DEFINING OROFACIAL PAIN

Ramesh Balasubramaniam OAM

DENT5310

Orofacial Pain and Dental Sleep Medicine Module

16th April 2026

DISCLOSURE

Ramesh Balasubramaniam OAM
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The University of Western Australia

Neither I nor my immediate family have any financial interests that would create a conflict of interest or restrict my independent judgment with regard to the content of this presentation.

SPECIFIC LEARNING OUTCOMES

Unit Learning Outcome 26:

Explain the common causes and mechanisms of orofacial pain.

Ability to define, classify, and differentiate between various mechanisms of pain including orofacial pain.

Distinguish various pain presentations including acute vs chronic pain; physiological vs pathophysiological pain and understand how the biopsychosocial model contributes to the experience and perception of orofacial pain.

Define, classify and discuss the aetiological factors of temporomandibular disorders (TMD) and understand the anatomy and function of the temporomandibular joint (TMJ) and masticatory muscles.

Learn to perform a comprehensive history for orofacial pain patients including the effective use of examination tools for TMD assessment and apply diagnostic criteria for TMD.

SPECIFIC LEARNING OUTCOMES

Understand common intracapsular disorders with regards to aetiology, pathophysiology, diagnosis, clinical features and management including subluxation and luxation of the TMJs.

Understand common extracapsular disorders with regards to aetiology, pathophysiology, diagnosis, clinical features and management.

Outline the rationale for splint therapy including mechanisms of action, various types of splint designs, indications, and the evidence supporting their use in managing temporomandibular disorders and bruxism.

Discuss the indications, mechanism of action, contraindications, side effects, and complications of neuromodulators.

Outline the aetiology, pathogenesis, clinical features, diagnosis and management of neuropathic orofacial pain conditions.

SPECIFIC LEARNING OUTCOMES

Describe prevalence, aetiology, pathophysiology, clinical features, diagnosis and management of various conditions that may present as non-odontogenic toothache.

Describe evolution, epidemiology, risk factors, aetiology and pathophysiology, clinical features, diagnosis and management of bruxism.

Understand the relationship between sleep and overall health, identify risk factors for sleep-disordered breathing, recognise tools for evaluating sleep disorders, and understand available treatment options, including effective management with oral appliance therapy.

Unit Learning Outcome 27:

Explain the clinical examination and tests required to diagnose orofacial pain, including temporomandibular disorders, and explain their management.

LECTURE TOPICS

Date	Day	Start Time	Finish Time	Venue	Lecture / Tutorial Topic	Lecturer
17/4/25	Friday	9	10	211	Defining Orofacial Pain	A/Prof Ramesh Balasubramaniam
17/4/25	Friday	10	11	211	History and Examination including DC/TMD	A/Prof Ramesh Balasubramaniam
17/4/25	Friday	11	12	211	Temporomandibular Disorders: Intracapsular Disorders	Supeetha Suntharamoorthy supeetha@pomds.com.au
24/4/26	Friday	8	9	211	Temporomandibular Disorders: Extracapsular Disorders	Dr. Lalima Tiwari lalima.tiwari@uwa.edu.au
24/4/26	Friday	9	10	211	Occlusal Splint Therapy	A/Prof Ramesh Balasubramaniam
24/4/26	Friday	10	11	211	Botulinum Toxin for Orofacial Pain	Lasanthini Weerakkody lasanthini@pomds.com.au
24/4/26	Friday	11	12	211	Neuropathic Orofacial Pain including Burning Mouth Syndrome	Dr. Amanda Phoon Nguyen amanda.phoonnguyen@uwa.edu.au
1/5/26	Friday	9	10	KJG S	Non-Odontogenic Toothache	A/Prof Ramesh Balasubramaniam
1/5/26	Friday	10	11	KJG S	Bruxism	Dr. Amanda Phoon Nguyen amanda.phoonnguyen@uwa.edu.au
1/5/26	Friday	11	12	KJG S	Oral Appliance Therapy for Snoring and Obstructive Sleep Apnoea	A/Prof Ramesh Balasubramaniam
15/5/26	Friday	8	12	211	TUTORIAL: Clinical cases in temporomandibular disorders, orofacial pain and dental sleep medicine 1 Timetable Hours: 4	A/Prof Ramesh Balasubramaniam
22/5/26	Friday	8	12	211	TUTORIAL: Clinical cases in temporomandibular disorders, orofacial pain and dental sleep medicine 2. Timetable Hours: 4	A/Prof Ramesh Balasubramaniam

AGENDA

- Pain Definition
- Is Pain Good or Bad?
- 3 Pains
- Biopsychosocial Model for Pain
- Definition & Classification of Orofacial Pain
- Take Home Message

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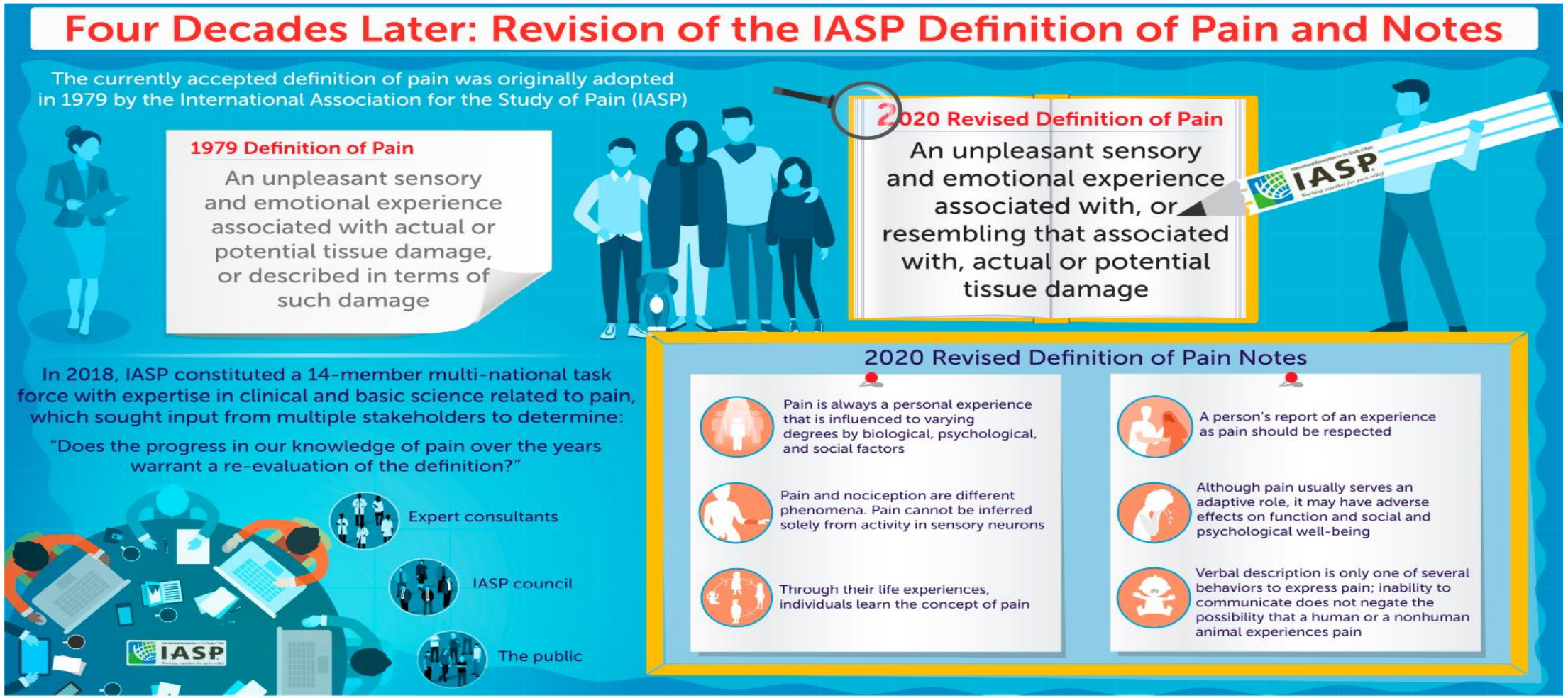
NEW DEFINITION OF PAIN

NEW DEFINITION OF "PAIN"



The revised IASP definition of pain: concepts, challenges, and compromises
Raja *et al*. (2020) | Pain
DOI: 10.1097/j.pain.0000000000001939

PAIN

NEW DEFINITION OF "PAIN"

"An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage."

Raja SN et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. Pain. 2020 Sep 1;161(9):1976-1982.

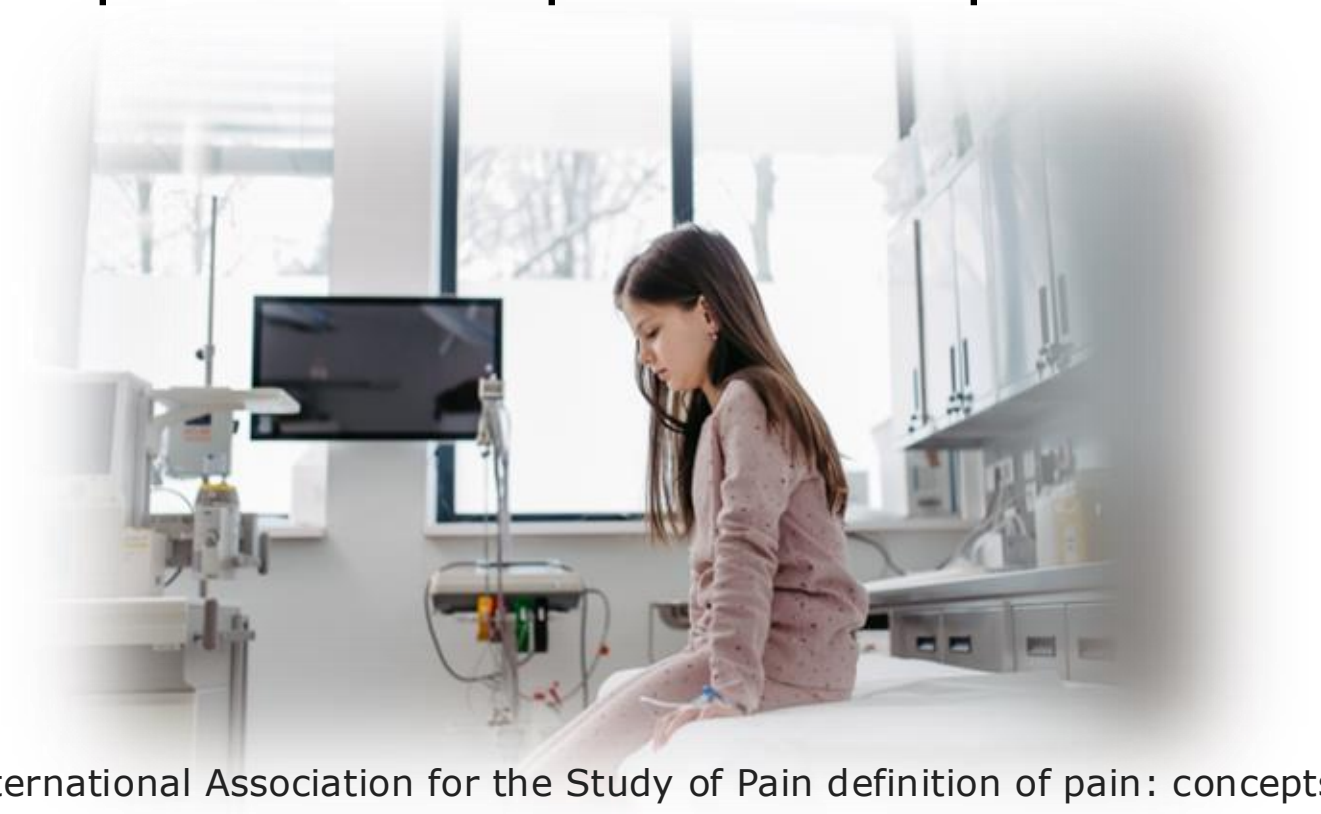
THE NEW DEFINITION OF PAIN: Notes

- Pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors.
- Pain and nociception are different phenomena. Pain cannot be inferred solely from activity in sensory neurons.

Raja SN et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. Pain. 2020 Sep 1;161(9):1976-1982.

THE NEW DEFINITION OF PAIN: Notes

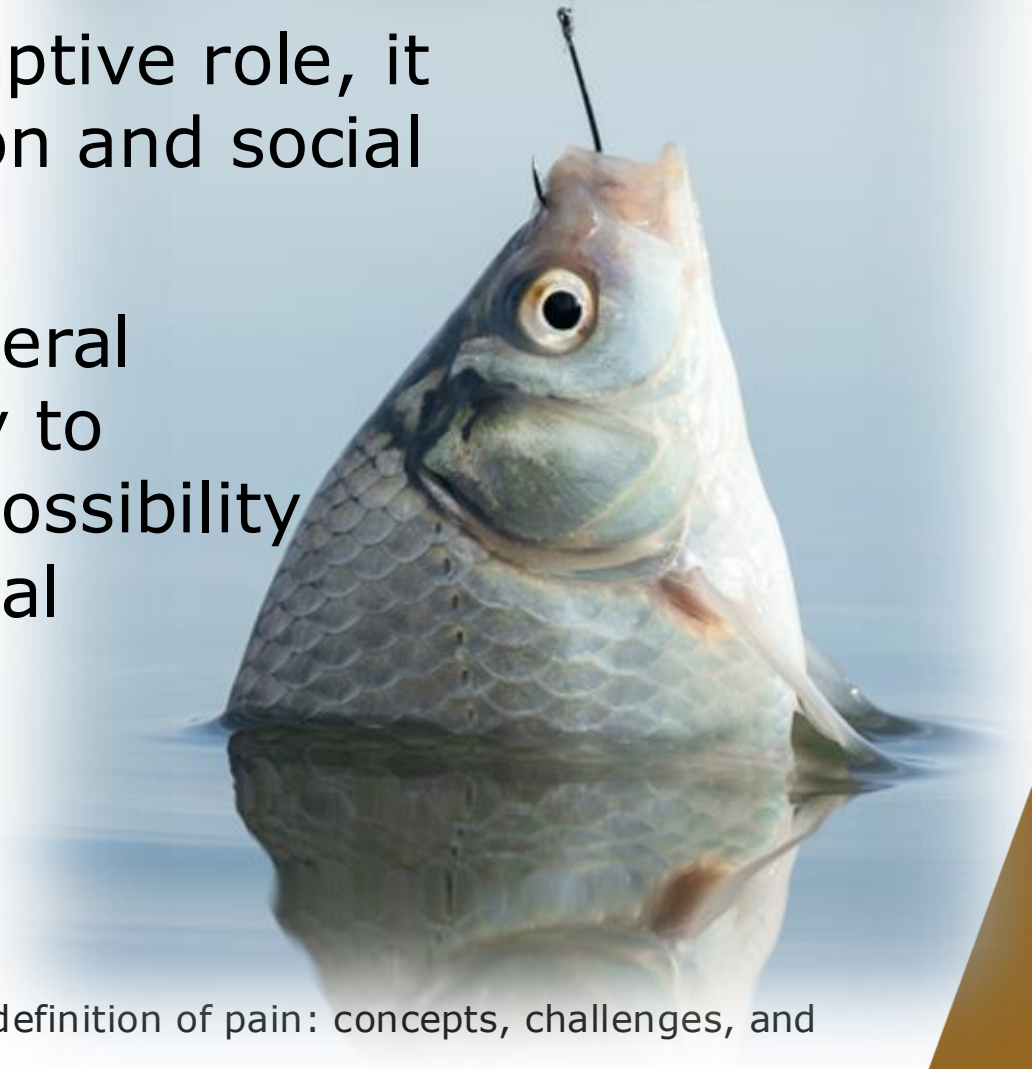
- Through their life experiences, individuals learn the concept of pain.
- A person's report of an experience as pain should be respected.



Raja SN et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. Pain. 2020 Sep 1;161(9):1976-1982.

THE NEW DEFINITION OF PAIN: Notes

- Although pain usually serves an adaptive role, it may have adverse effects on function and social and psychological well-being.
- Verbal description is only one of several behaviours to express pain; inability to communicate does not negate the possibility that a human or a non-human animal experiences pain.



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IS PAIN GOOD OR BAD?

No one wants to be in pain

Important for health & survival

IS PAIN PHYSIOLOGICAL OR PATHOPHYSIOLOGICAL?

Physiological Pain

- Consequence of tissue injury or noxious stimuli
- Site of injury = source of pain
- “Normal Pain” / protective
- When noxious stimuli is removed, inflammation resolves and pain ceases

IS PAIN PHYSIOLOGICAL OR PATHOPHYSIOLOGICAL?

Pathophysiological Pain

- Pain persist after noxious stimuli has ceased and tissue healed
- Lesion / dysfunction of the PNS or CNS
- Chronic pain
- No protective or reparative role

IS PAIN BIOLOGICAL OR PSYCHOLOGICAL ?

Biomedical Pain

- Pain is primarily a sensory experience signaling tissue damage
- Somatosensory cortex of brain perceives the pain
- Pain = tissue damage / stimuli

Biopsychosocial Pain

- Biological, psychological, social and cultural
- Mind – body connection
- Interaction of the higher centres accounts for psychological aspects
- Influenced by genetics, conditioning, context, emotion, mood, expectation of pain

IS PAIN BIOLOGICAL OR PSYCHOLOGICAL ?

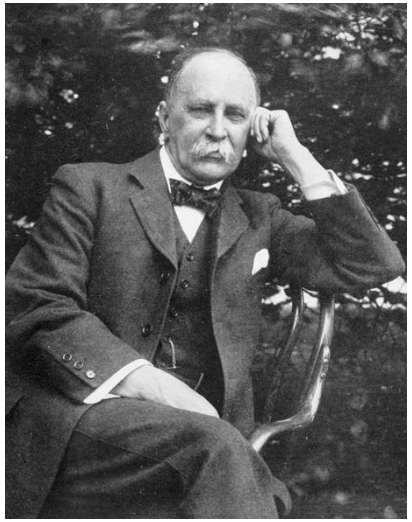
In spite of same noxious stimuli

My 10 is not the same as your 10.

Particularly influence by childhood experiences

Pain is an individual experience

Sir William Osler



"It is more important to know what type of individual has the pain rather the type of pain the patient has."

PAIN & SUFFERING

Pain experience have 2 distinct components:

Sensory-Discriminative

Localisation, intensity discrimination, quality of noxious stimulus

Motivational-Affective

Emotion, arousal and pain behaviour

How the individual reacts

Influenced by prior experience, expectations, possible misconceptions

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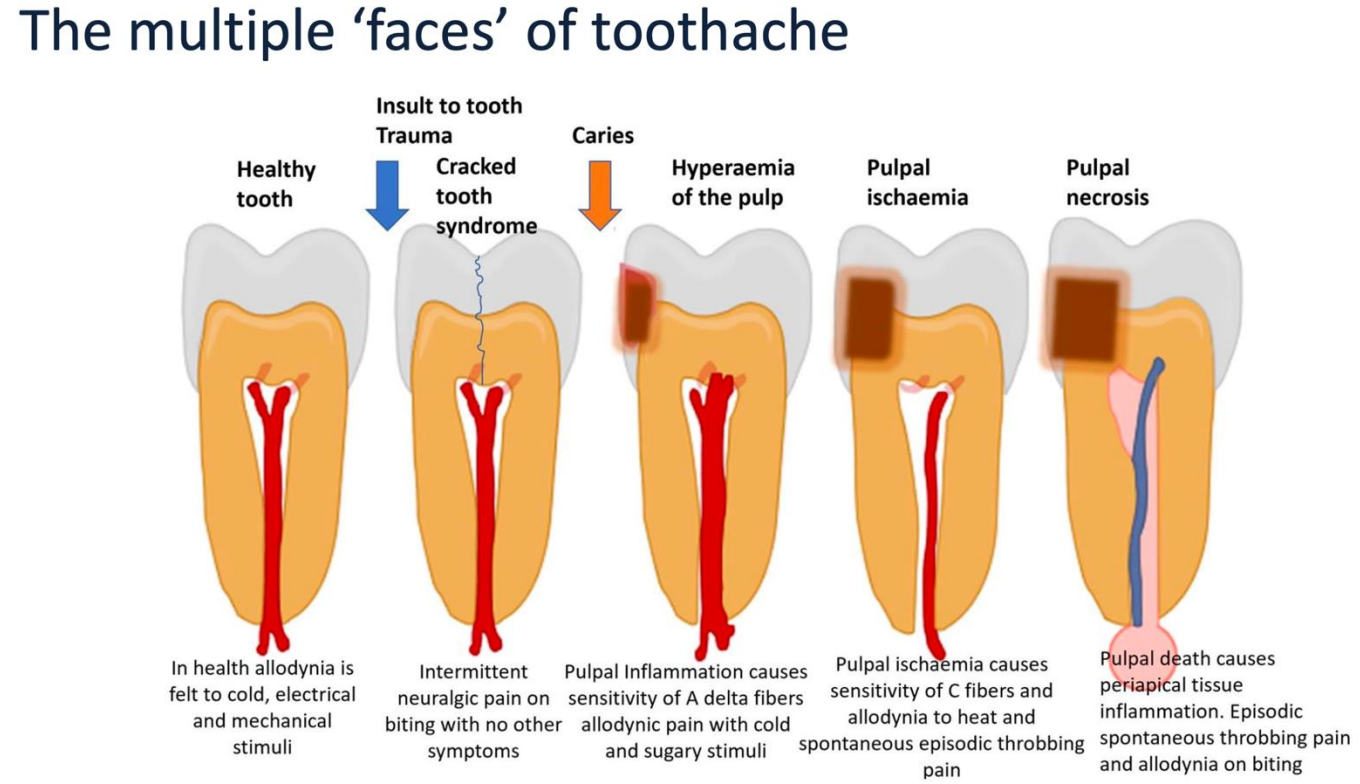
THE 3 PAINS: NOCICEPTIVE PAIN



1

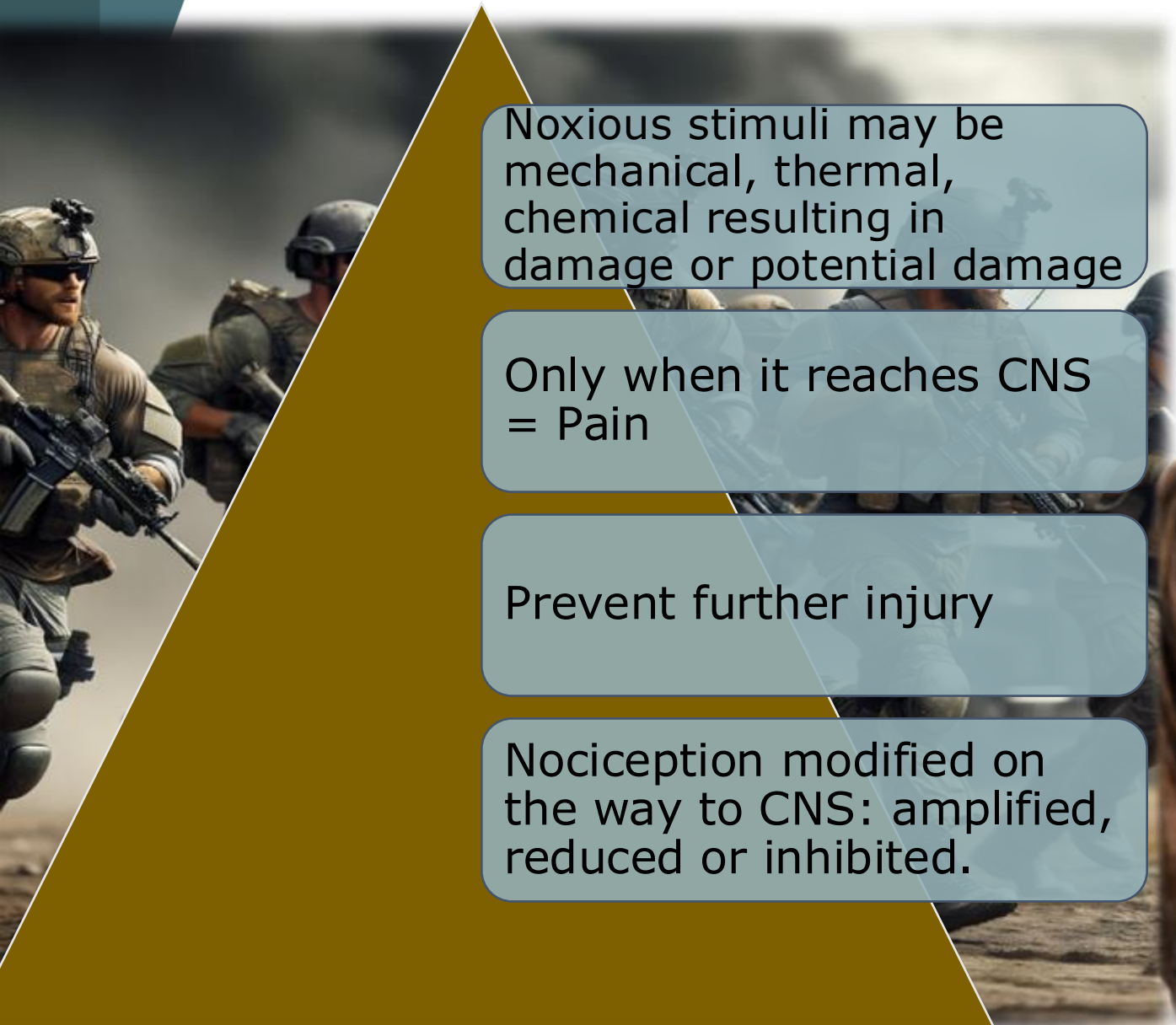
Nociceptive Pain: Pain that arises from actual or threatened damage to non-neural tissue and is due to the activation of nociceptors.

- Normally functioning somatosensory nervous system

https://www.iasp-pain.org/resources/terminology/

Renton T. Tooth-Related Pain or Not?. *Headache*. 2020;60(1):235-246.

THE 3 PAINS: NOCICEPTIVE PAIN



1

Noxious stimuli may be mechanical, thermal, chemical resulting in damage or potential damage

Only when it reaches CNS = Pain

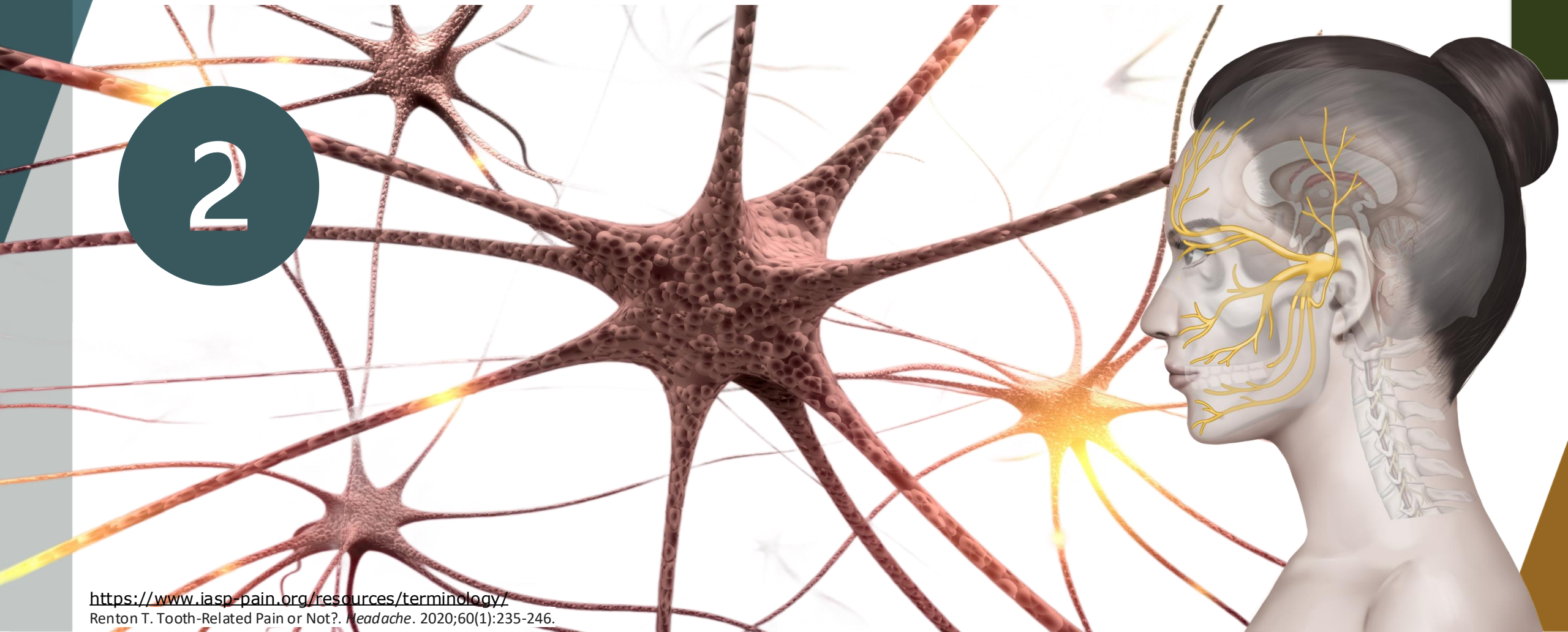
Prevent further injury

Nociception modified on the way to CNS: amplified, reduced or inhibited.

THE 3 PAINS: NEUROPATHIC PAIN

Neuropathic Pain: Pain caused by a lesion or disease of the somatosensory nervous system.

2



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THE 3 PAINS: NEUROPATHIC PAIN

Abnormality of the nervous system

No need for noxious stimuli

May be spontaneous

No protective role

2

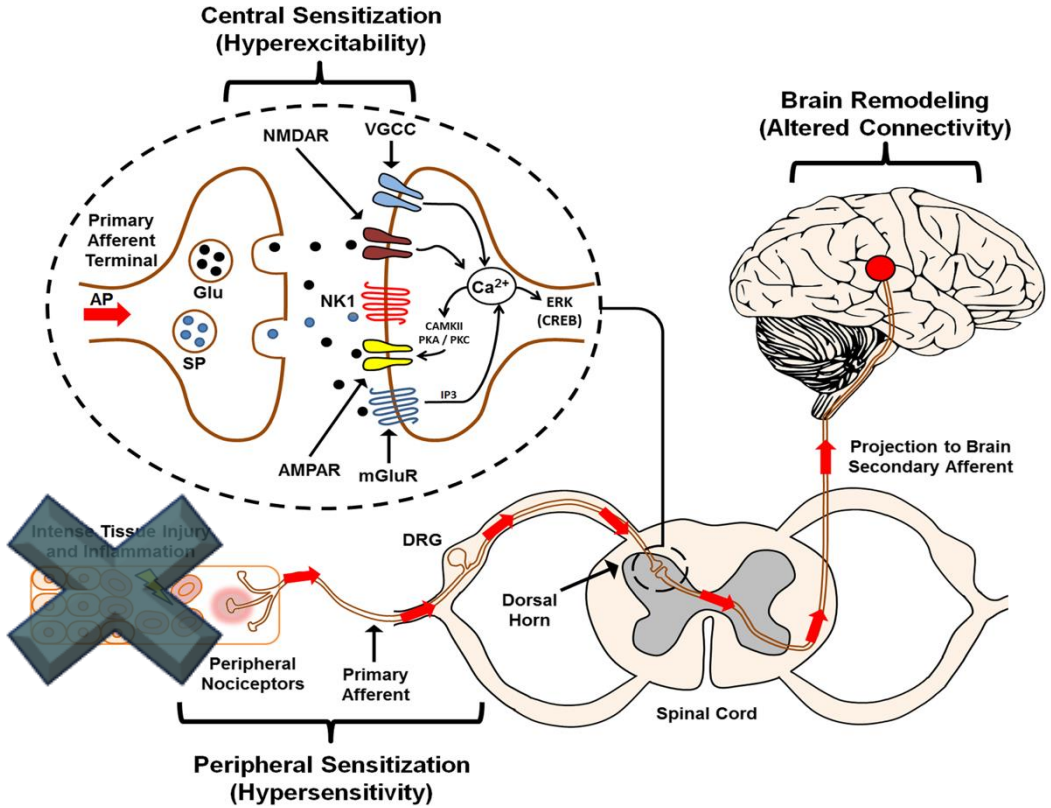
Episodic vs Continuous Neuropathic Pain

THE 3 PAINS: NOCIPLASTIC PAIN

Nociplastic Pain: Pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence for disease or lesion of the somatosensory system causing the pain.

3

Maladaptive Plasticity



https://www.iasp-pain.org/resources/terminology/
Renton T. Tooth-Related Pain or Not?. *Headache*. 2020;60(1):235-246.

THE 3 PAINS: NOCIPLASTIC PAIN

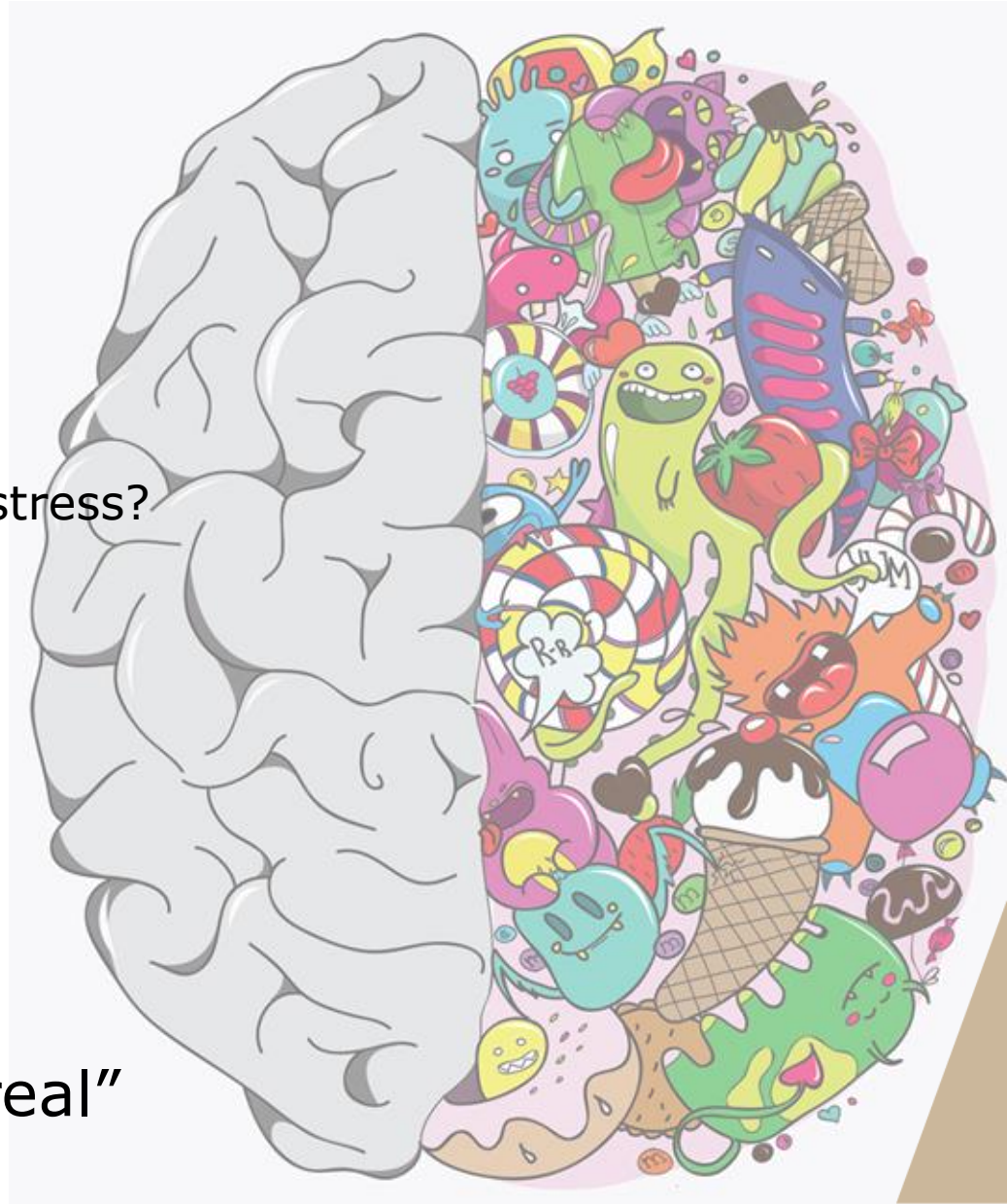
Pain without evidence of of tissue damage or physiological cause

3

Caused by psychological stress?

Neurophysiological basis for pain

Pain is “real”



DON'T GET FANCY: THE 3 PAINS

THREE TYPES OF PAINS			
	NOCICEPTIVE / INFLAMMATORY	**NEUROPATHIC**	**NOCIPLASTIC/ CENTRAL SENSITISATION**
Stimulus	Injury or Inflammation (tissue injury)	Neural damage, pinching, irritation (nerve injury)	Central nervous system dysfunction (sensitised nervous system)
Neuron	Nociceptor and non-nociceptor	Nociceptor and non-nociceptor	Non-nociceptor
Site	Peripheral and central nervous system	Peripheral and central nervous system	Central nervous system
Clinical / Dentistry	Pulpitis, jaw fracture, acute periodontitis	Trigeminal neuralgia, anaesthesia dolorosa, post-herpetic neuralgia	Burning mouth syndrome, persistent facial pain, persistent dentoalveolar pain
Function	Protective, healing / repair, pathological	Pathological	Pathological
Pain Sensitivity	High or low threshold	Low threshold	Low threshold

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ACUTE VS CHRONIC PAIN

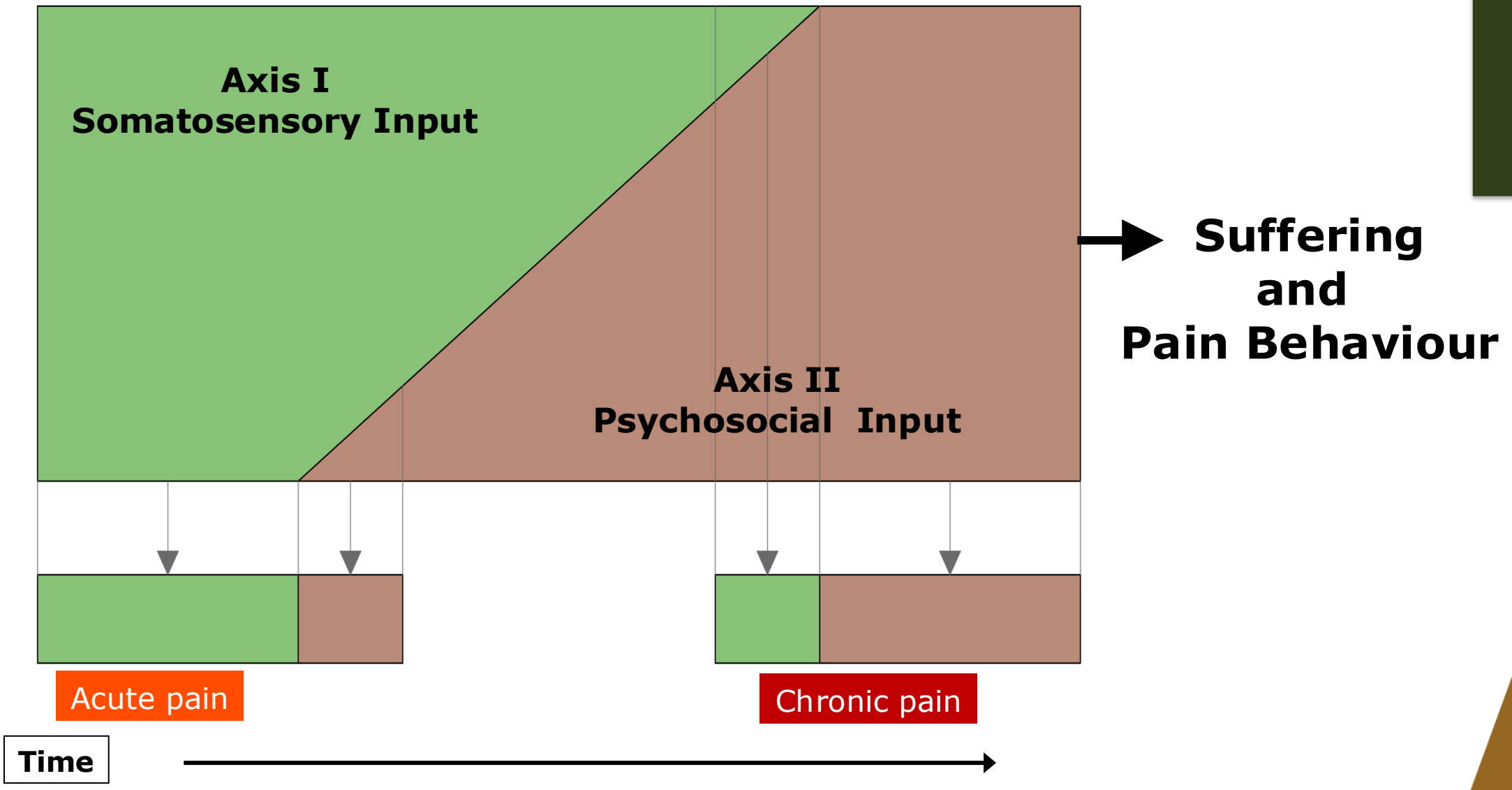
Chronic Pain is pain beyond normal healing time

- Neuroplasticity may prolong and maintain pain.

Chronic vs recurrent pain disorders

- Behavioural and psychological changes begin

BIOPSYCHOSOCIAL MODEL OF PAIN



BIOPSYCHOSOCIAL MODEL OF PAIN

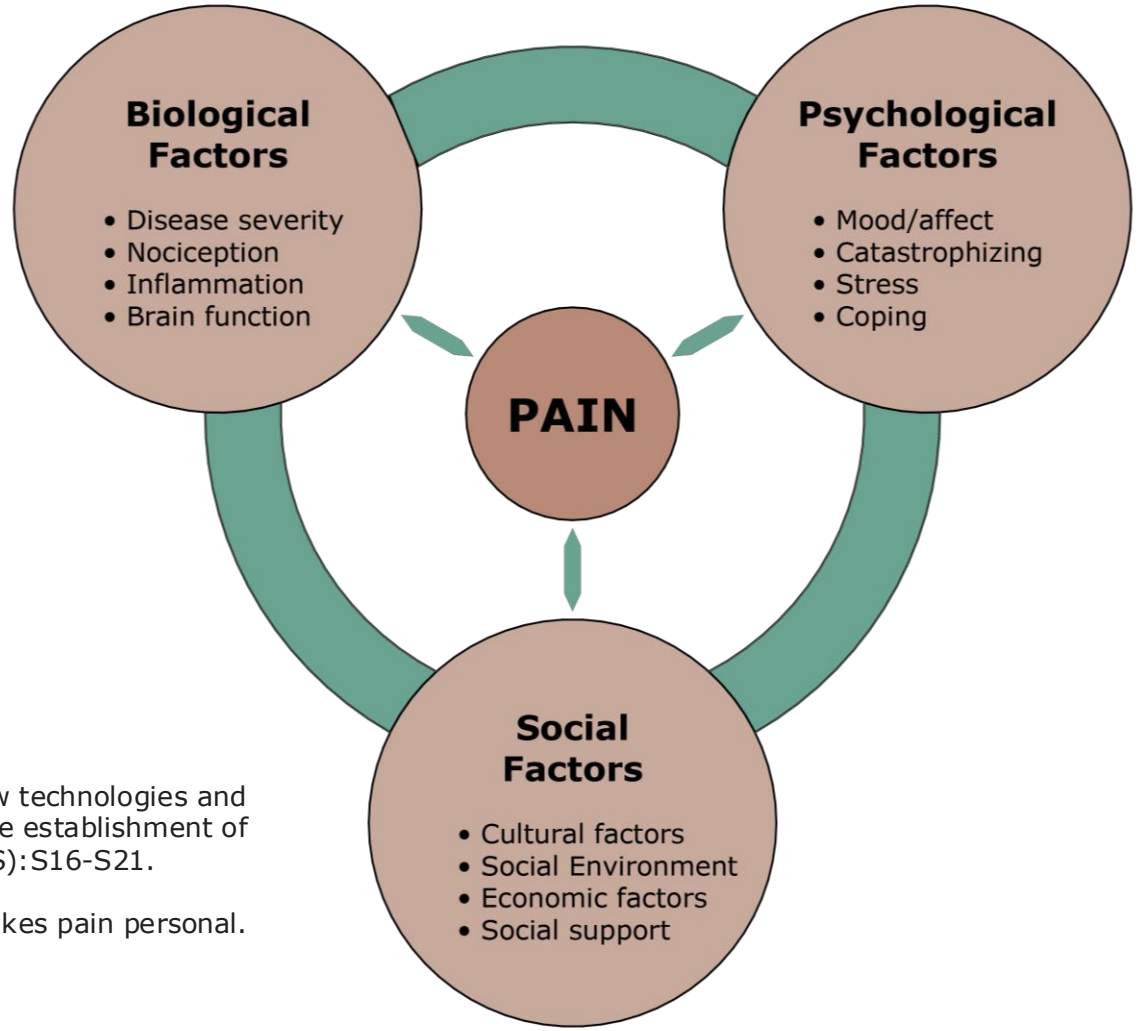
1 in 15 Australians live with chronic pain = cost $22,588 - $44,979 / year

Acute Pain: unpleasant, dynamic psychophysiological process, response to tissue trauma and related inflammatory processes.

- Survival value
- Role in healing

Chronic pain = little evolutionary benefit (maladaptive)

- Shift mindset from eradicating problem to management (functional and emotional resilience)



Flor H, Noguchi K, Treede RD, Turk DC. The role of evolving concepts and new technologies and approaches in advancing pain research, management, and education since the establishment of the International Association for the Study of Pain. Pain. 2023 Nov 1;164(11S):S16-S21.

Fillingim RB. Individual differences in pain: understanding the mosaic that makes pain personal. Pain. 2017 Apr;158 Suppl 1(Suppl 1):S11-S18.

Deloitte Access Economics. The cost of pain in Australia. March, 2019.

BIOPSYCHOSOCIAL MODEL OF PAIN

Longitudinal (Motion Picture) vs Cross-Sectional (Snapshot) Perspective

SOCIOECONOMIC & HEALTH CARE CONTEXTS

Premorbid characteristics

- Demographics
- Genes
- Lifestyle
- Learning history
- Culture

Age at symptom onset

- Pathology
- Treatments
- Beliefs
- Behaviour

Consult age

- Change in pathology
- Expectancies
- Behaviour
- Consequences

Life expectancy

- Aging
- Change in pathology

0 → 37** → 44* → 76+

Resources:

- Interpersonal support
- Economic

Flor H, Noguchi K, Treede RD, Turk DC. The role of evolving concepts and new technologies and approaches in advancing pain research, management, and education since the establishment of the International Association for the Study of Pain. Pain. 2023 Nov 1;164(11S):S16-S21.

PAIN IS PAIN BUT OROFACIAL PAIN .....

Facial pain & headache more severe & emotionally draining compared to bodily pain.

- Smith JG, Elias LA, Yilmaz Z, Barker S, Shah K, Shah S, Renton T. The psychosocial and affective burden of posttraumatic neuropathy following injuries to the trigeminal nerve. J Orofac Pain. 2013 Fall;27(4):293-303.

Craniofacial pain qualitatively different from bodily nociception. Repeated noxious heat to face = sensitisation (not habituation).

- Schmidt K, Schunke O, Forkmann K, Bingel U. Enhanced short-term sensitization of facial compared with limb heat pain. J Pain. 2015 Aug;16(8):781-90.

Fear related to facial pain higher compared to bodily pain for same pain intensity.

- Schmidt K, Forkmann K, Sinke C, Gratz M, Bitz A, Bingel U. The differential effect of trigeminal vs. peripheral pain stimulation on visual processing and memory encoding is influenced by pain-related fear. Neuroimage. 2016 Jul 1;134:386-395.

PAIN IS PAIN BUT OROFACIAL PAIN .....

fMRI showed higher amygdala activation for facial pain compared to hand for same pain intensity.

•Moulton EA, Pendse G, Morris S, Strassman A, Aiello-Lammens M, Becerra L, Borsook D. Capsaicin-induced thermal hyperalgesia and sensitization in the human trigeminal nociceptive pathway: an fMRI study. Neuroimage. 2007 May 1;35(4):1586-600.

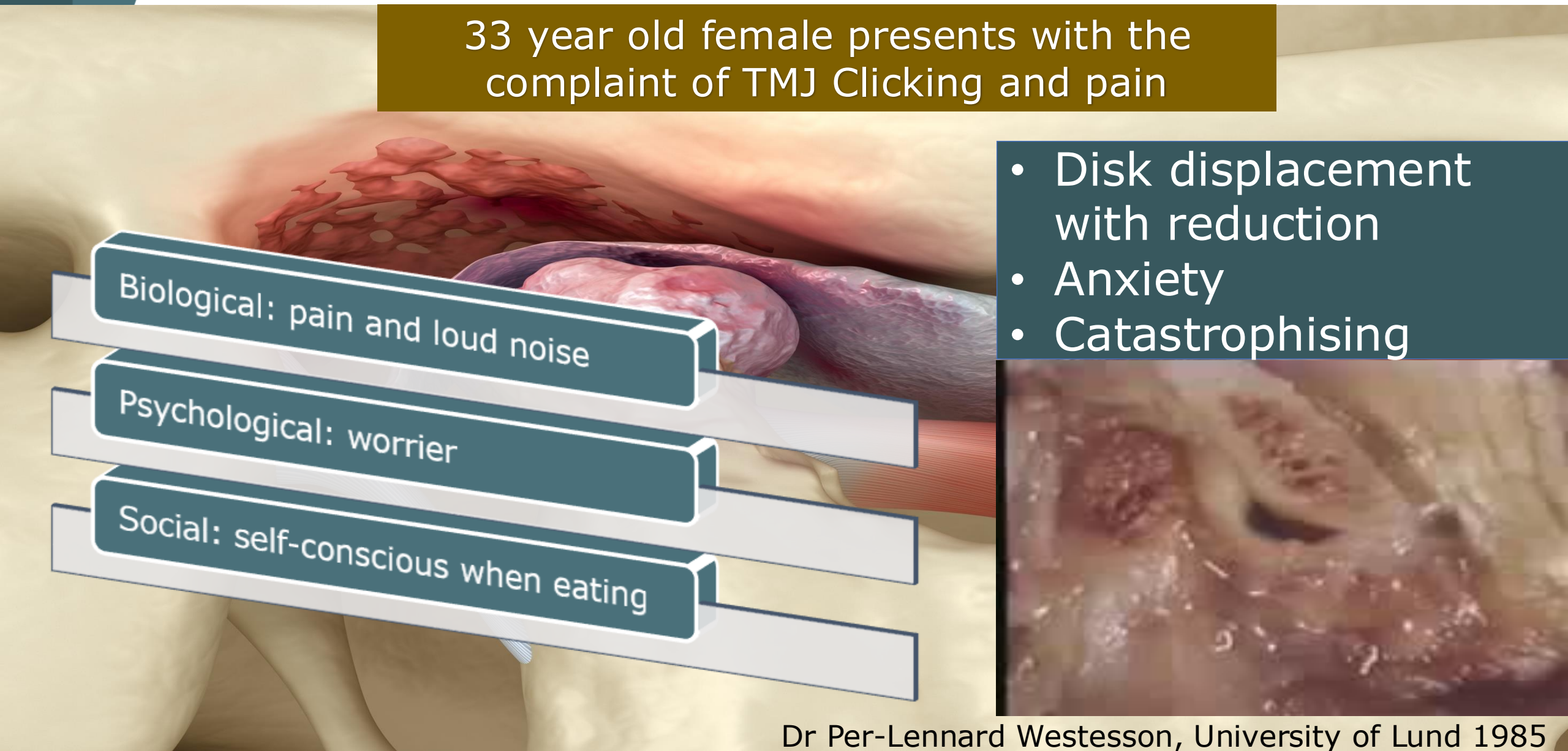
Lateral parabrachial nucleus (PB_L) is activated more strongly by noxious facial stimulation.
Monosynaptic connection between cranial sensory neurons & PB_L-nociceptive neurons.

•Rodriguez E, Sakurai K, Xu J, Chen Y, Toda K, Zhao S, Han BX, Ryu D, Yin H, Liedtke W, Wang F. A craniofacial-specific monosynaptic circuit enables heightened affective pain. Nat Neurosci. 2017 Dec;20(12):1734-1743.

BIOPSYCHOSOCIAL MODEL EXPLAINED

33 year old female presents with the complaint of TMJ Clicking and pain

- Disk displacement with reduction
- Anxiety
- Catastrophising



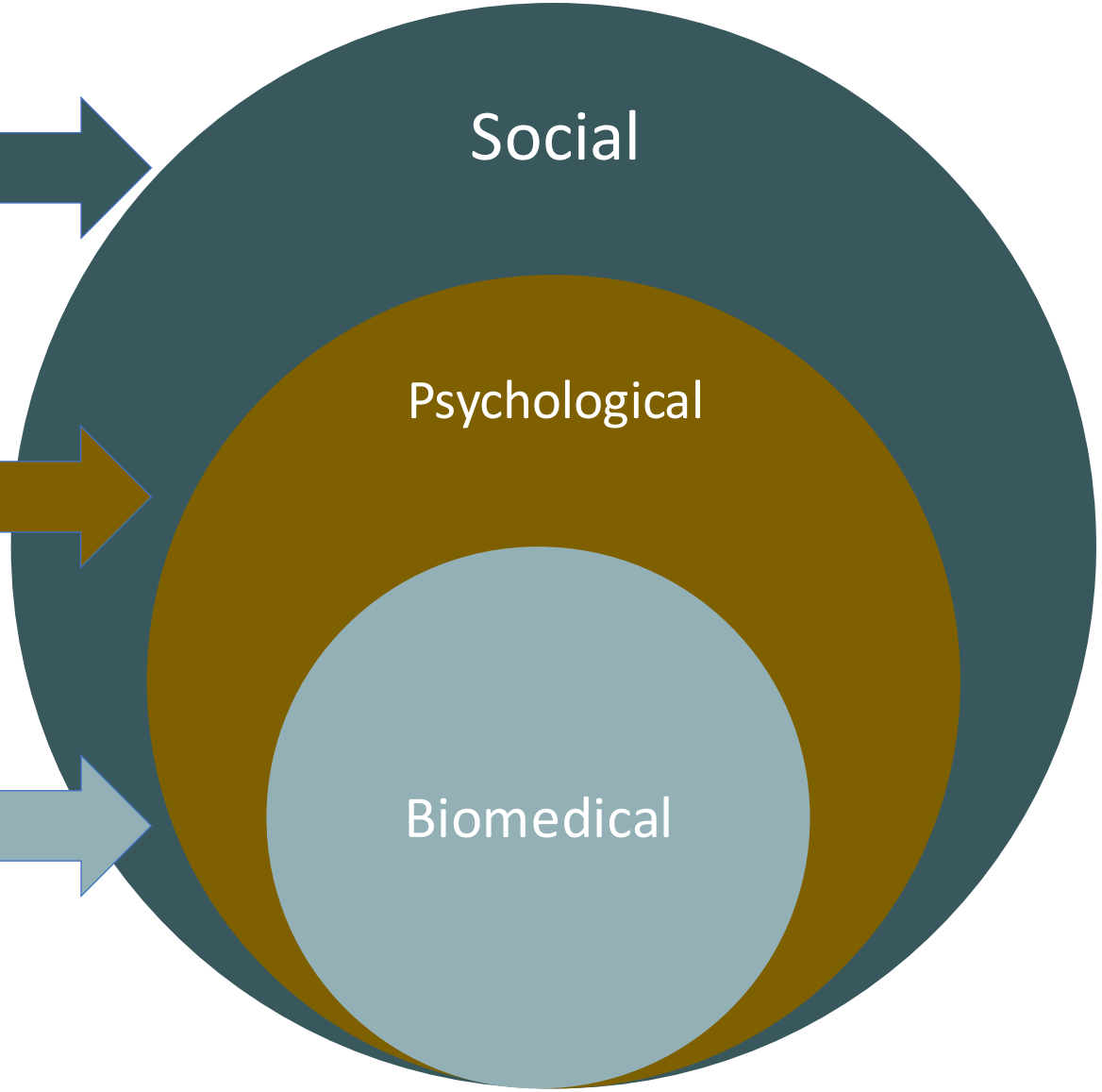
Dr Per-Lennard Westesson, University of Lund 1985

BIOPSYCHOSOCIAL MODEL EXPLAINED

- Empathy
- Social Bonding
- Isolation Induced Suffering

- Depression
- Anxiety
- Somatisation

- Mechanism & Mediators
- Clinical Pain, Clicking, Locking
- Occlusion & Asymmetries



Carr & Bradshaw (2014) Anesthesiology 120(1):12-4

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DEFINITIONS

Orofacial Pain

- Orofacial pain is pain perceived in the face and/or oral cavity.
- Prevalence:17-26%

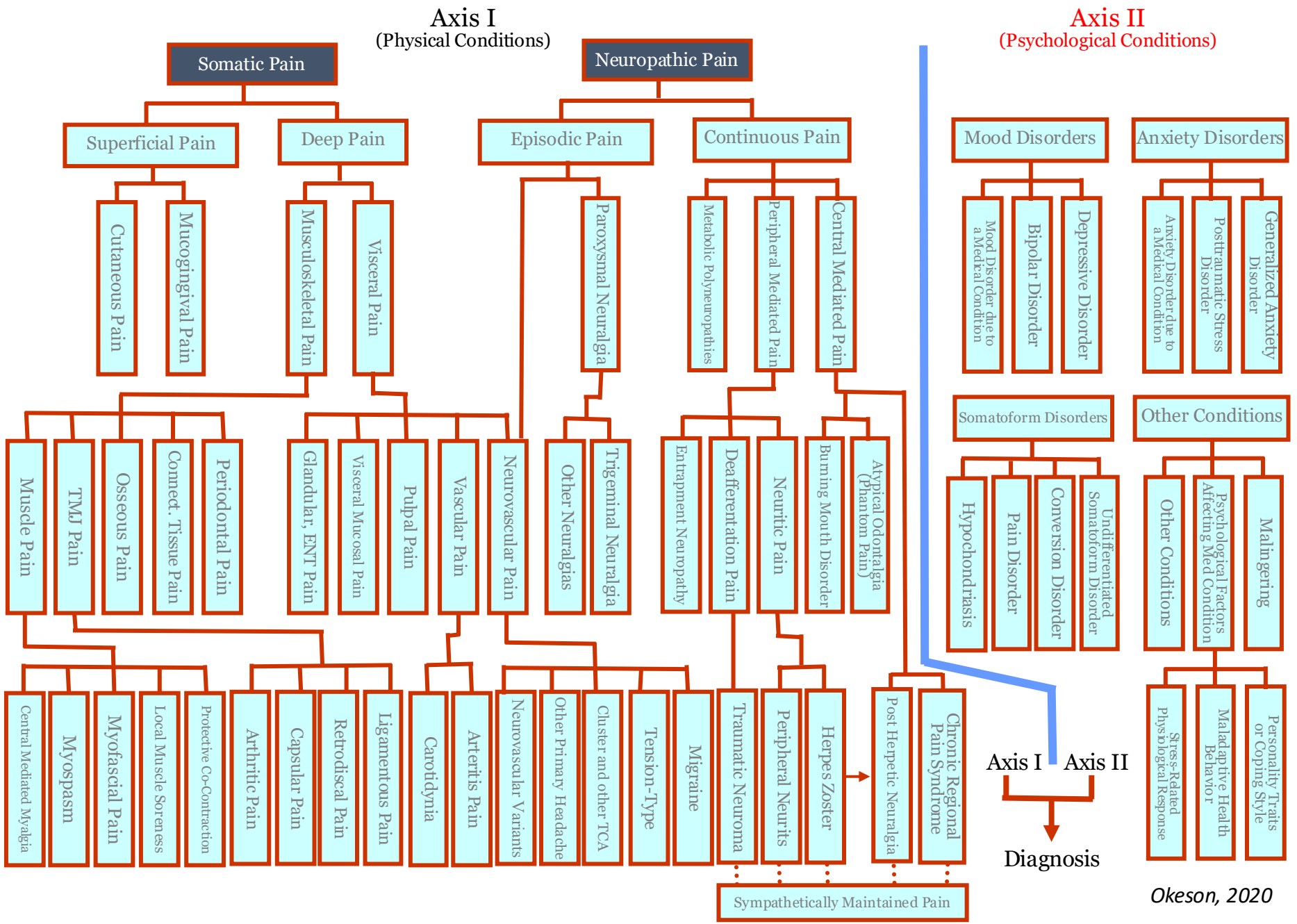
•Porporatti AL et al. J Oral Facial Pain Headache. 2024 Sep;38(3):1-14.

Temporomandibular Disorders

- Temporomandibular Disorders: diverse group of musculoskeletal and neuromuscular conditions involving the TMJs, masticatory muscles and associated structures.
- Prevalence:4.6% Isong et al 2008

•Klasser & Romero Reyes (2023) Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management 6th Ed. Quintessence Publishing

CLASSIFICATION OF OROFACIAL PAIN



Okeson, 2020

DIAGNOSTIC CRITERIA FOR TEMPOROMANDIBULAR DISORDERS (DC/TMD)

TMD Diagnosis		Sensitivity	Specificity
Pain related temporomandibular disorders	A. Myalgia	0.90	0.99
	1. Local myalgia	Not established	
	2. Myofascial pain	Not established	
	3. Myofascial pain with referral	0.86	0.98
	B. Arthralgia	0.89	0.98
	C. Headache attributed to TMD	0.89	0.87
Intra-articular temporomandibular disorders	A. Disc displacement with reduction	0.34	0.92
	B. Disc displacement with reduction with intermittent locking	0.38	0.98
	C. Disc displacement without reduction with limited opening	0.80	0.97
	D. Disc displacement without reduction without limited opening	0.54	0.97
	E. Degenerative joint disease	0.55	0.61
	F. Subluxation	0.98	1.00

Schiffman et al. *J Oral Facial Pain Headache 2014;28:6–27.*

INTERNATIONAL CLASSIFICATION OF OROFACIAL PAIN 1ST EDITION

- Orofacial Pain attributed to disorders of dentoalveolar and anatomically related structures
- Myofascial orofacial pain
- Temporomandibular joint pain
- Orofacial pain attributed to lesion or disease of the cranial nerves
- Orofacial pains resembling presentation of primary headache
- Idiopathic orofacial pain
- Psychosocial assessment of patients with orofacial pain

Cephalalgia 2020, Vol. 40(2): 129-221

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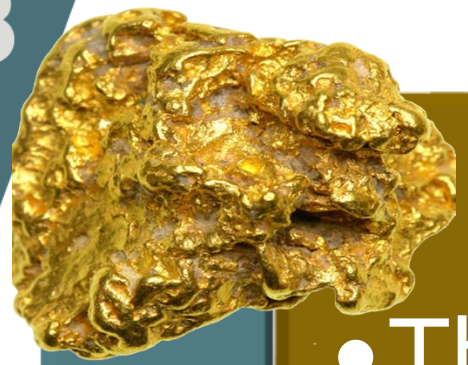
TAKE HOME MESSAGE



TAKE HOME MESSAGE

- There is a new definition of pain.
- 3 types of pain enveloped around the biopsychosocial model.
- Always conduct a psychosocial history with empathy.
- If you don’t believe the pain, believe the suffering.
- Orofacial pain…..never a boring day.

THANK YOU!!!

Ramesh Balasubramaniam OAM

DENT5310

Orofacial Pain and Dental Sleep Medicine Module

16th April 2026