Barlafante[4,b]

Systematic Review and Meta-Analysis

Medicine®

OPEN

Osteopathic manipulative treatment showed reduction of length of stay and costs in preterm infants

A systematic review and meta-analysis

Diego Lanaro, PhD[a], Nuria Ruffini, DO[a,*], Andrea Manzotti, DO[b], Gianluca Lista, MD[c]

Cerritelli et al. Chiropractic & Manual Therapies 2014, 22:18
http://www.chiromt.com/content/22/1/18

CHIROPRACTIC & MANUAL THERAPIES

METHODOLOGY Open Access

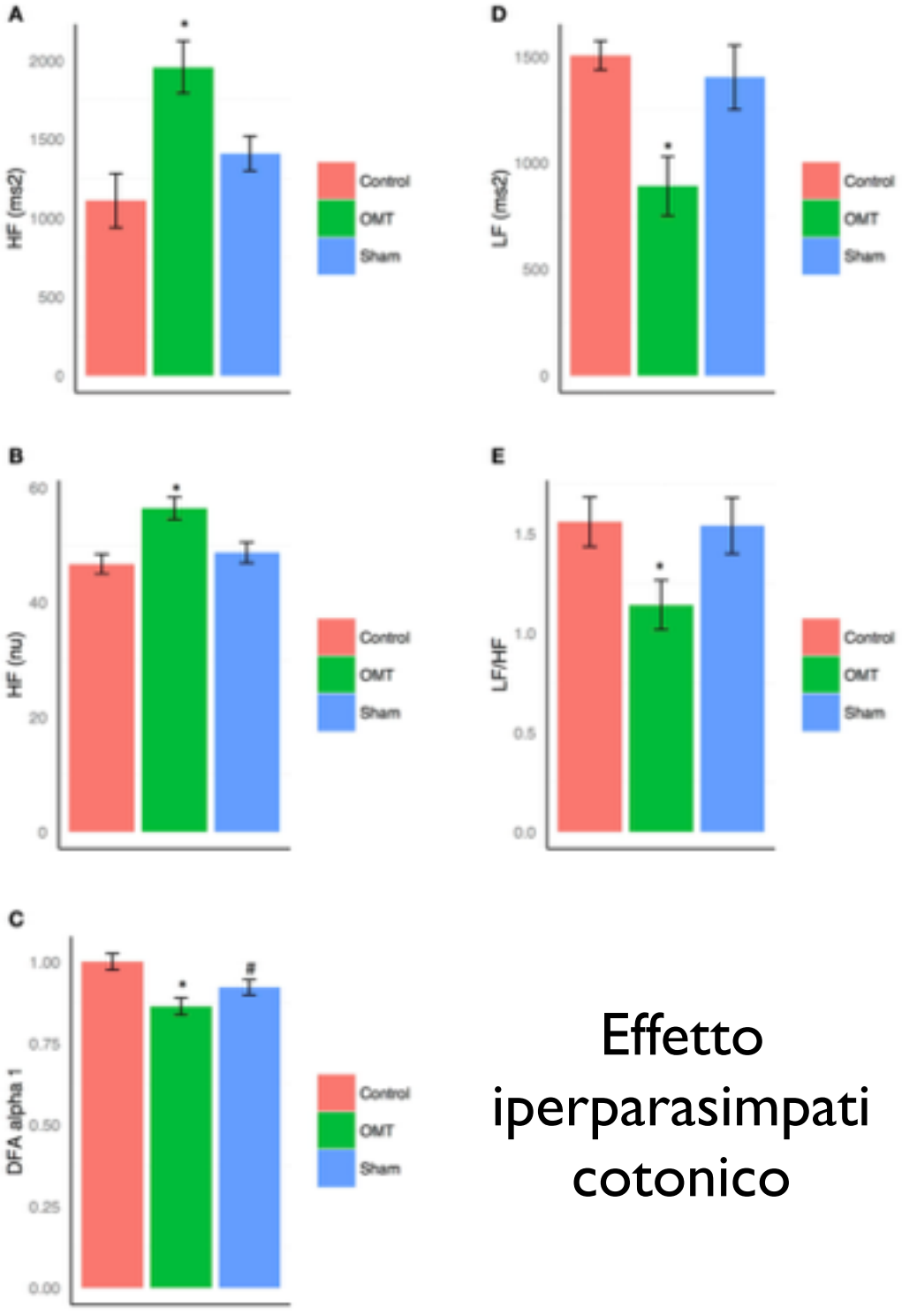
Introducing an osteopathic approach into neonatology ward: the NE-O model

Francesco Cerritelli[1,2*†], Marta Martelli[1,2†], Cinzia Renzetti[1,2], Gianfranco Pizzolorusso[1,2], Vincenzo Cozzolino[1,2] and Gina Barlafante[1,2]

Research Article

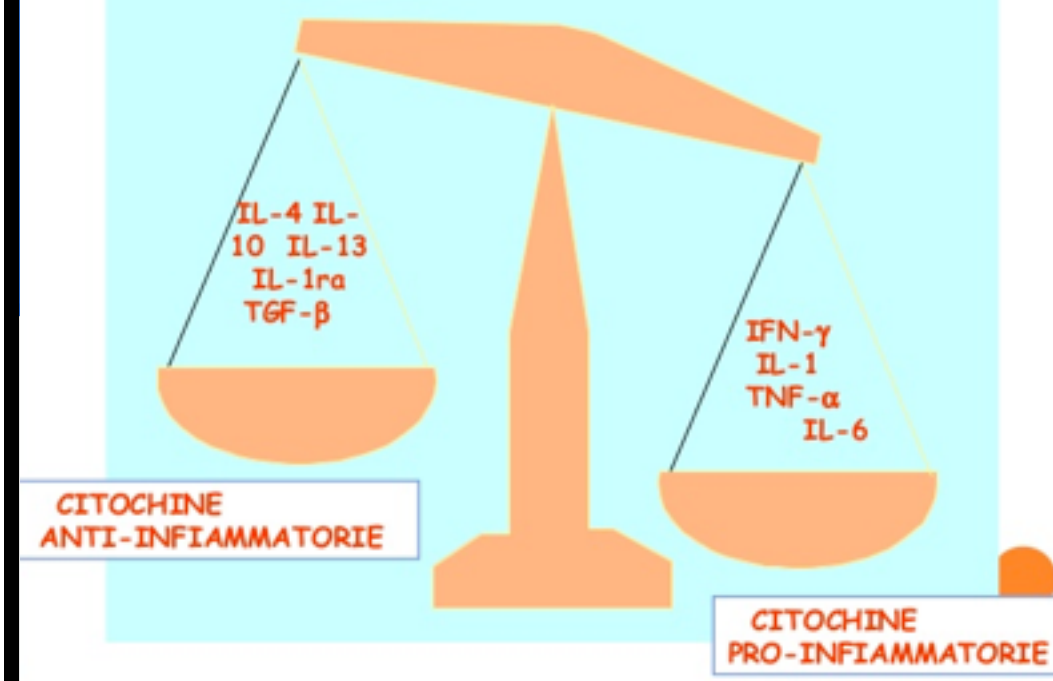
The Effect of Optimally Timed Osteopathic Manipulative Treatment on Length of Hospital Stay in Moderate and Late Preterm Infants: Results from a RCT

Gianfranco Pizzolorusso,[1,2] Francesco Cerritelli,[1,2] Alessandro Accorsi,[1,2] Chiara Lucci,[1,2] Lucia Tubaldi,[3] Jenny Lancellotti,[2] Gina Barlafante,[1,2] Cinzia Renzetti,[1,2] Carmine D'Incecco,[4] and Francesco Paolo Perri[3]

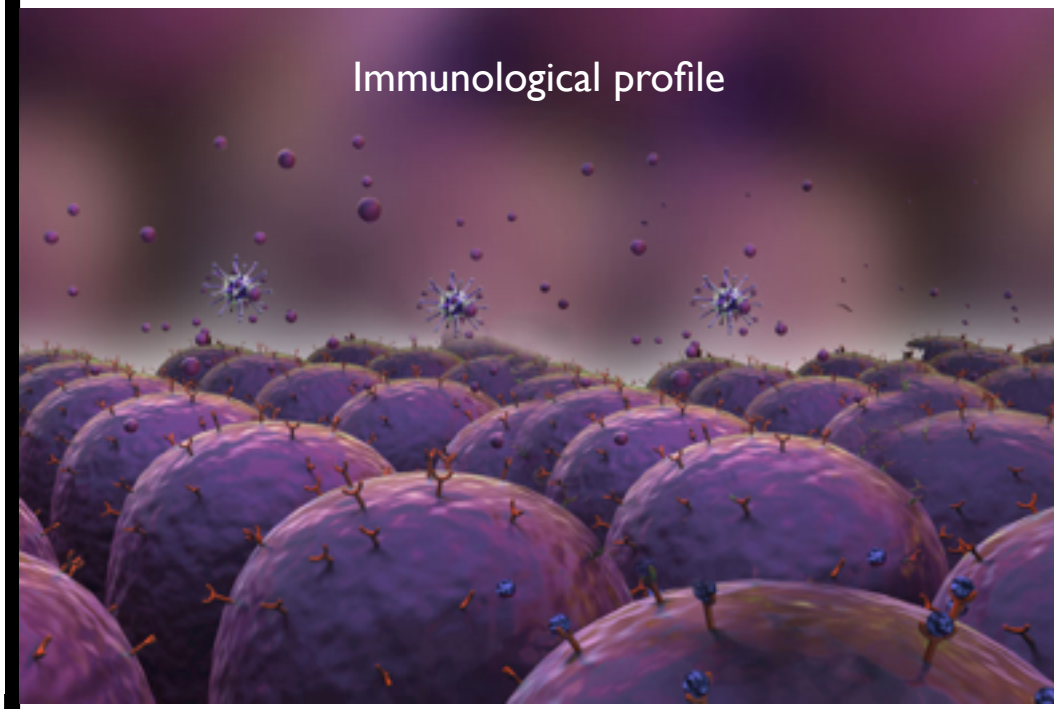


Effetto iperparasimpati cotonico

Ruffini et al, Front Neurosc 2015

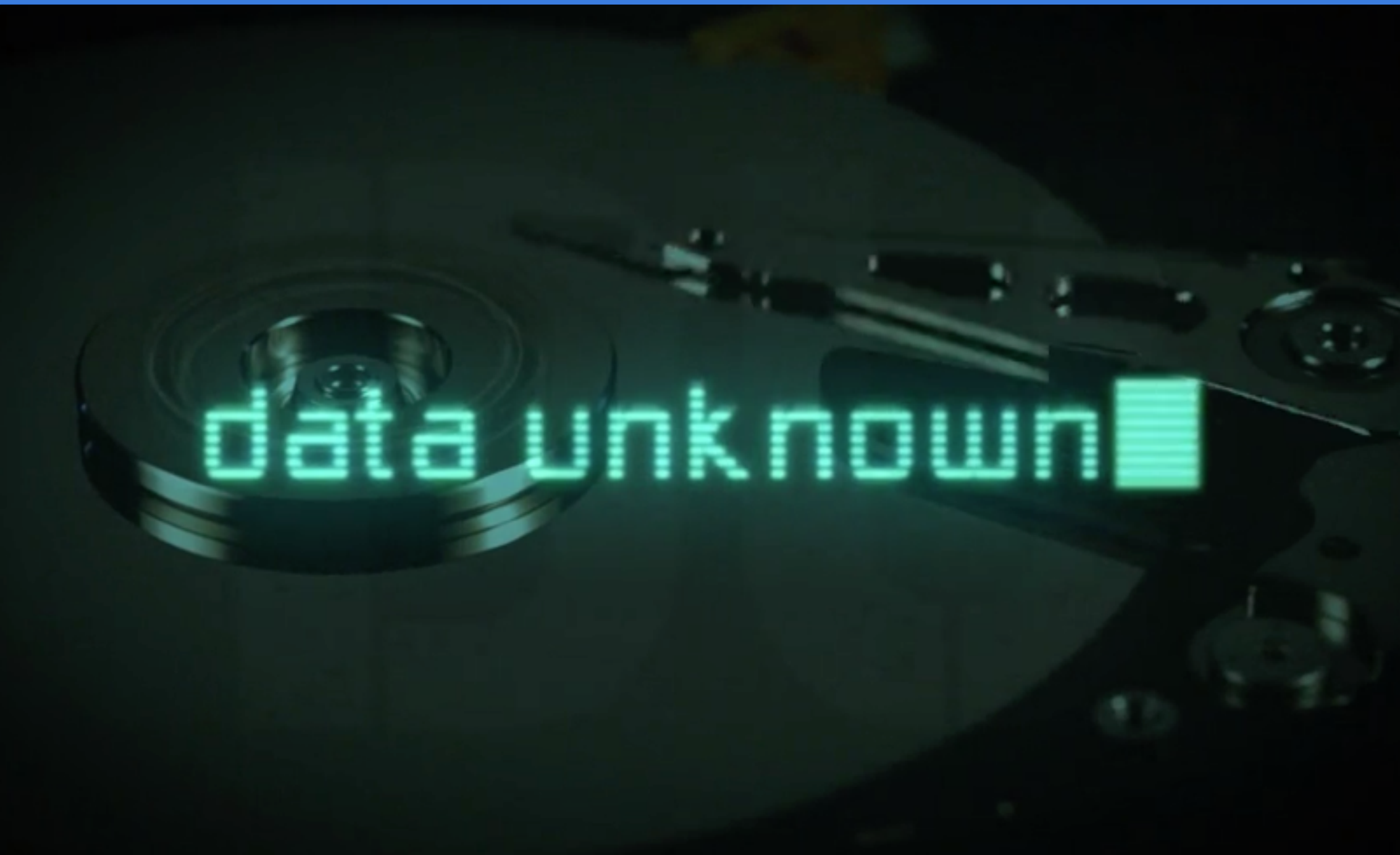


Zein-Hammoud M, Standley PR. 2015; Licciardone 2012; Degenhardt 2014



Walkowski, 2014; Schander, 2013; 2012

Osteopathic care…biological mechanisms?



Interestingly…

- The light touch condition which involved "gentle, systematic, and comprehensive stroking of an individual for 45 minutes" also induced quantifiable effects on neuroendocrine and immune parameters (Rapaport et al., 2012)

- But…it has been shown repeatedly that low intensity stimulation of cutaneous somatosensory nerves, particularly through stroking touch, warmth and light pressure, induces the release of endogenous peptides such as OT and opioids which promote relaxation and well-being (Uvnas-Moberg, 1998; Panksepp, 1998)

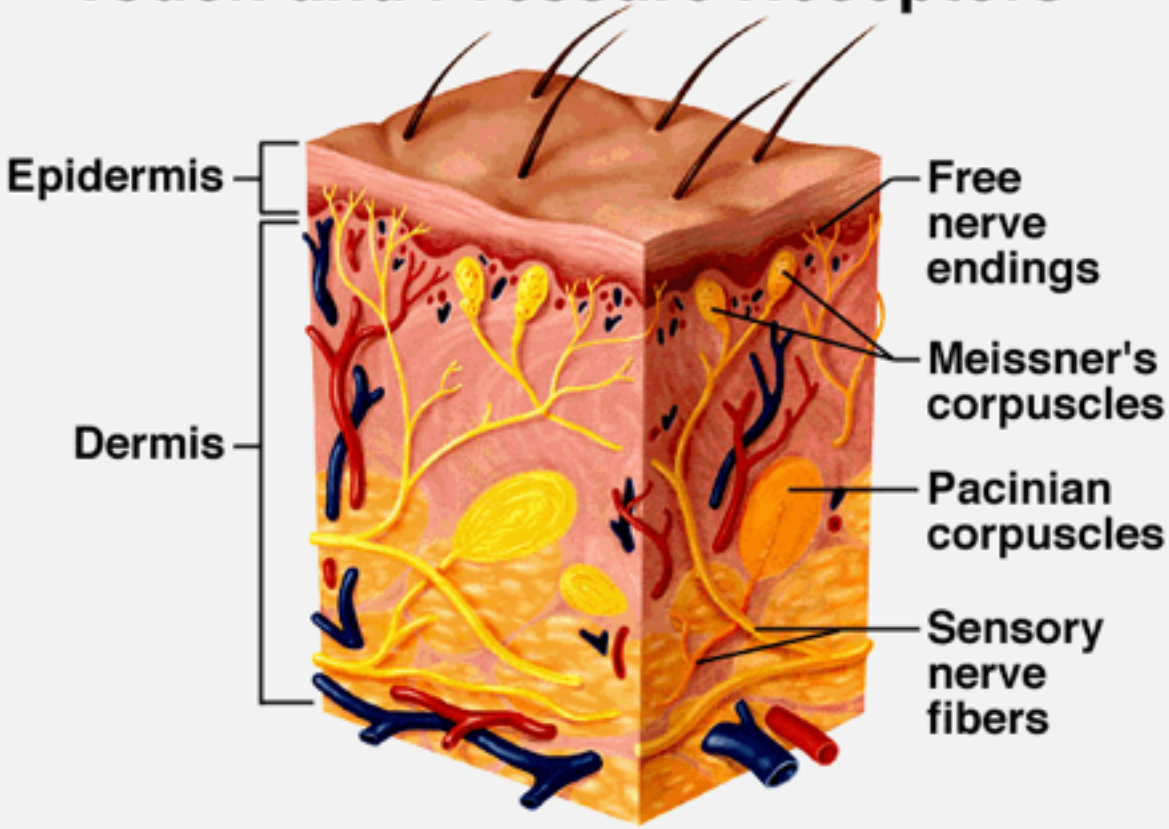
What it is about touch that correlates with so many observations down the centuries of its therapeutic value?

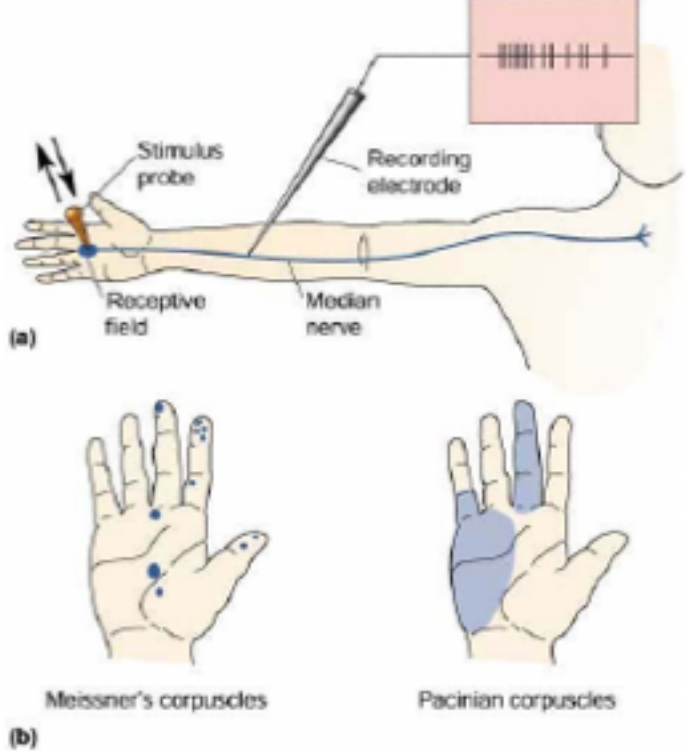
Discriminatory, 'fast' touch…

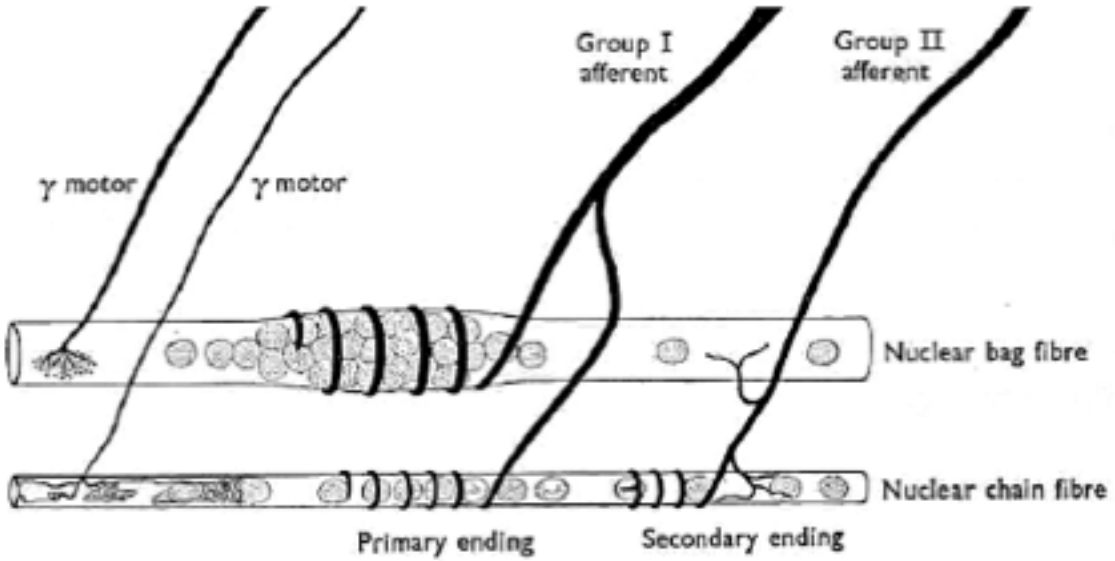
- Most people understand the sense of touch as a discriminative sense, enabling us to detect for example a fly landing on our face, or the texture of surface being manipulated.

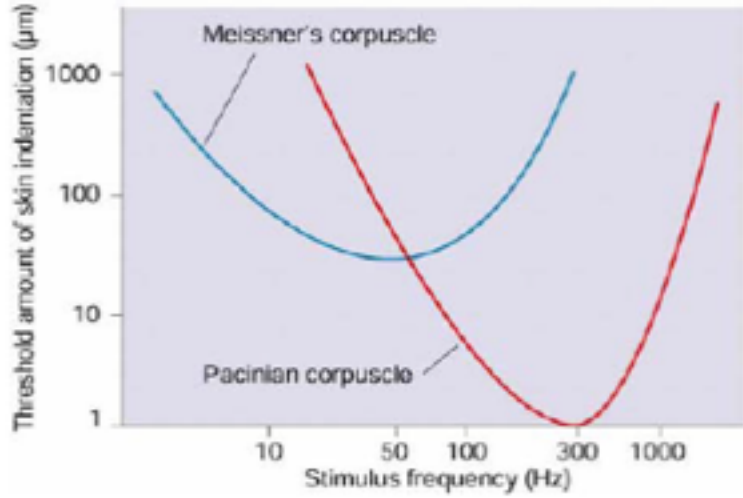
- This primacy of touch has been reflected in the focus of research where most investigations of skin mechanoreceptors have been conducted in either the glabrous skin of the hands or to a lesser extent the perioral regions of the face, possibly reflecting the importance of hand-to-mouth actions in feeding and the initial exploratory behaviours in infants – and the somatosensory homunculus.

Touch and Pressure Receptors









‘slow’, affective touch…

- There is a relatively recently discovered (in humans) ‘slow’ touch system that is dependent on a system of unmyelinated low threshold mechanosensitive c-fibres called c-tactile (CT) afferents

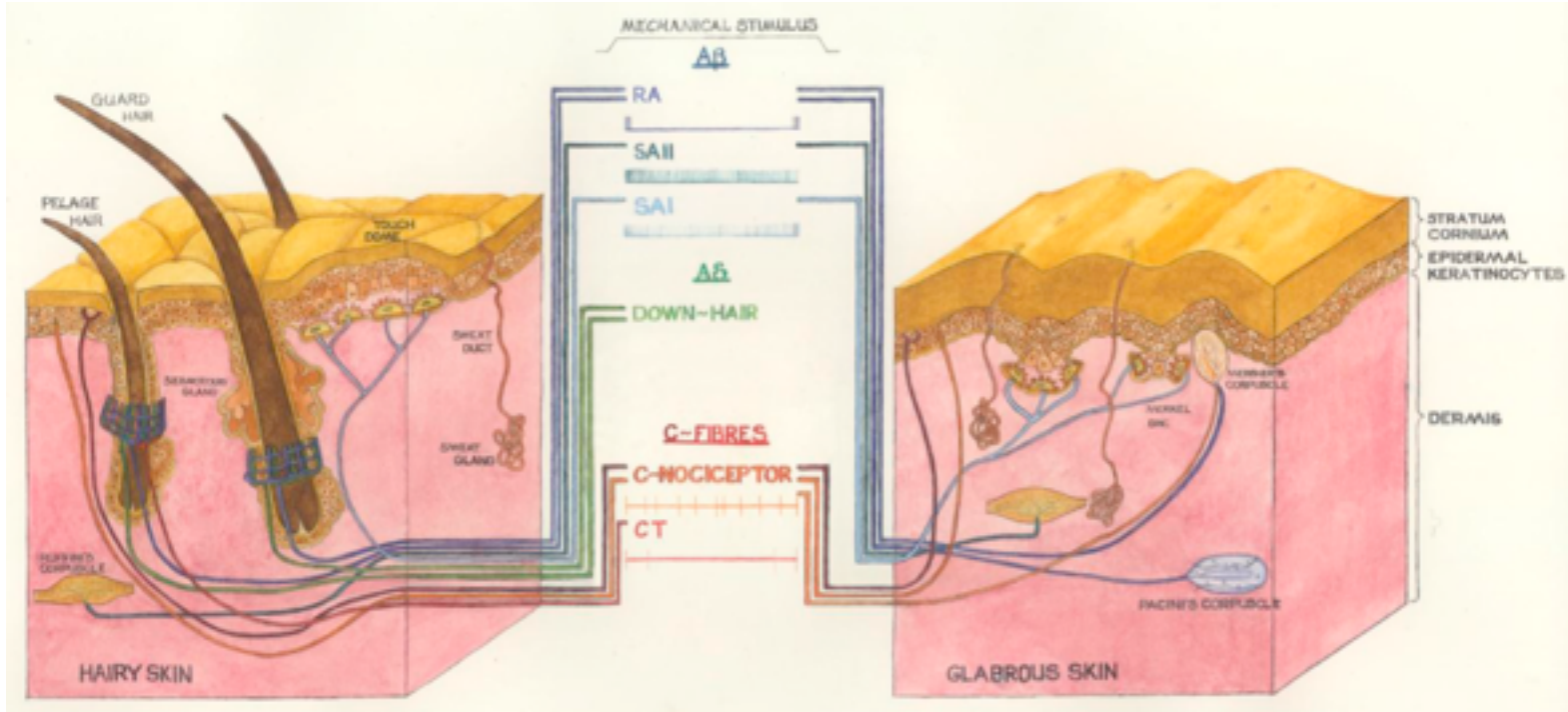
- They cannot provide any useful discriminative information due to the slow conduction velocity of c-fibres

- CTs have only been in the hairy skin of the body i.e. all skin other than the glabrous skin of the palms and soles, and are hypothesised to code for pleasant and affiliative properties of touch (Nordin, 1990; Vallbo et al, 1993; Vallbo et al, 1999; McGlone et al, 2012; McGlone et al, 2014)

Neuron
Perspective

Discriminative and Affective Touch: Sensing and Feeling

Francis McGlone,[1,3,*] Johan Wessberg,[2] and Håkan Olausson[4]
[1]School of Natural Science & Psychology, Liverpool John Moores University, Liverpool, L3 3AF, UK
[2]Institute of Neuroscience and Physiology, University of Gothenburg, Box 432, 40530 Göteborg, Sweden
[3]Institute of Psychology, Health & Society, University of Liverpool, Liverpool, L69 3BX, UK
[4]Department of Clinical and Experimental Medicine, Division of Neuroscience, Neurophysiology, Faculty of Health Sciences, Linköping University, SE-581 83 Linköping, Sweden
*Correspondence: f.p.mcglone@ljmu.ac.uk
http://dx.doi.org/10.1016/j.neuron.2014.05.001



Affective/pleasant touch

- McGlone et al (2014) have argued that the "affective touch hypothesis" implies that the essential role of the CT system is to provide or support emotional, hormonal, and behavioural responses to skin-to-skin contact with conspecifics

- On the other hand, it is also likely that a natural perceptive emotional response to pleasant touch is dependent on the combination of afferents from the two tactile systems, because selective CT stimulation fails to evoke anything like a full sensation of pleasant touch

- The combination of CT and Ab afferents is required for the complete feeling of pleasant touch in the hairy skin, and the intensity and even the quality of the emotional response evoked by a particular stimulus is highly dependent on contextual factors

Discriminative vs. Affective Touch

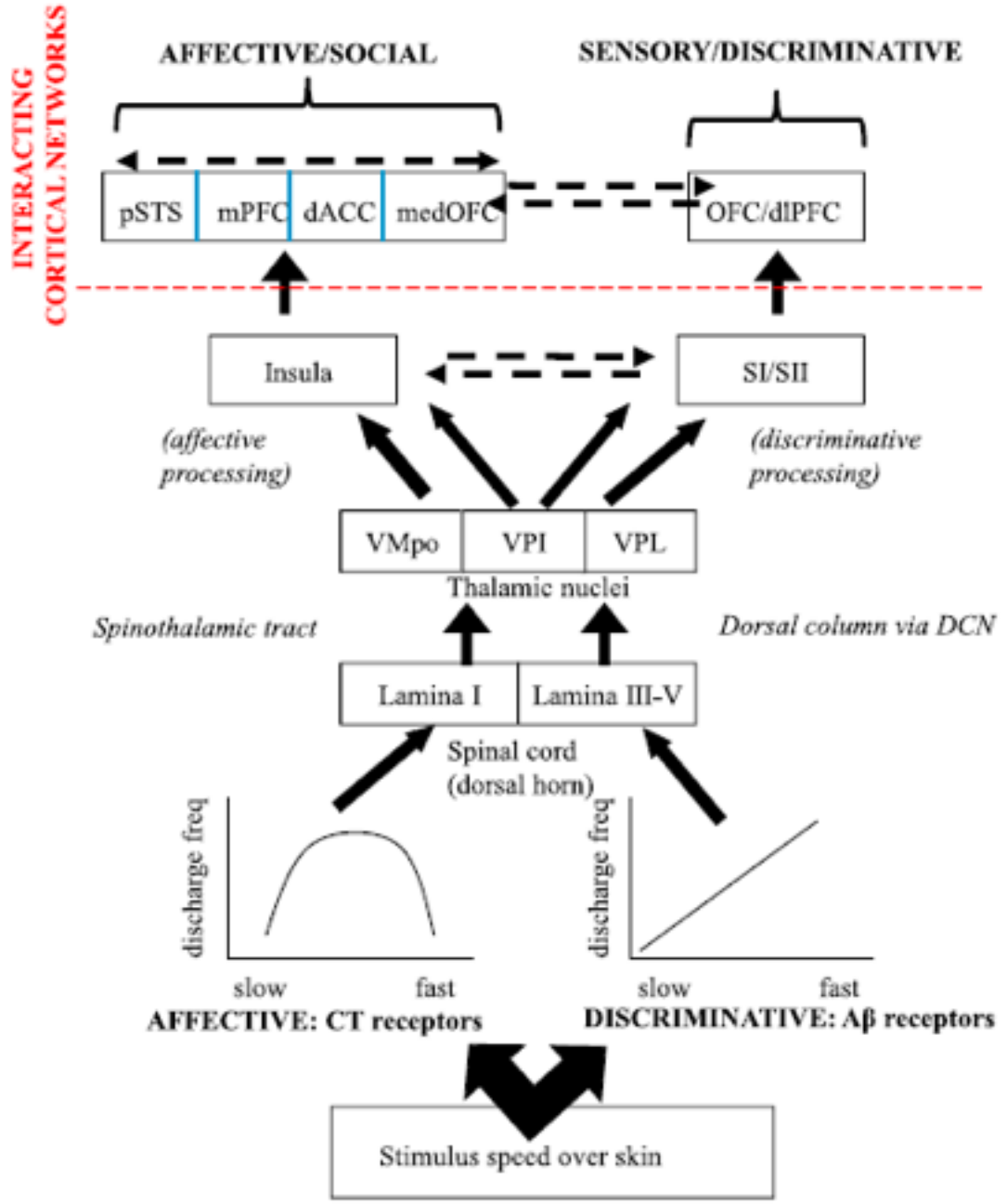


Figure 5. Schematic Diagram of Affective and Discriminative Pathways for Touch to Hairy Skin

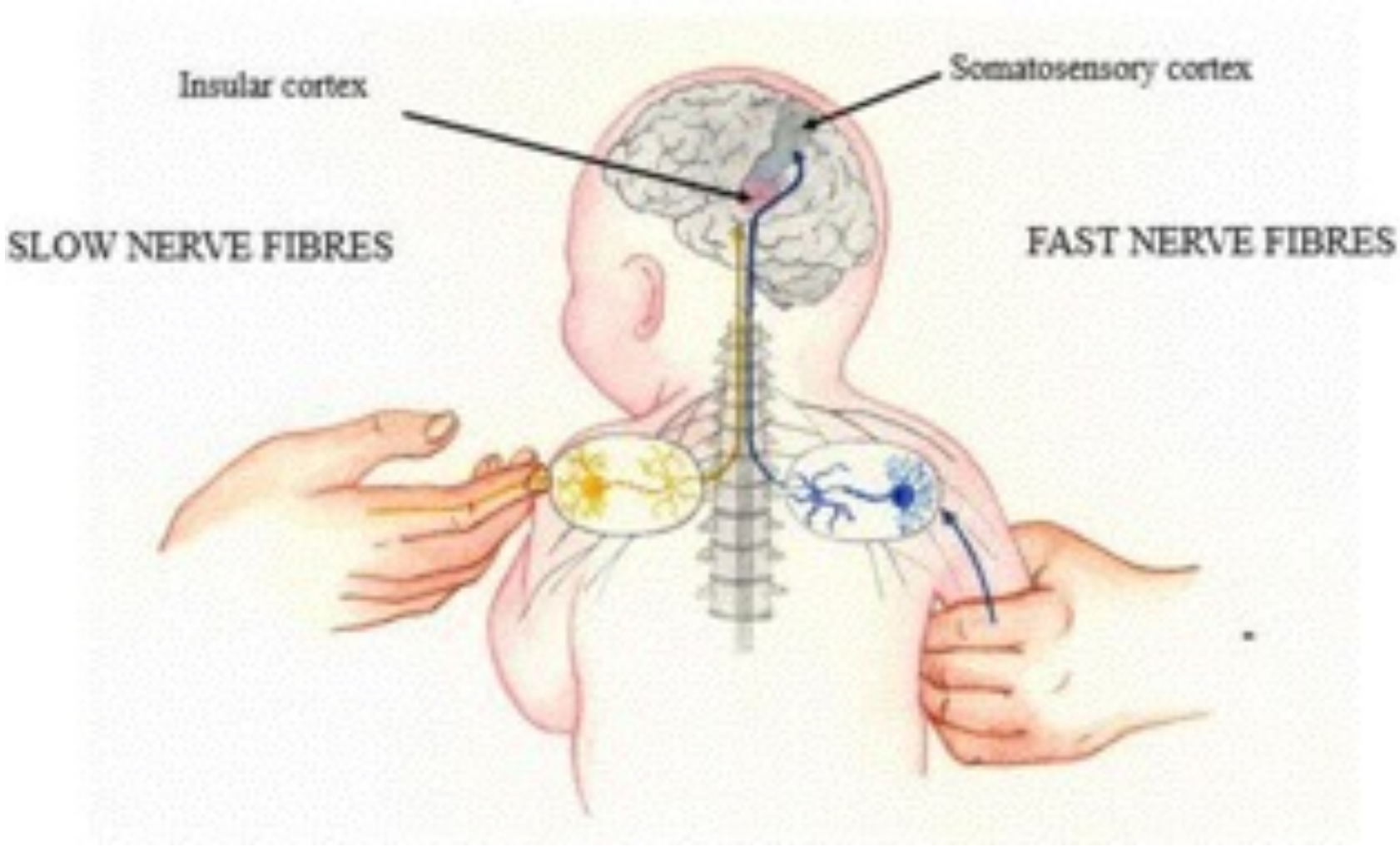
Two sides of touch

SLOW NERVE FIBRES – UNMYELINATED

- Intense long lasting pain
- Temperature
- Pleasant touch

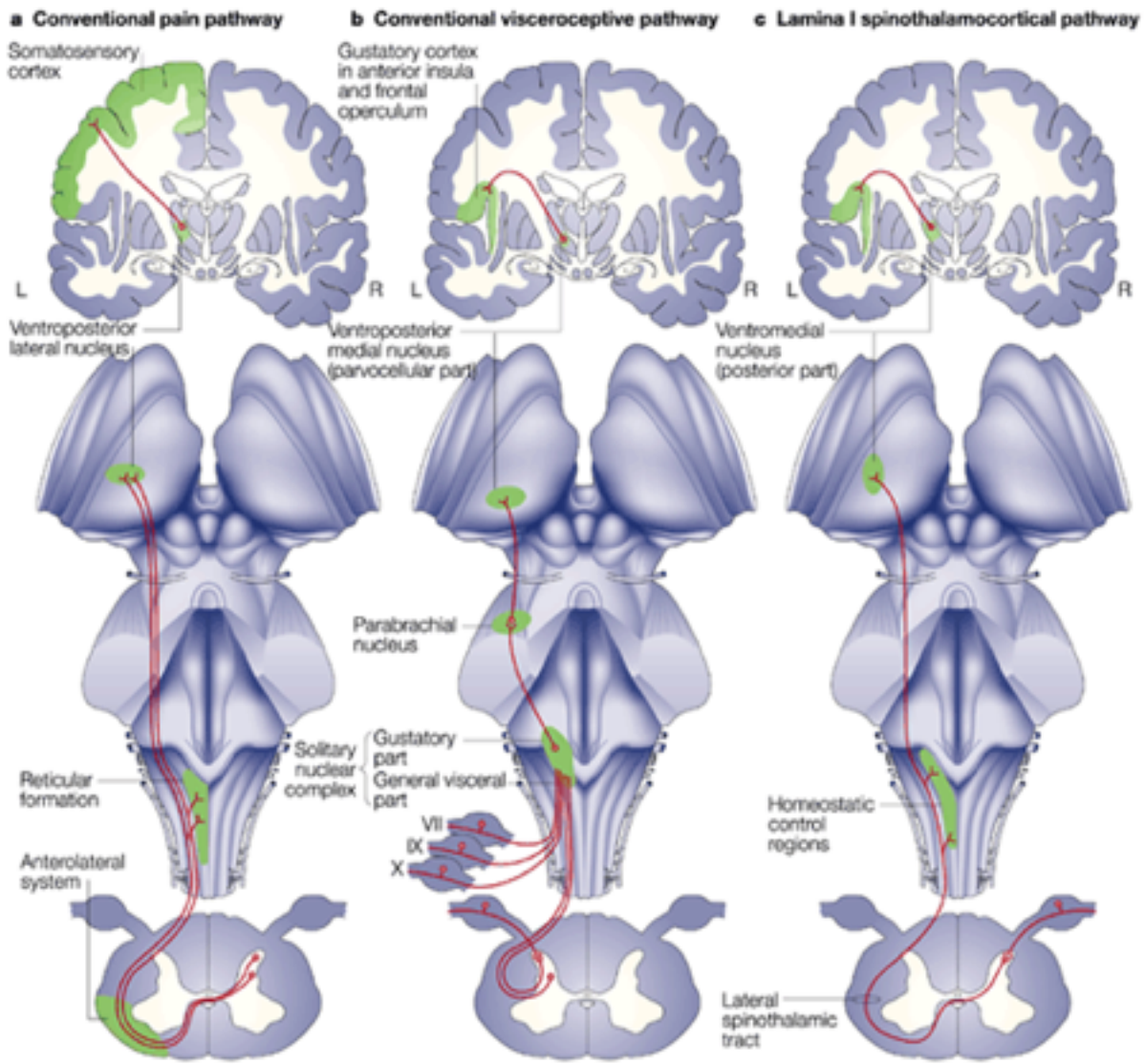
FAST NERVE FIBRES – MYELINATED

- Pressure
- Vibration
- Pin prick
- Spatial localisation



Background

Interoception:
The sense of physiological condition of the entire body



Craig A.D. How do you feel? Interoception: the sense of the physiological condition of the body. Nature Reviews Neuroscience 3, 655-666 (2002);

Local stimuli
Adelta – C fibers role

The A - and C-type primary afferent fibres that are relayed by lamina I relate **homeostatic information** — that is, much more than simply 'pain and temperature' sensations — from all tissues.

These fibres convey slow activity that is sensitive to changes in a wide variety of physiological conditions —not only temperature and mechanical stress, but also:

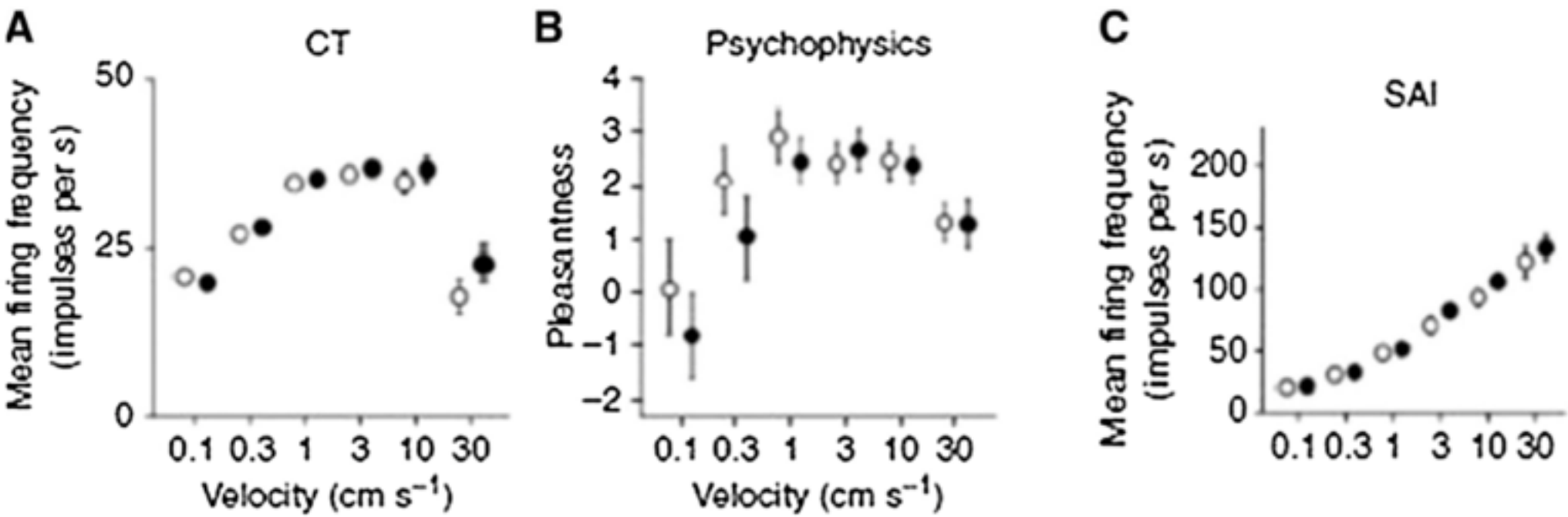
- local metabolism(acidic pH, hypoxia, hypercapnia, hypoglycaemia, hypo-osmolarity and lacticacid), *Hill J. 1992*
- cell rupture (ATP and glutamate), *Cook S. 2002*
- cutaneous parasite penetration(histamine), *Petho G. 1999*
- mast cell activation (serotonin, bradykinin and eicosanoids), *Cook S. 2002*
- immune and hormonal activity (cytokines and somatostatin). *Carlton S 2001*

Local stimuli
Adelta – C fibers role

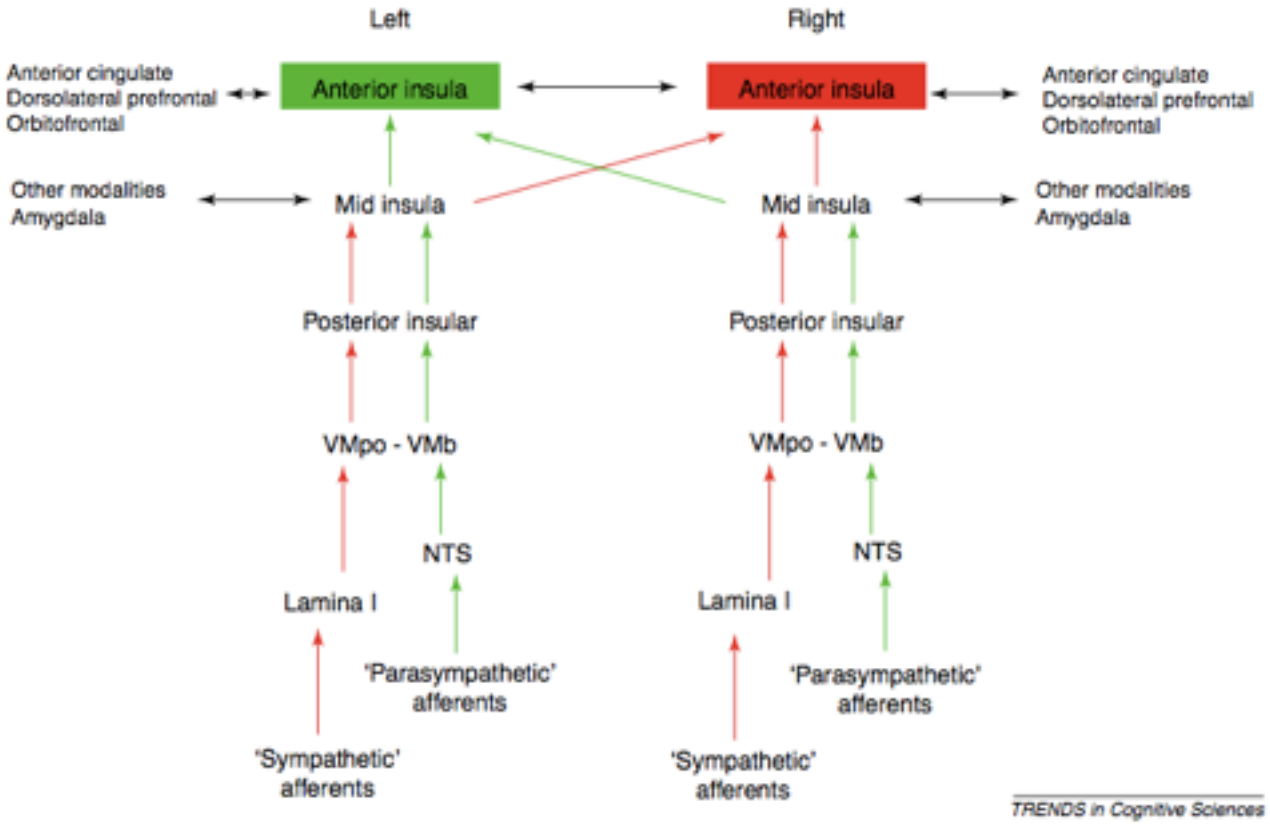
The A - and C-type primary afferent fibres that are relayed by lamina I relate **homeostatic information** — that is, much more than simply 'pain and temperature' sensations — from all tissues.

These fibres convey slow activity that is sensitive to changes in a wide variety of physiological conditions —not only temperature and mechanical stress, but also:

- local metabolism(acidic pH, hypoxia, hypercapnia, hypoglycaemia, hypo-osmolarity and lacticacid), *Hill J. 1992*
- cell rupture (ATP and glutamate), *Cook S. 2002*
- cutaneous parasite penetration(histamine), *Petho G. 1999*
- mast cell activation (serotonin, bradykinin and eicosanoids), *Cook S. 2002*
- immune and hormonal activity (cytokines and somatostatin). *Carlton S 2001*


A
CT
Mean firing frequency (impulses per s)
50
25
0
0.1 0.3 1 3 10 30
Velocity (cm s−1)
B
Psychophysics
Pleasantness
4
3
2
1
0
−1
−2
0.1 0.3 1 3 10 30
Velocity (cm s−1)
C
SAI
Mean firing frequency (impulses per s)
200
150
100
50
0
0.1 0.3 1 3 10 30

Insula



The underlying anatomical pathway involves:

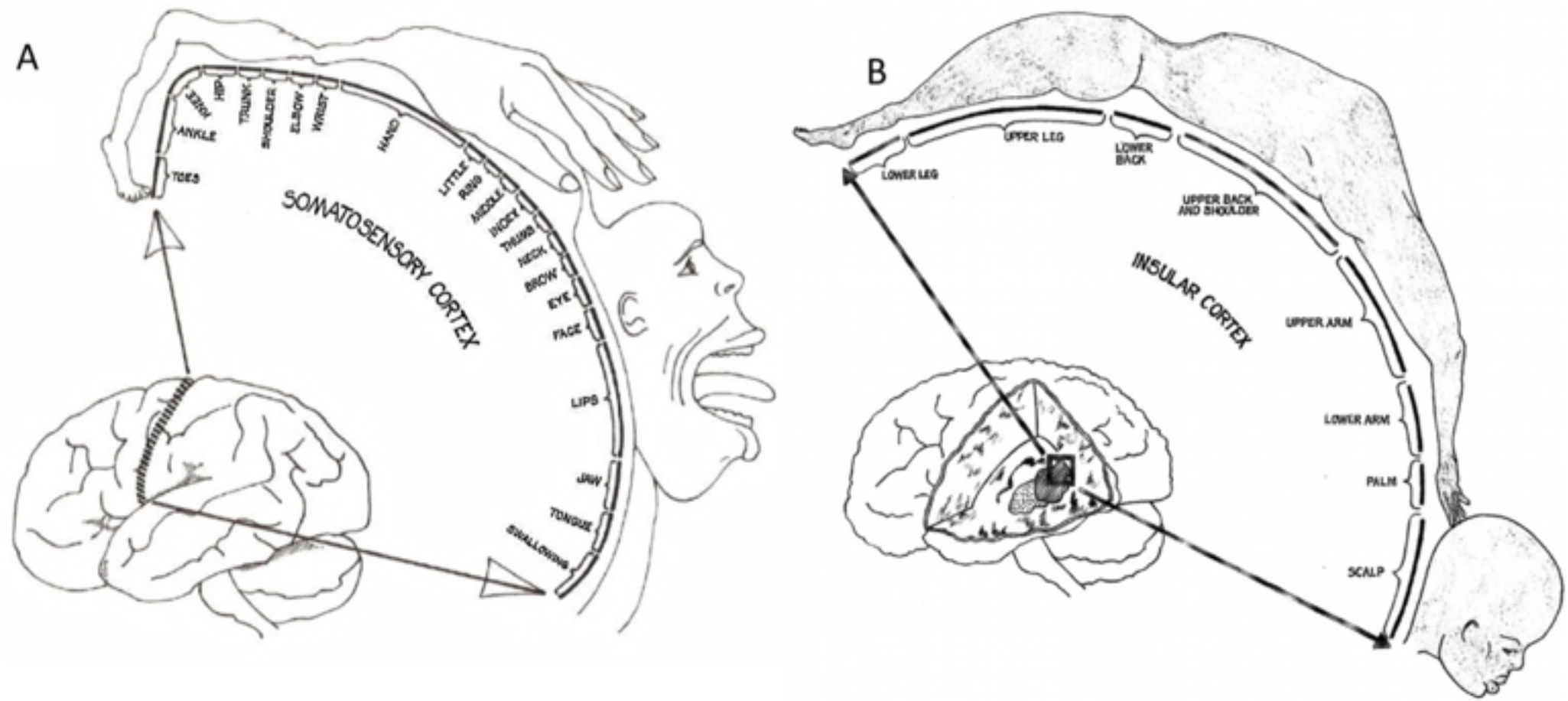
1. the contralateral anterior insula, which must contain an initial re-representation of interoceptive cortex on the same side,

2. by way of a callosal pathway, a lateralized, second-order re-representation on the right side that is subsequently forwarded to orbitofrontal cortex.

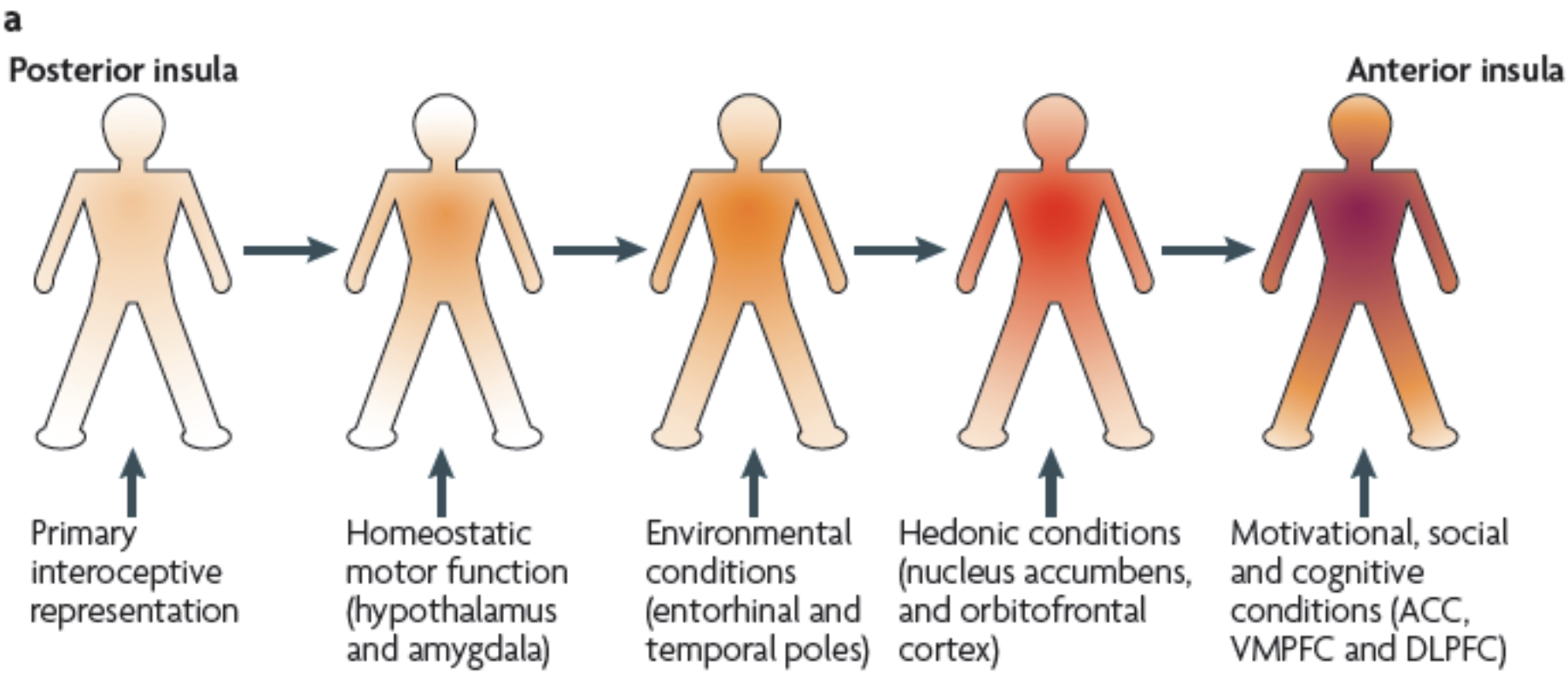
Craig A.D. How do you feel? Interoception: the sense of the physiological condition of the body. Nature Reviews Neuroscience 3, 655-666 (2002);

Two Homunculi – Discriminative and Affective

F. McGlone et al. / Neuroscience and Biobehavioral Reviews 72 (2017) 1–9

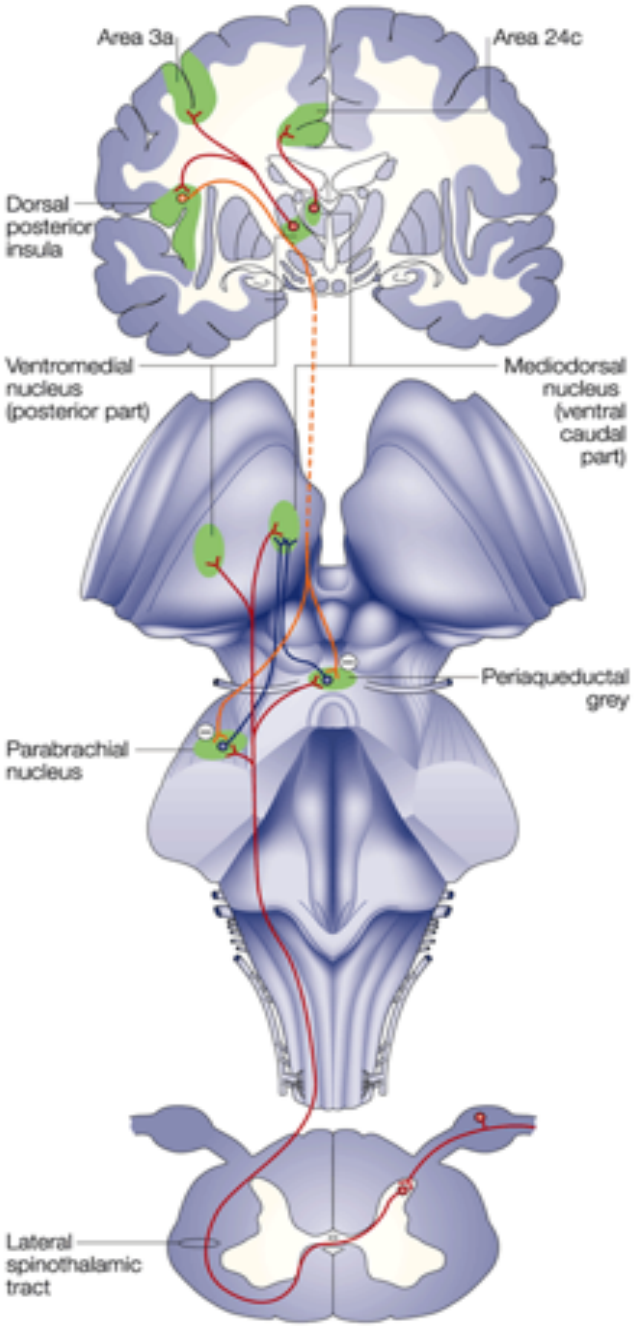


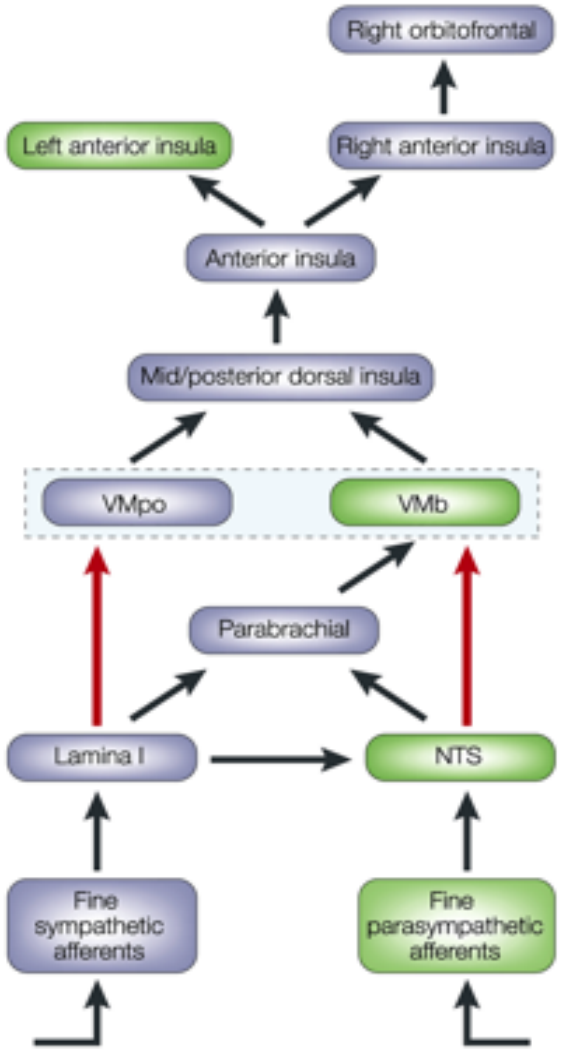
Model of awareness



Craid AD. How do you feel – now? The anterior insula and human awareness. Nat Rev Neurosc. 2009; 10, 59:70.

Orbito-frontal cortex





Craig A.D. How do you feel? Interoception: the sense of the physiological condition of the body. Nature Reviews Neuroscience 3, 655-666 (2002);

‘Interoceptive’ touch

frontiers in Neuroscience

REVIEW
published: 10 March 2016
doi: 10.3389/fnins.2016.00100

Recently, D'alessandro et al (2016) hypothesised that the ‘interoceptive paradigm’, a theoretical framework to explain how patient’s clinical history and associated signs and symptoms can be mutually related in clinical practice, is mediated by CT afferents, which can intercede with sensitisation states, at all levels, via interoceptive pathways.

Sensitization and Interoception as Key Neurological Concepts in Osteopathy and Other Manual Medicines

Giandomenico D’Alessandro [1, 2], Francesco Cerritelli [1, 3, 4] and Pietro Cortelli [5, 6]*

[1] Clinical-based Human Research Department, Centre for Osteopathic Medicine Collaboration, Pescara, Italy, [2] Accademia Italiana Osteopatia Tradizionale, Pescara, Italy, [3] Department of Neuroscience, Imaging and Clinical Sciences “G. D’Annunzio” University of Chieti-Pescara, Pescara, Italy, [4] ITAB-Institute for Advanced Biomedical Technologies, “G. D’Annunzio” University of Chieti-Pescara, Pescara, Italy, [5] Department of Biomedical and Neuromotor Sciences, Bellaria Hospital, University of Bologna, Bologna, Italy, [6] IRCCS Istituto delle Scienze Neurologiche di Bologna, AUSL di Bologna, Bologna, Italy

Implications for Osteopathy

- Osteopathic treatment provides a privileged entry-point to the interoceptive system offering patients with chronic pain a solid way-in to inner world of experiencing while serving as tangible support

- It enables patients to explore the nature of their experiences and to trust their body as a source of tacit knowledge and counter-weight the often hyper-cognitive ways of coping with stress

- Co-using evocative language and movement to explore and express their inner self and emotions makes the embodied self-awareness resonate as it appears in the present moment (Calsius et al., 2016)

Osteopathy in perinatal care

- Extrapolating from what we now know about the functional properties of CTs, we argue that the proven benefits of the kinds of gentle handling typically applied to pre-term infants during OMT will, in some part, be due to the selective stimulation of these cutaneous afferents and they are therefore likely to play a critical and significant role in perinatal care.

Further research

- Investigating the role of different types of touch will shed light on the physiological effects of care on pre-term infants' brain function and development, nerve conduction velocity, biomarker variation and pain modulation.
- The results from this research could open avenues for multimodal care of pre-term infants, considering slow-stroking CT-based touch as part of usual medical care.

Acknowledgements

Prof Francis McGlone and Dr Susannah Walker Somatosensory & Affective Neuroscience Group , Liverpool John Moores University

Prof. Jorge Esteves

Piaget Institute, OHC, COME Collaboration

SIETE I BENVENUTI! :)