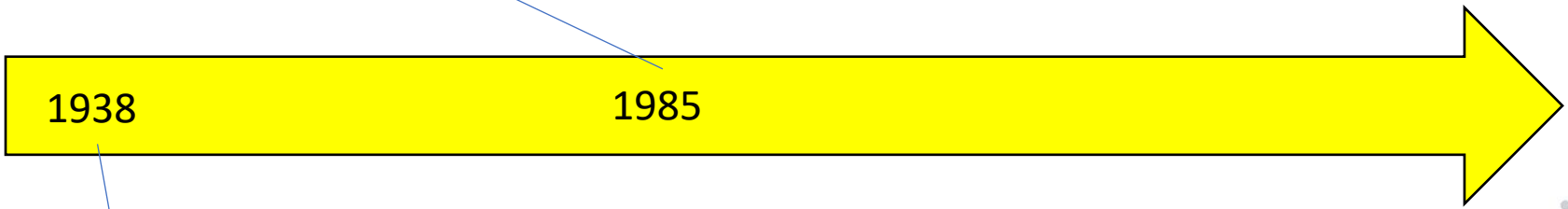
8° CONGRESSO NAZIONALE ROI
VERONA 16-18 GIUGNO 2023
OSTEOPATIA E SALUTE
NELLE DIVERSE ETÀ DELLA VITA

# La fisiologia delle fibre c-tattili tra osteopatia e placebo

Giandomenico D'Alessandro

ROI
REGISTRO DEGLI OSTEOPATI D'ITALIA

# CT fibers (CTs)



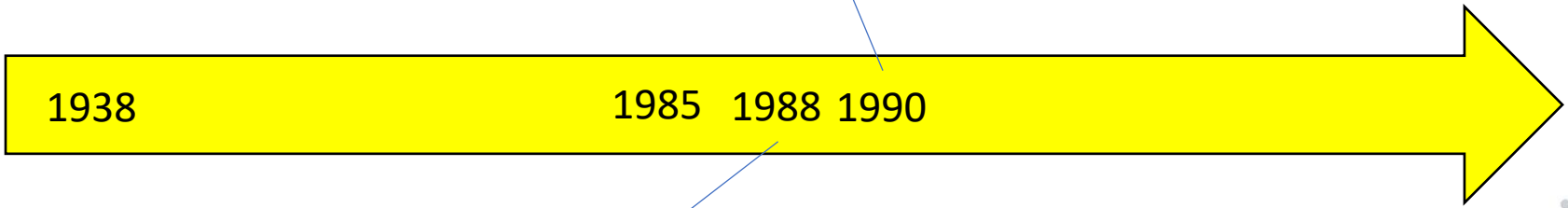

Zotterman
(gatto)

Shea and Perl
(coniglio)

# CT fibers (CTs)

**Low Threshold Mechanoreceptors (LTMs/CLTMs)**

Nordin et al.




Johansson et al.

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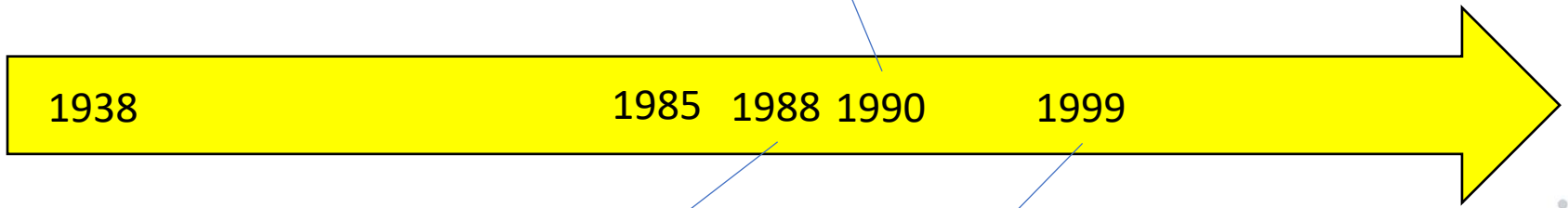



Nordin et al.

Johansson et al.

Vallbo et al.
*"Tactile C afferents"*

# CT fibers (CTs)

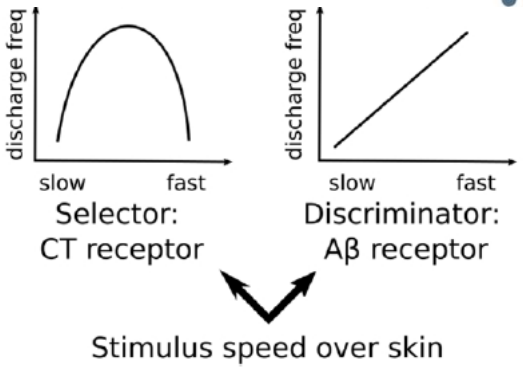
- dove si trovano?
- cosa le attiva?
- effetti neurobiologici?
- effetti psicofisiologici?

# CTs – dove si trovano?

- Cute con peli
- Abbondanti su braccia e viso, meno sulle gambe [Edin, 2001; Loken et al., 2022]
- Rinvenute anche a livello del palmo della mano [Watkins et al., 2021]

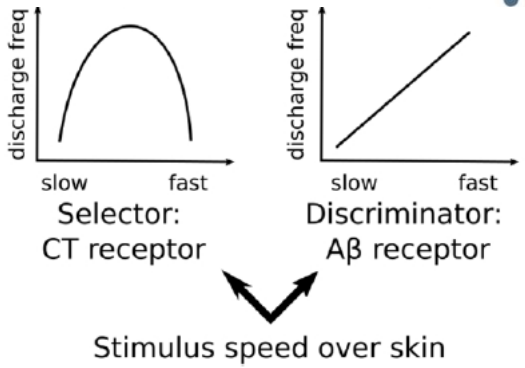
# CTs – cosa le attiva?

- *Preferenzialmente* velocità 1-10 cm/s



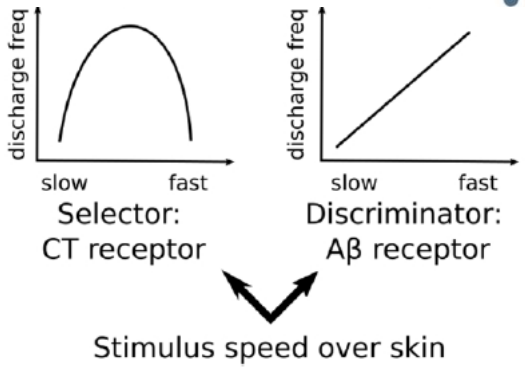
# CTs – cosa le attiva?

- *Preferenzialmente* velocità 1-10 cm/s
- Temperatura cute umana



# CTs – cosa le attiva?

- *Preferenzialmente* velocità 1-10 cm/s
- Temperatura cute umana
- 0.2/2.5 mN [Vallbo et al., 1999; Ackerley et al., 2014; Löken et al., 2009]



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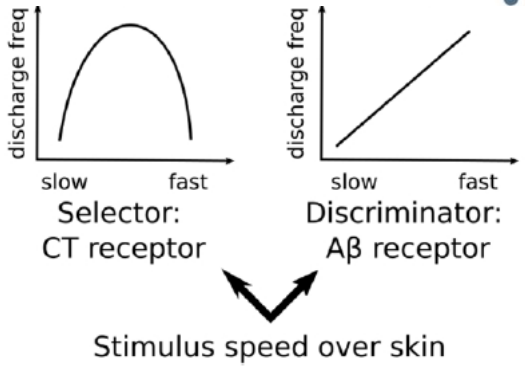

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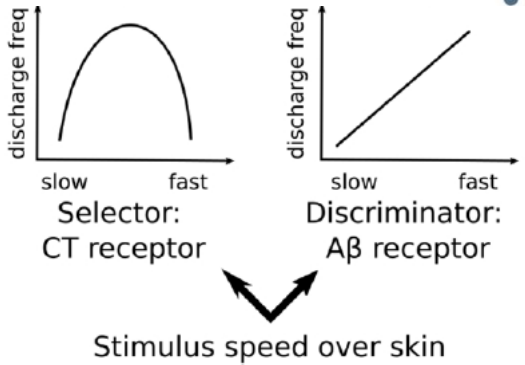
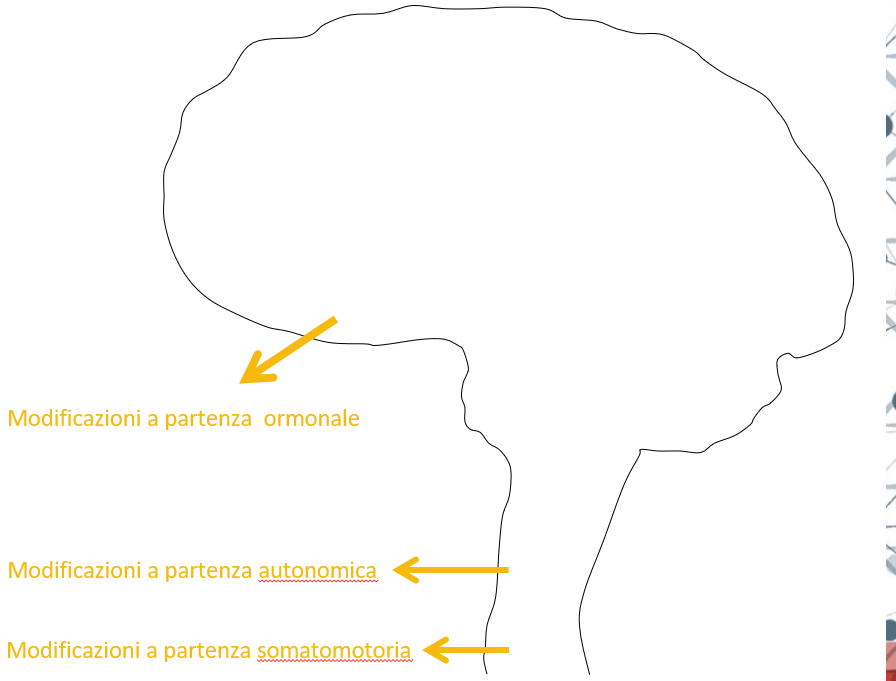


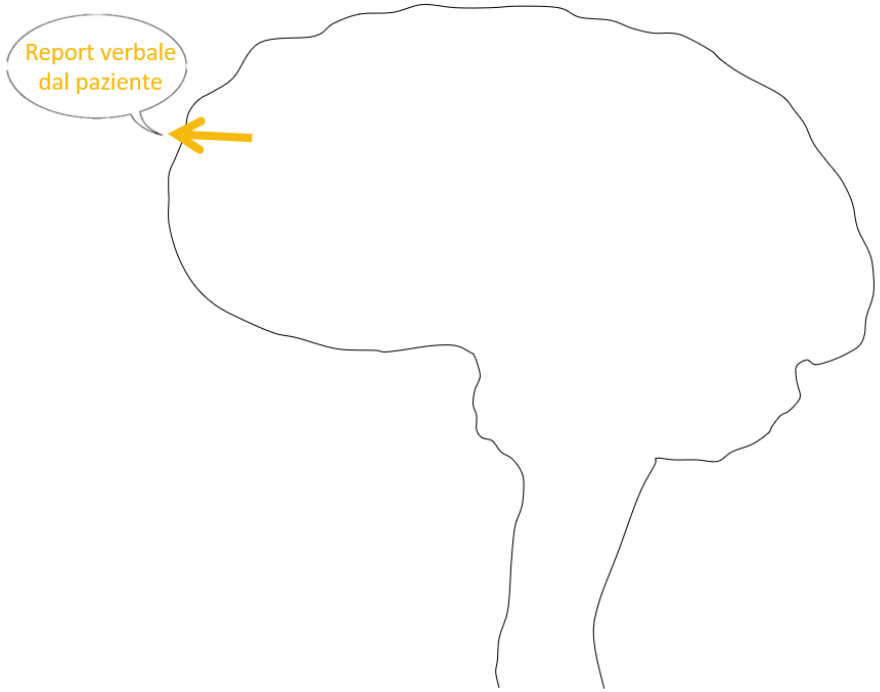

‘‘Rispondono ad una carezza’’ [Morrison et al., 2010]

# CTs – effetti neurobiologici?

- Riduzione della frequenza cardiaca in neonati a termine e pretermine [Manzotti et al., 2019; Püschel et al., 2022]
- Riduzione della risposta dolorifica nei neonati a termine sottoposti a procedure mediche [Gursul et al., 2018].

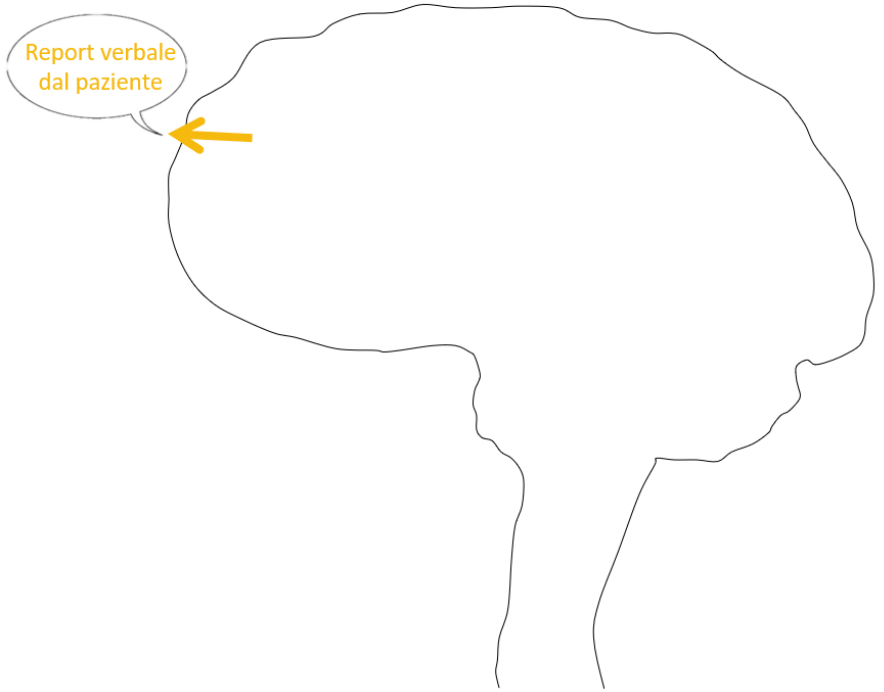


# CTs – effetti psicofisiologici?



# CTs – effetti psicofisiologici?

- Proporzionalità tra frequenza di scarica e piacevolezza percepita del tocco [Vallbo et al., 2009].
- Aumenta i sentimenti positive affects [Pawling et al., 2017]
- Riduzione dolore da stimolazione termica cutanea elevata [Liljencrantz et al., 2017
- Valutazione più positiva dei volti neutri precedentemente accoppiati (condizionamento) all'accarezzamento a 4 cm/s dei soggetti valutati [Della Longa et al., 2019; Francis et al., 1999; Fu et al., 2018; Triscoli et al., 2017]
- Attivazione dell'insula posteriore [Olausson et al., 2002]
- Maggior efficacia per il processo di enbodiement [Crucianelli et al., 2013; van Stralen et al., 2014]



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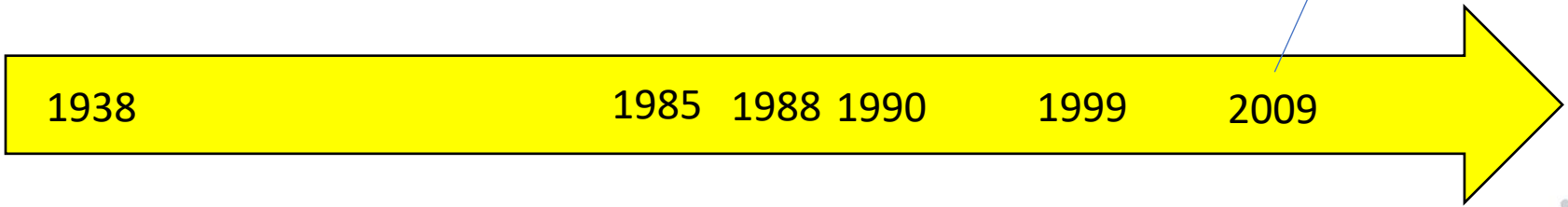
*"Affective touch Hypothesis"*



# CTs → Affective Touch Hypothesis
## (Vallbo et al., 2009)

*"The essential role of the CT system is to convey pleasant aspects of light touch, particularly of skin-to-skin contact with affiliative human beings"*

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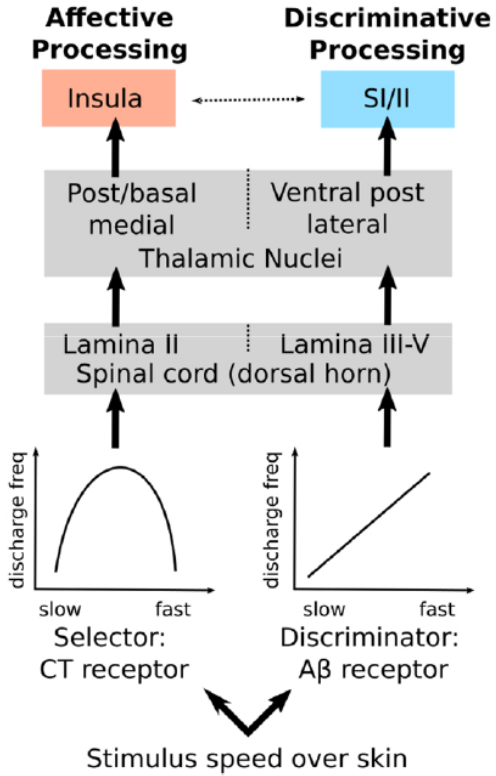
# Mechanosensory Pathways



# Sistema somato-sensoriale

## SISTEMA **B**

Interocezione/nocicezione

- Recettori (free endings)
- Fibre (Aδ, c)

## SISTEMA **A**

Esterocezione/propriocezione

- Recettori (7)
- Fibre (Aα, Aβ)

# Infatti si scopre che

- Bloccando l'attività delle fibre Aβ l'intensità e la piacevolezza percepita del tocco risultano entrambe diminuite, sia con tocco leggero che con pressione più intensa. Quindi le fibre Aβ hanno un ruolo in quello che sarebbe il tocco affettivo [Case et al., 2023]
- Pazienti con lesioni spinali che hanno colpito le proiezioni corticali delle fibre c ma non delle fibre Aβ (appunto perchè hanno diverse vie) mostrano nessuna differenza di piacevolezza tra prima e dopo la lesione [Marshall et al., 2019].

# Affective Touch: The Enigmatic Spinal Pathway of the C-Tactile Afferent

Andrew G Marshall[1,2] and Francis P McGlone[3]

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Neuroscience Insights
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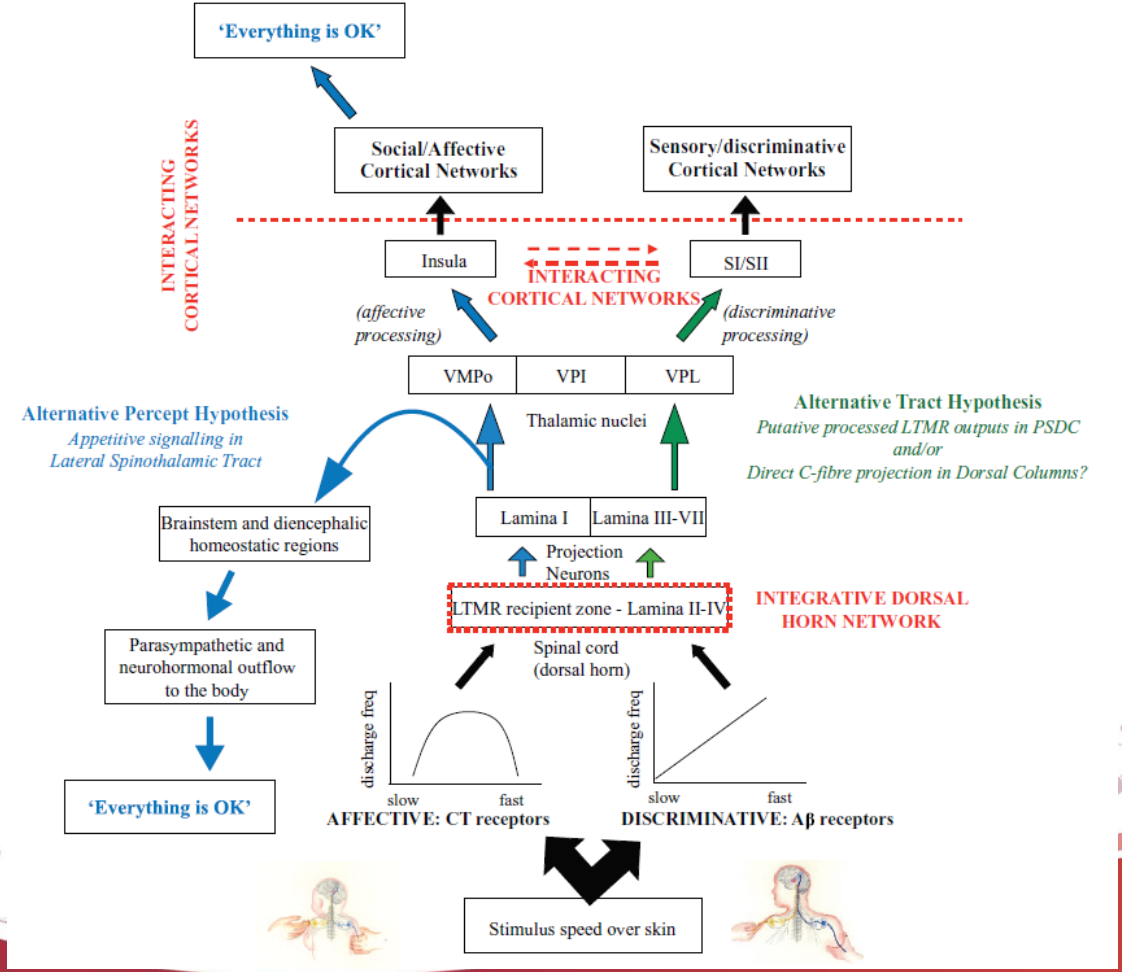
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Sensory/discriminative Cortical Networks
Insula
INTERACTING CORTICAL NETWORKS
SI/SII
(affective processing)
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VMPo
VPI
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Appetitive signalling in Lateral Spinothalamic Tract
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Putative processed LTMR outputs in PSDC and/or Direct C-fibre projection in Dorsal Columns?
Brainstem and diencephalic homeostatic regions
Lamina I
Lamina III-VII
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LTMR recipient zone - Lamina II-IV
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Parasympathetic and neurohormonal outflow to the body
Spinal cord (dorsal horn)
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discharge freq
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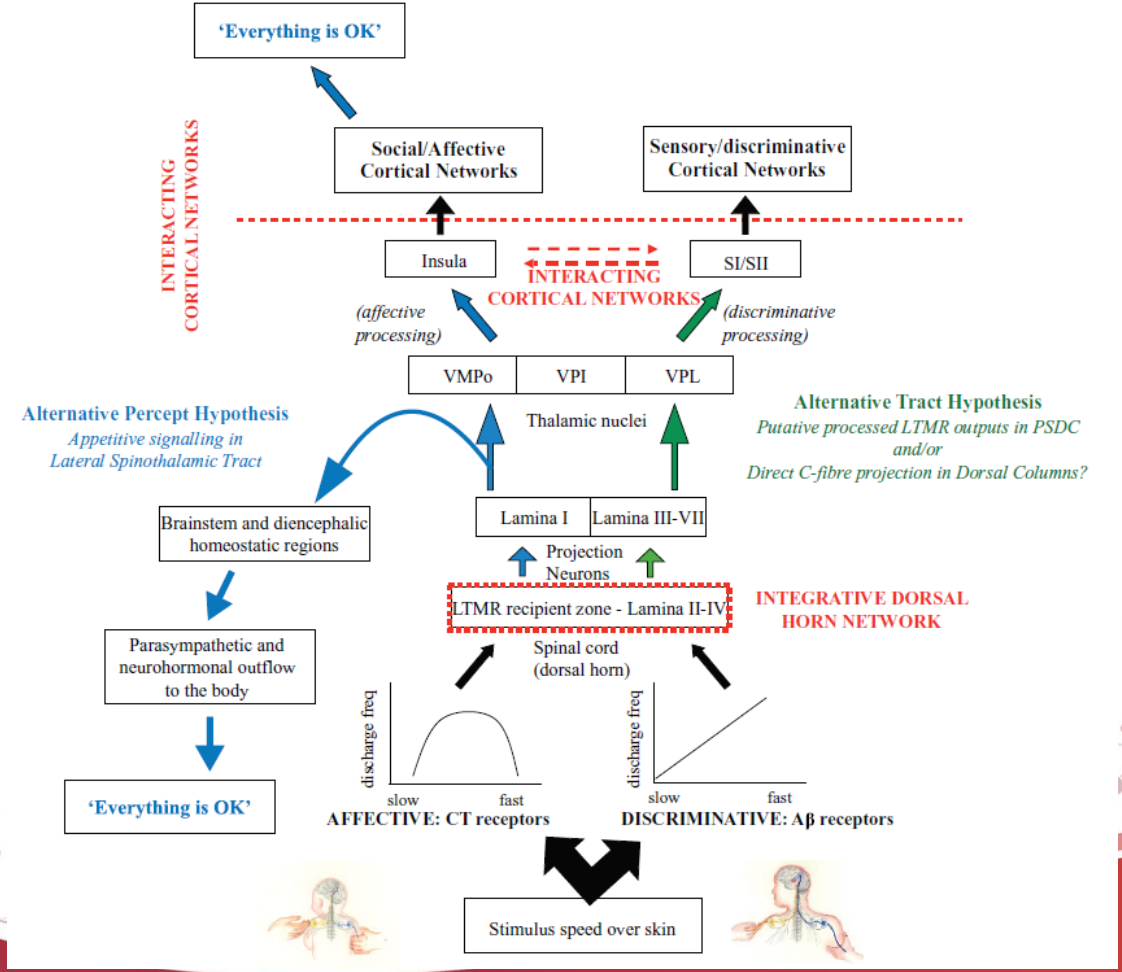
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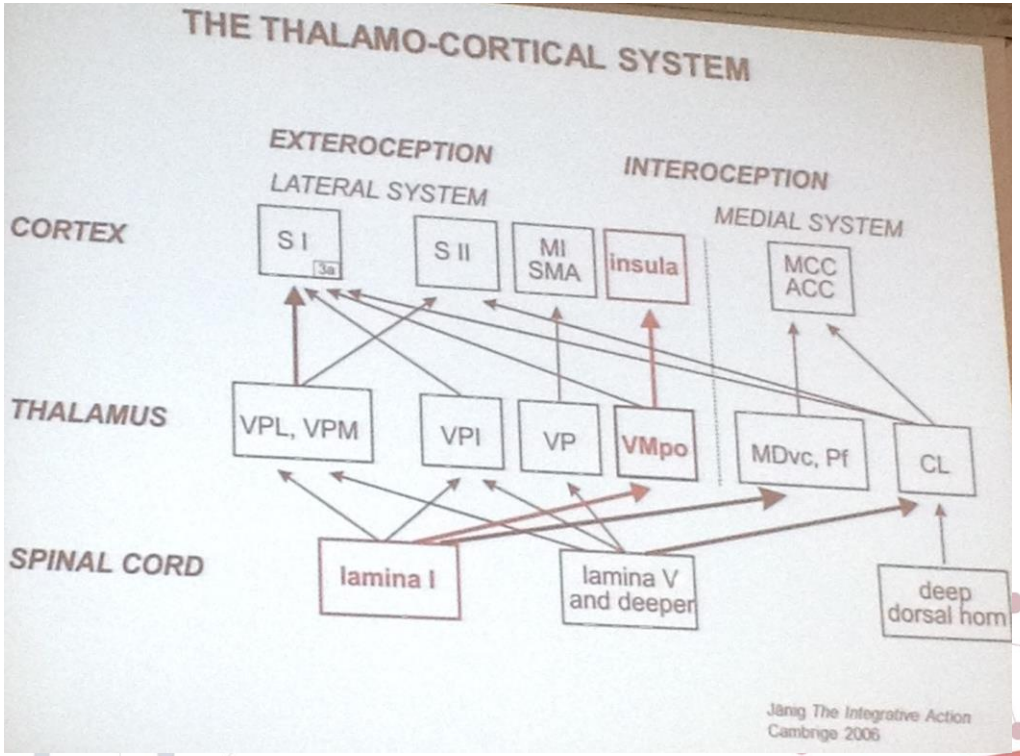
OSTEOPATIA E SALUTE NELLE DIVERSE ETÀ DELLA VITA

# Ma si sapeva che




*Janig W, Neuhuber W:*
Le Basi Neurobiologiche della Clinica Osteopatica in Medicina - Nocicezione e Dolore.
09-11 Ottobre 2014, Pescara

ROI REGISTRO DEGLI OSTEOPATI D'ITALIA

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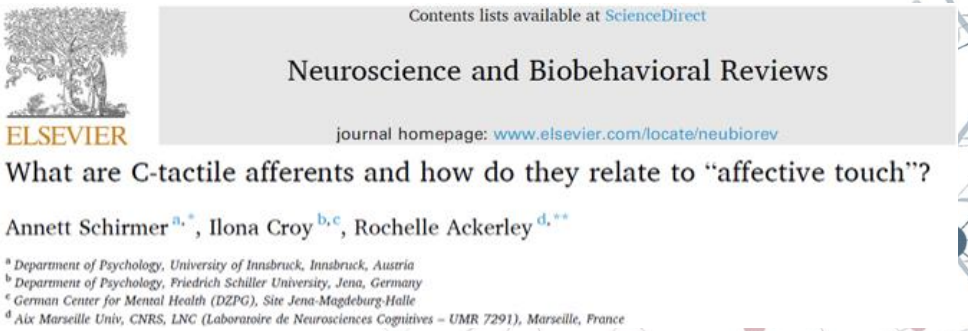

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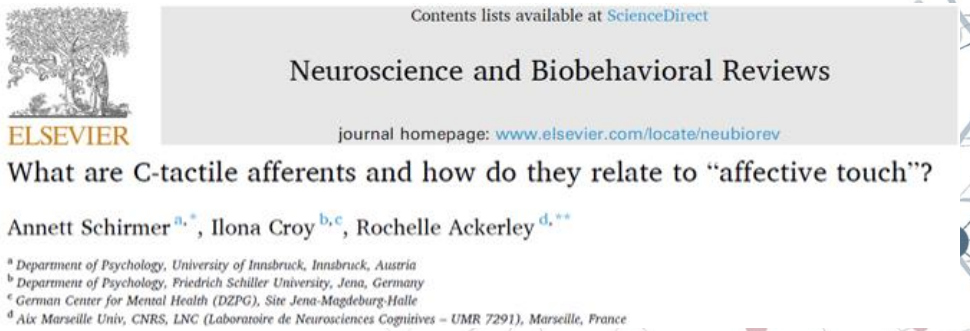
Notably, this latter point has often gone unnoticed in subsequent work".



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# Meccanismo di funzionamento delle tecniche

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# Meccanismo di funzionamento delle tecniche

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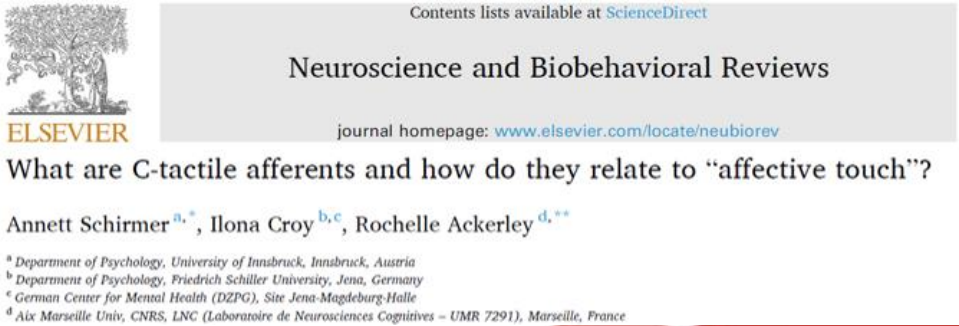

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## The role of gentle touch in perinatal osteopathic manual therapy

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nature research

Sci Rep. 2020; 10: 3214.
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PMCID: PMC7035282
PMID: 32081945

## Effect of manual approaches with osteopathic modality on brain correlates of interoception: an fMRI study

Francesco Cerritelli,[1,2,3] Piero Chiacchiaretta,[1,2] Francesco Gambi,[1,2] Mauro Gianni Perrucci,[1,2] Giovanni Barassi,[4] Christian Visciano,[4] Rosa Grazia Bellomo,[5] Raoul Saggini,[4] and Antonio Ferretti[1,2]

Roi
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# Meccanismo di funzionamento delle tecniche

ELSEVIER

Complementary Therapies in Clinical Practice
Volume 42, February 2021, 101277

## The role of touch in osteopathic practice: A narrative review and integrative hypothesis

Francesca Baroni [a b], Nuria Ruffini [a c], Giandomenico D'Alessandro [a], Giacomo Consorti [a d], Christian Lunghi [a b]

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# Meccanismo di funzionamento delle tecniche

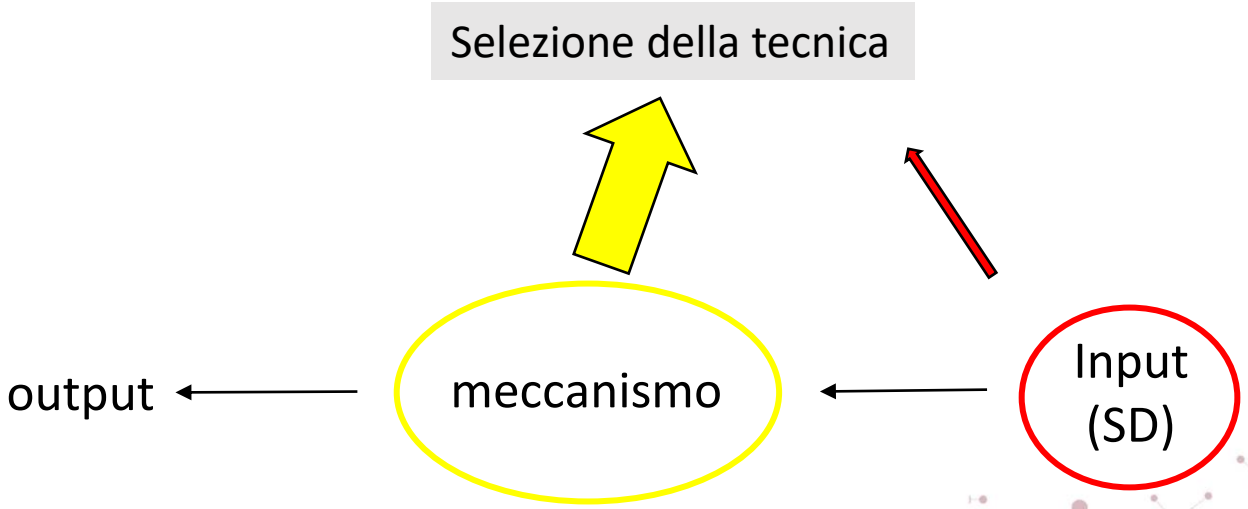
**Table 2**
Selection of osteopathic touch based on the impact of osteopathic palpatory findings and on multidimensional nature of the patient's complaint [43]. [82.87].

| Examples of some clinical hypothesis of tissue alterations involved in maintaining somatic dysfunction or fascial pattern. | Hypothesis of mechanoreceptors mostly involved in the dysfunctional pattern | Provocation tests (touch or movement) to evocate patient responsiveness | Type of touch (applied by the practitioner) in osteopathic approaches | Movement (used by the patient) in osteopathic approaches | Functional response expected after treatment |
|---|---|---|---|---|---|
| - Myofascial tissue | - Muscle spindle | Compressional moves toward muscle mass | - Soft-tissue technique | Micromovements, coordination and precision | - Tonus decrease in related myofibers |
| - Myotendinous junction<br>- Joint capsules | - Golgi receptor | Slow elongation of related collagen fibers above a certain strain threshold (a post-isometric relaxation could be requested) | - Muscle energy technique | - Hanna's Pandiculation techniques<br>- Active Resistant Stretches | -Tonus decrease in related myofibers |
| - Spinal Ligaments<br>- Joint capsule | - Pacini corpuscle | Rapid pressure changes and vibration | - High velocity techniques<br>- Recoil techniques<br>- Harmonic techniques | - Rapid stimulation and vibratory tools exercise | Enhancement of local proprioception and improvement in local neuromuscular self-regulation |
| - Joint capsule | - Ruffini endings | Slow deformation along tangential vectors | -Myofascial release<br>- Balanced ligamentous tension | -Slow movements with myotatic reflex activation<br>- Melting stretches | - Inhibition of sympathetic activity |
| - Epidermis | - Free nerve endings | Antalgic positioning associate to light and slow touch, affective touch | - Interoceptive osteopathic approaches (e.g. Positional release techniques) | -Slow movements with myotatic reflex activation<br>- Melting stretches<br>- Meditative movements,<br>- Experiential bodywork<br>- Intentional breathing<br>- Intrinsic myofascial vibration exercises | - Tactile C- fibres afferent: affiliation, pain-inhibition, well-being<br>- Relieving pain: orienting response, pain desensitization |
| Visceral tissue | - Piezo 2 | Antalgic positioning associate to light and slow touch, affective and vibratory touch | - Harmonic and Vibration technique | - Low-frequency vibratory exercise<br>- Intrinsic myofascial vibration exercises | -Affiliation, pain-inhibition, well-being |

# Meccanismo di funzionamento delle tecniche

Perché sottolineare questo aspetto?

# Meccanismo di funzionamento delle tecniche



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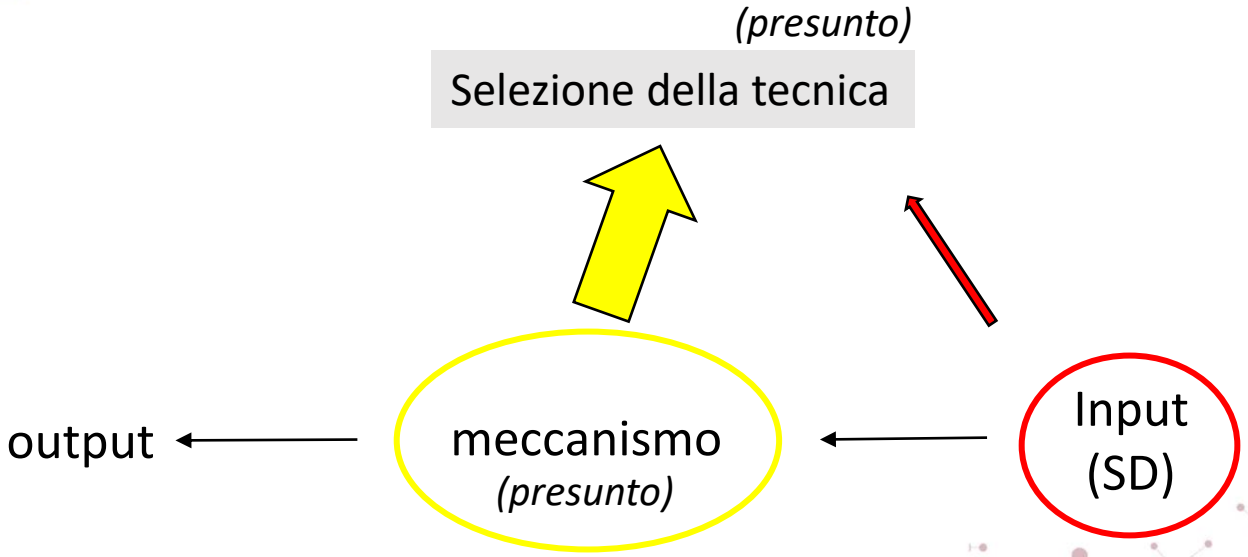

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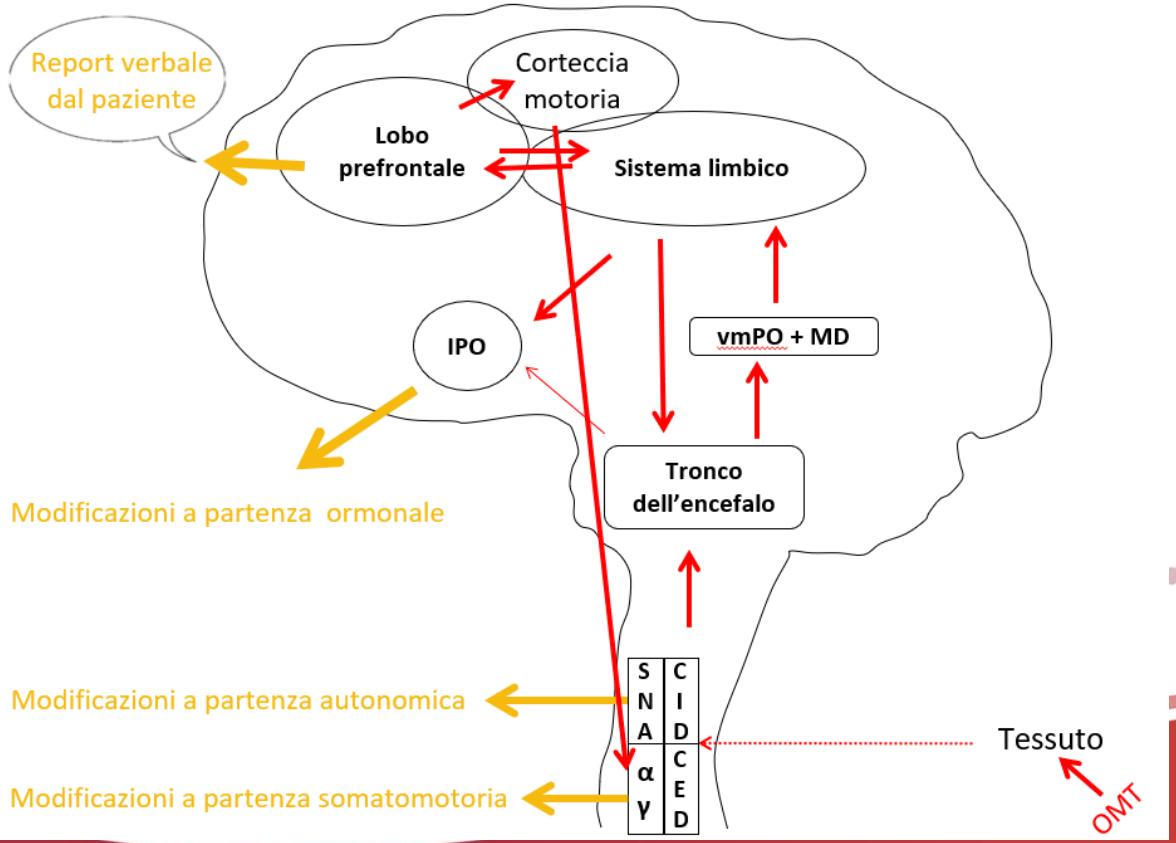

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# Meccanismo di funzionamento delle tecniche

Questa è una scatola nera


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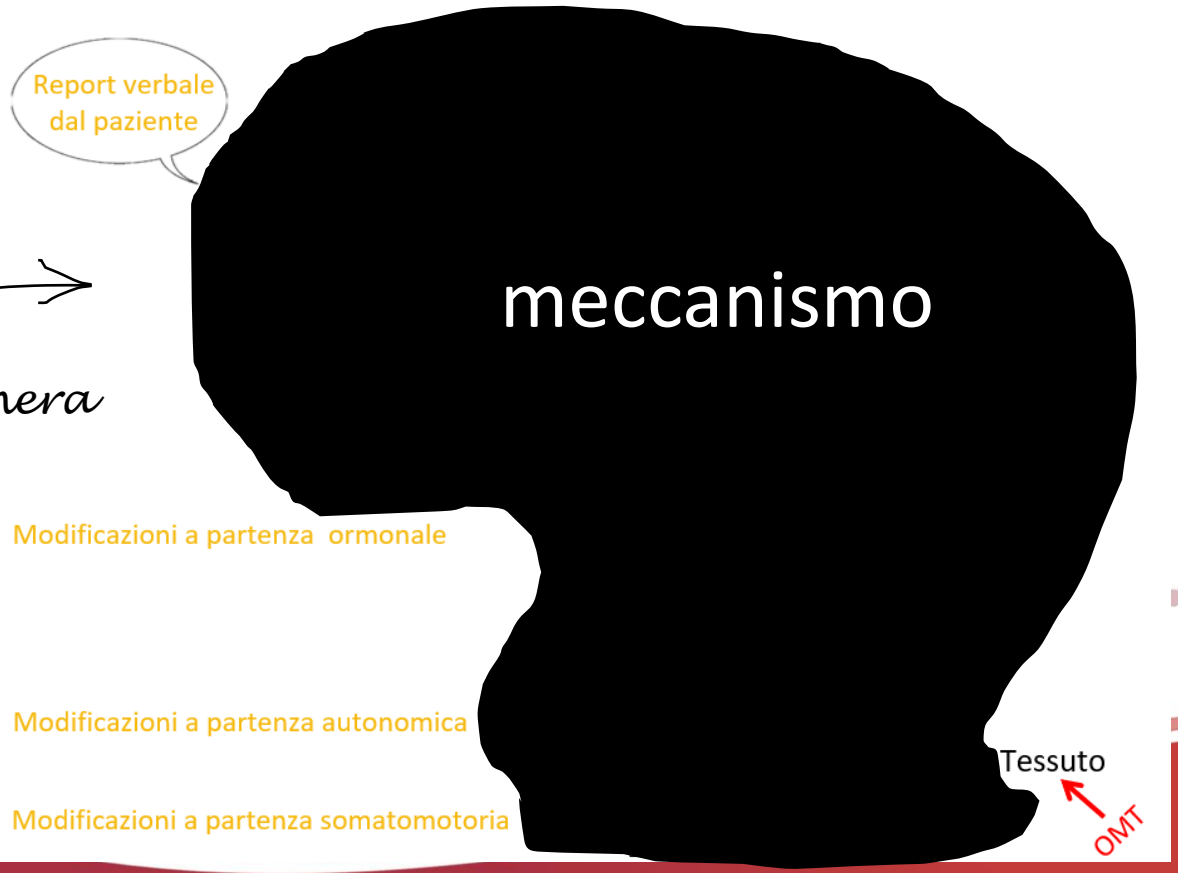
# Meccanismo di funzionamento delle tecniche




*Questa è una scatola nera*

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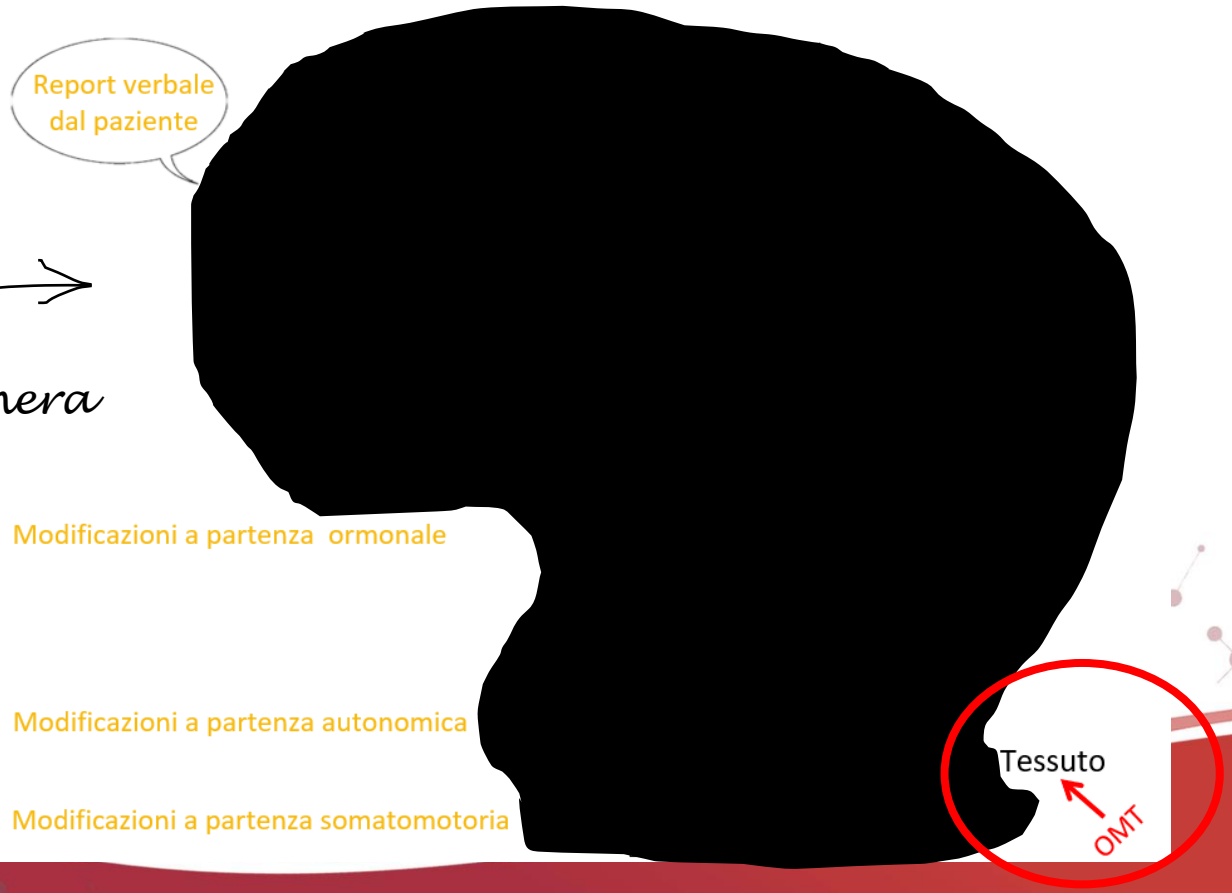


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# Meccanismo di funzionamento delle tecniche

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OSTEOPATIA E SALUTE
NELLE DIVERSE ETÀ DELLA VITA

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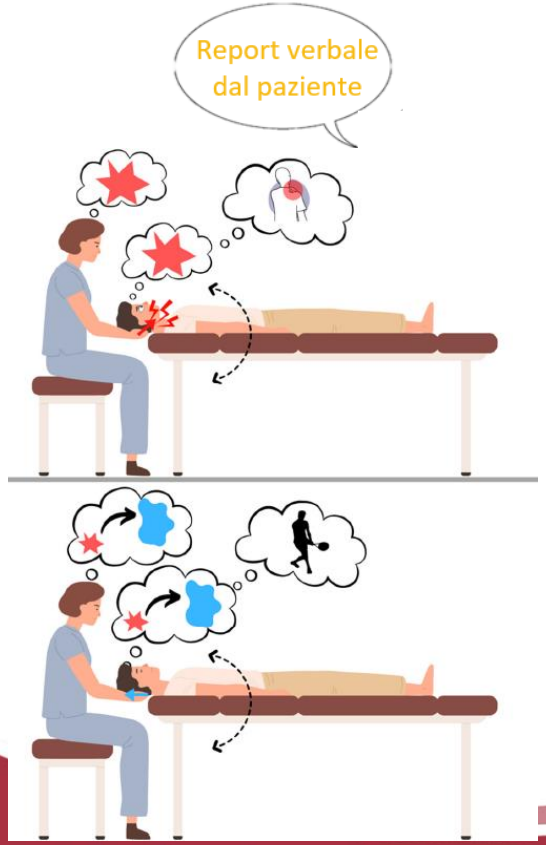


*healthcare*

*Perspective*

## Reconceptualizing Somatic Dysfunction in the Light of a Neuroaesthetic Enactive Paradigm

Giacomo Consorti [1,*], Carmine Castagna [1], Marco Tramontano [2,3], Mauro Longobardi [4], Paolo Castagna [1], Daniele Di Lernia [5] and Christian Lunghi [6]

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# Meccanismo di funzionamento delle tecniche

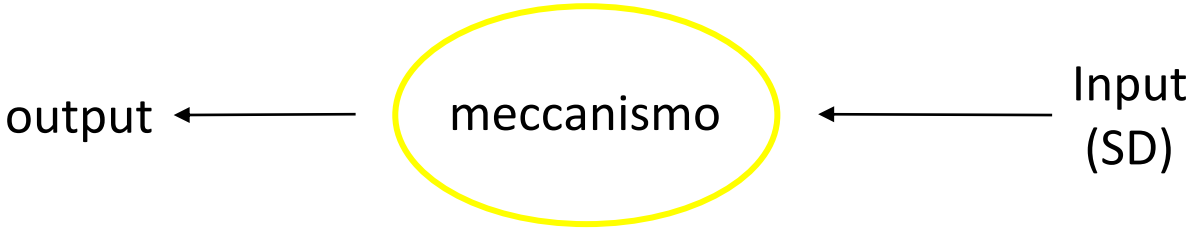
Traslazione degli studi di laboratorio

# Meccanismo di funzionamento delle tecniche

## Traslazione degli studi di laboratorio

1. Sì, ma ricordati che spessissimo son studi fatti su soggetti sani
2. Sì, ma ricordati che nel laboratorio i fattori contestuali (placebici) sono differenti
3. Sì, ma non al centro della tua pratica (identità)
4. Sì, ma poi ricordati di misurare **l'output (cioè l'efficacia)**

# Meccanismo di funzionamento delle tecniche




**Progressiva scomparsa della SD**

# Meccanismo di funzionamento delle tecniche


Progressiva scomparsa della SD

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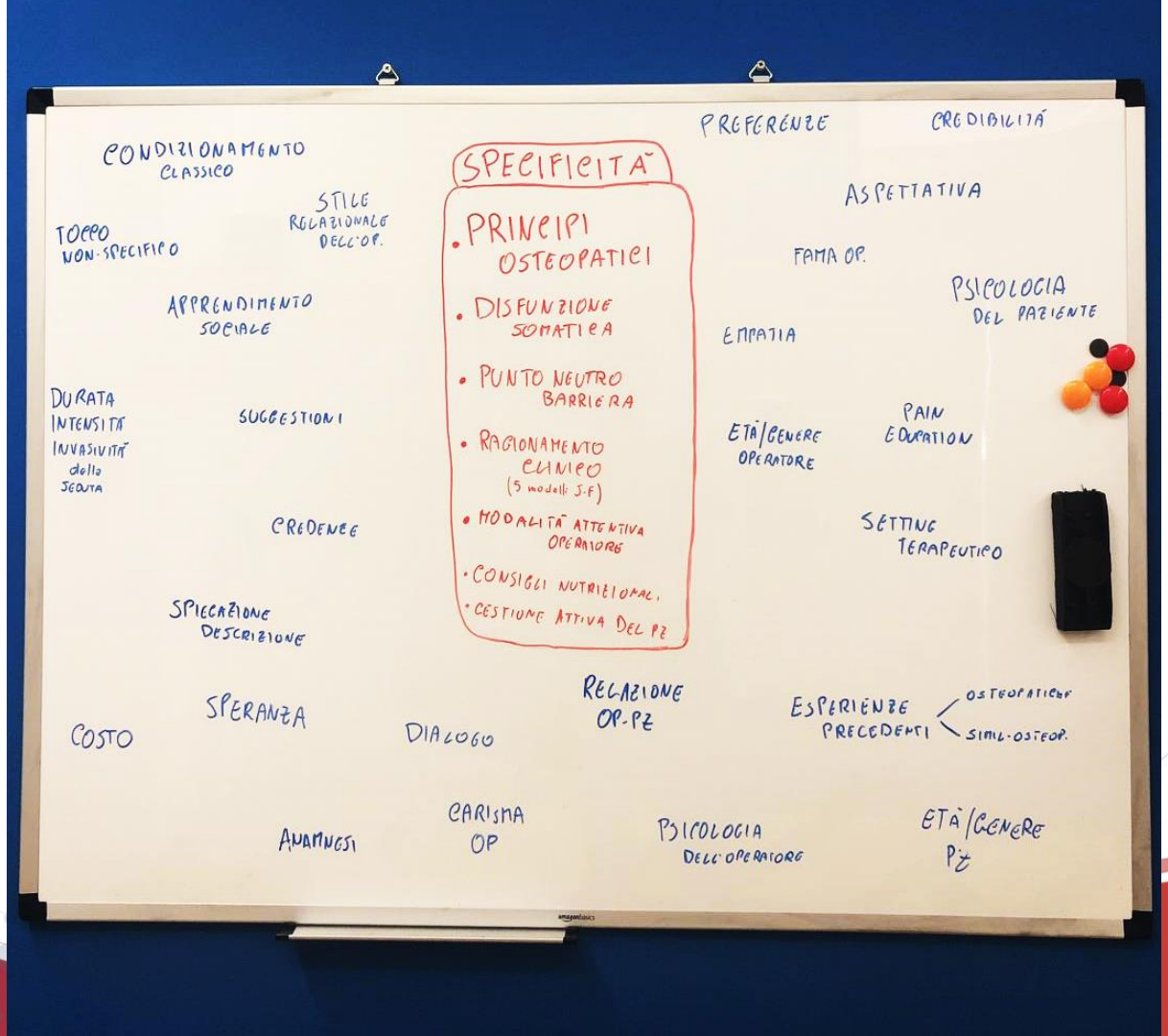


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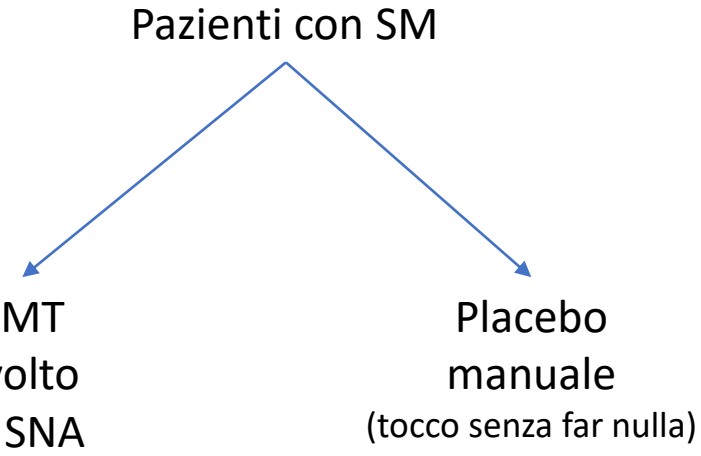

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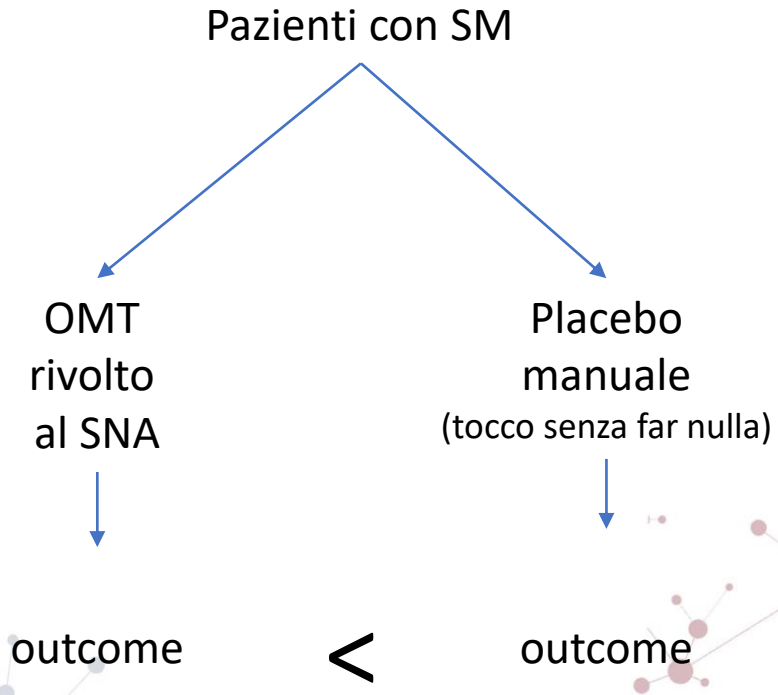

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# Meccanismo di funzionamento delle tecniche

*healthcare*

MDPI

*Review*

## International Overview of Somatic Dysfunction Assessment and Treatment in Osteopathic Research: A Scoping Review

Marco Tramontano [1,*], Federica Tamburella [1], Fulvio Dal Farra [2], Andrea Bergna [2,3], Christian Lunghi [4], Mattia Innocenti [5], Fabio Cavera [5], Federica Savini [5], Vincenzo Manzo [5] and Giandomenico D'Alessandro [4,5]

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''SD è stata considerata in 170 studi su 278''

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''SD è stata considerata in 170 studi su 278''

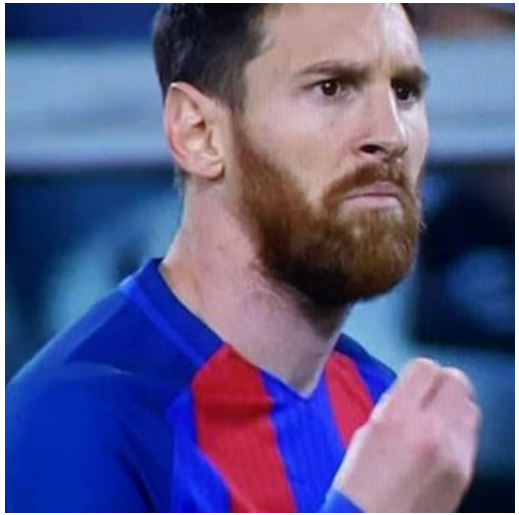
Osteopatia ''mechanism-based''

# Meccanismo di funzionamento delle tecniche

*Questa è un'iperbole*

*"Il miglior razionale di trattamento è la periferia corporea"*

# Placebo e fibre CT?



# Placebo e fibre CT?

1^ stagione

1938 1985 1988 1990 1999 2009 2021

# Placebo e fibre CT?


1^ stagione

2^ stagione

1938 1985 1988 1990 1999 2009 2021

# Placebo e fibre CT?


1^ stagione

2^ stagione

3^ stagione

1938 1985 1988 1990 1999 2009 2021

# Placebo e fibre CT?


Singolo individuo
Active inference

1^ stagione 2^ stagione 3^ stagione

1938 1985 1988 1990 1999 2009 2021

# Placebo e fibre CT?

PLoS One. 2023 May 23;18(5):e0281253. doi: 10.1371/journal.pone.0281253. eCollection 2023.

## Hold me or stroke me? Individual differences in static and dynamic affective touch

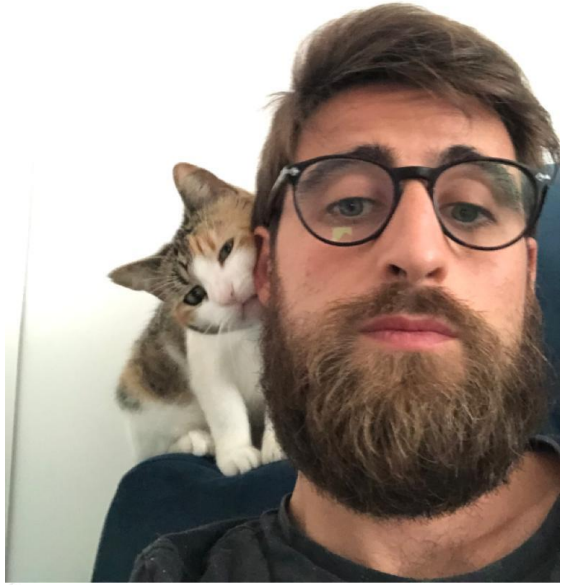
S Hasan Ali [1], Adarsh D Makdani [2], Maria I Cordero [3], Aspasia E Paltoglou [3], Andrew G Marshall [4 5], Martyn J McFarquhar [6], Francis P McGlone [1 2], Susannah C Walker [2], Paula D Trotter [2]

Singolo individuo
Active inference

3^ stagione

touch ratings. Perceived stress negatively predicted robotic static touch ratings. This study has identified individual difference predictors of CT-touch sensitivity. Additionally, it has highlighted the context dependence of affective touch responses and the need to consider static, as well as dynamic affective touch.

# Placebo e fibre CT?



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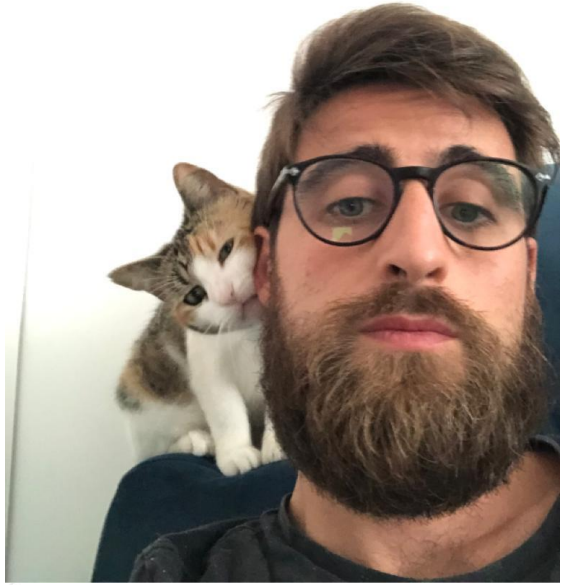
# Placebo e fibre CT?

Relazione

Precedente esperienza

Aspettativa



Psicologia

Contesto

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# CTs → Affective Touch Hypothesis

**(Vallbo et al., 2009)**

*"The essential role of the CT system is to convey pleasant aspects of light touch, particularly of skin-to-skin contact with affiliative human beings"*

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**Aspettativa**

**Precedente esperienza**

**Psicologia**

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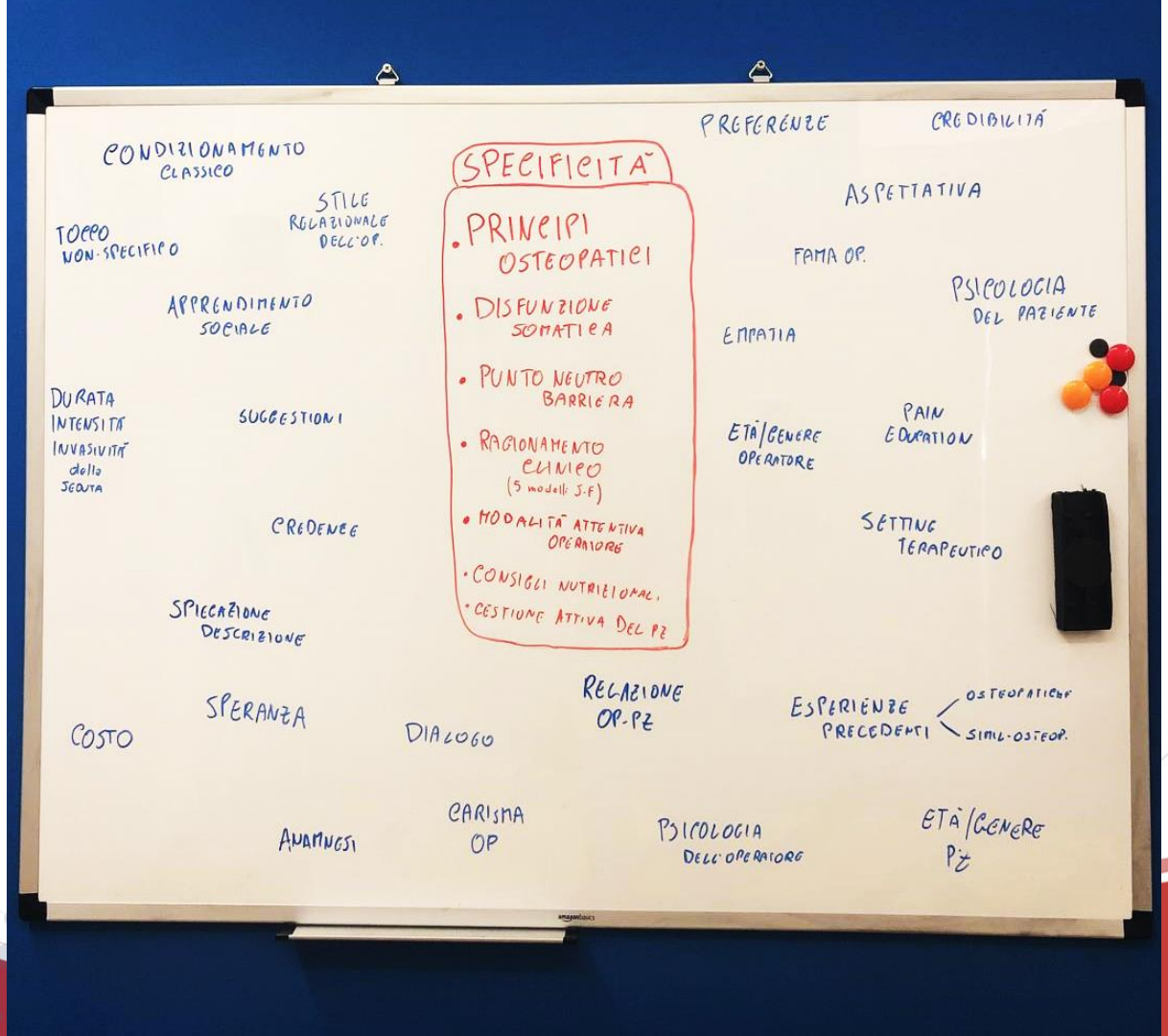


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# Terza stagione

- Quali sono le differenze individuali?
- Cosa avviene nella varie patologie?
- Come i modelli predittivi e l'active inference modificano la percezione della stimolo delle fibre?
- Quali sono altri effetti neurobiologici, soprattutto relativi al SNA?

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# Grazie per l'attenzione

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