HENRY FORD HEALTH®

Acupuncture, the Vagus, & Modern Interpretations

Michigan Osteopathic Association

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Mathew Kulas, L.Ac. – Speaker
I have no relevant financial relationships to disclose

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Intro

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Intro

- Licensed Acupuncturist and Chinese Herbal Practitioner
- Masters of Acupuncture from The Academy for Five Element Acupuncture, Gainesville, FL
- Transitional Doctorate of Acupuncture from Pacific College of Health Sciences, San Diego
- Been with HF for 7+ years
- Passionate about helping pts w/ pain, trauma, sleep, tinnitus, cancer, whole body wellness, and recently dysautonomia conditions
  - Auricular vagal stimulation + diaphragmatic breath work

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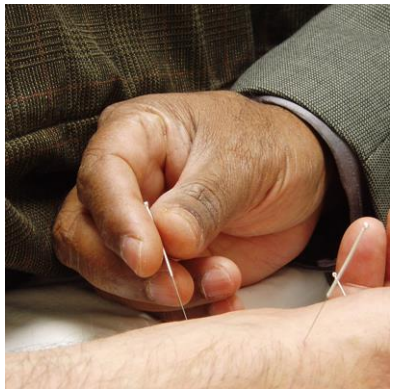
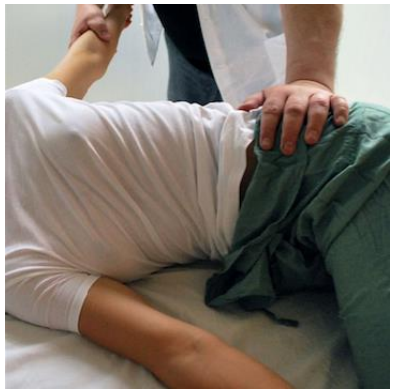
Modalities

Herbal Medicine

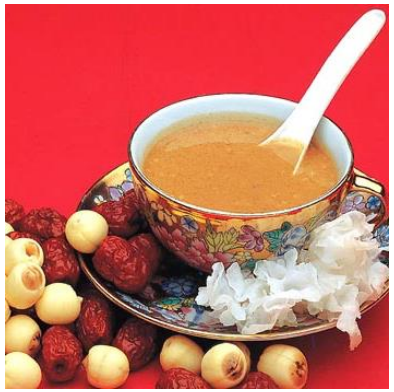
Acupuncture



Manual Therapies



Diet / Lifestyle



Exercise / Breathing

Objectives

- What is Acupuncture?
  - Classical perspective
  - Modern mechanisms
- Vagal mechanism and importance
- Integrative & translational approach

Goals

- Acupuncture is *REAL* science

Indications

National Center for Complementary and Integrative Health (NCCIH)

- Back/neck pain
- OA
- Headache
- Myofascial pain
- Sciatica
- Post-op pain
- Cancer pain
- Irritable Bowel
- Chronic Prostatitis / Pelvic pain
- Fibromyalgia
- Seasonal Allergies
- Urinary Incontinence
- Nausea / Vomiting
- Asthma
- Depression
- Smoking Cessation
- Carpal Tunnel
- Menopausal Hot Flashes

Best referrals

- Refractory to traditional therapies, such as:
  - PT – even if px have done dry needling
  - Medications
  - Lifestyle adjustments
  - When you suspect a psychosomatic cause or *barrier*
    - MVA, Veterans, etc
    - Acupuncture is **non-verbal** healing
- Optimizing overall health
  - Athletes, increase ADLs and QOL
- When pragmatic approaches are needed

What *is* Acupuncture?

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Classical Philosophy

- QI = energy
- Lots of different kinds of qi and ways to cultivate:
  - Air
  - Food
  - Water
  - Exercise
  - Meditation
  - Sleep
  - ATP
  - Nervous system action potentials
  - Chemical: digestive enzymes, bile
    - **Yuan qi, zhong qi, kidney qi, wei qi, etc**

- **TRANSFORMATIVE**
- **CULTIVATED**
- **OPTIMIZATION**
- **SALUTOGENIC**

Acupuncture & Moxibustion

针灸 Trad. 針灸

zhēn jiǔ

acupuncture and moxibustion
to give or have acupuncture and moxibustion

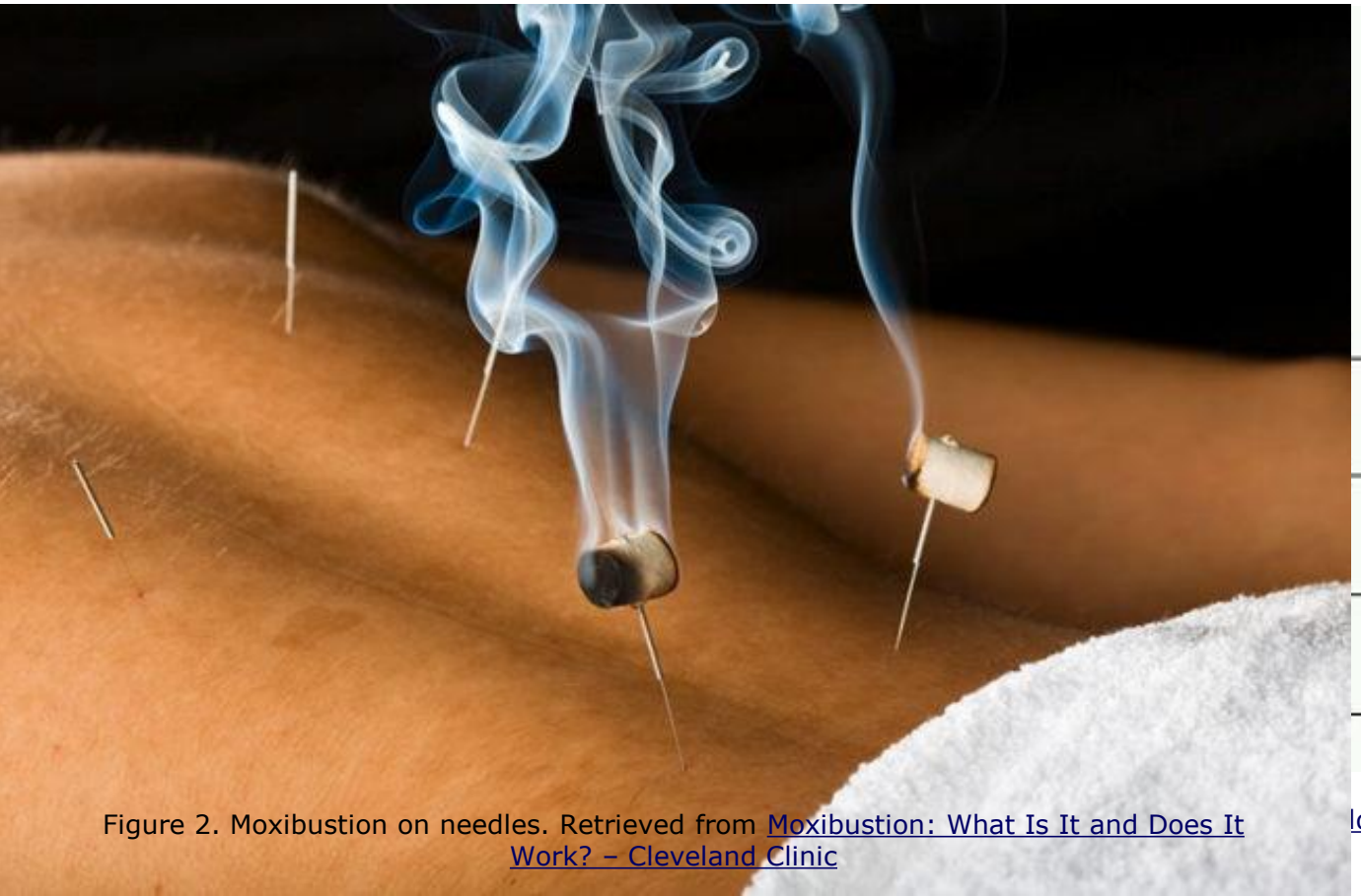


Figure 2. Moxibustion on needles. Retrieved from Moxibustion: What Is It and Does It Work? – Cleveland Clinic

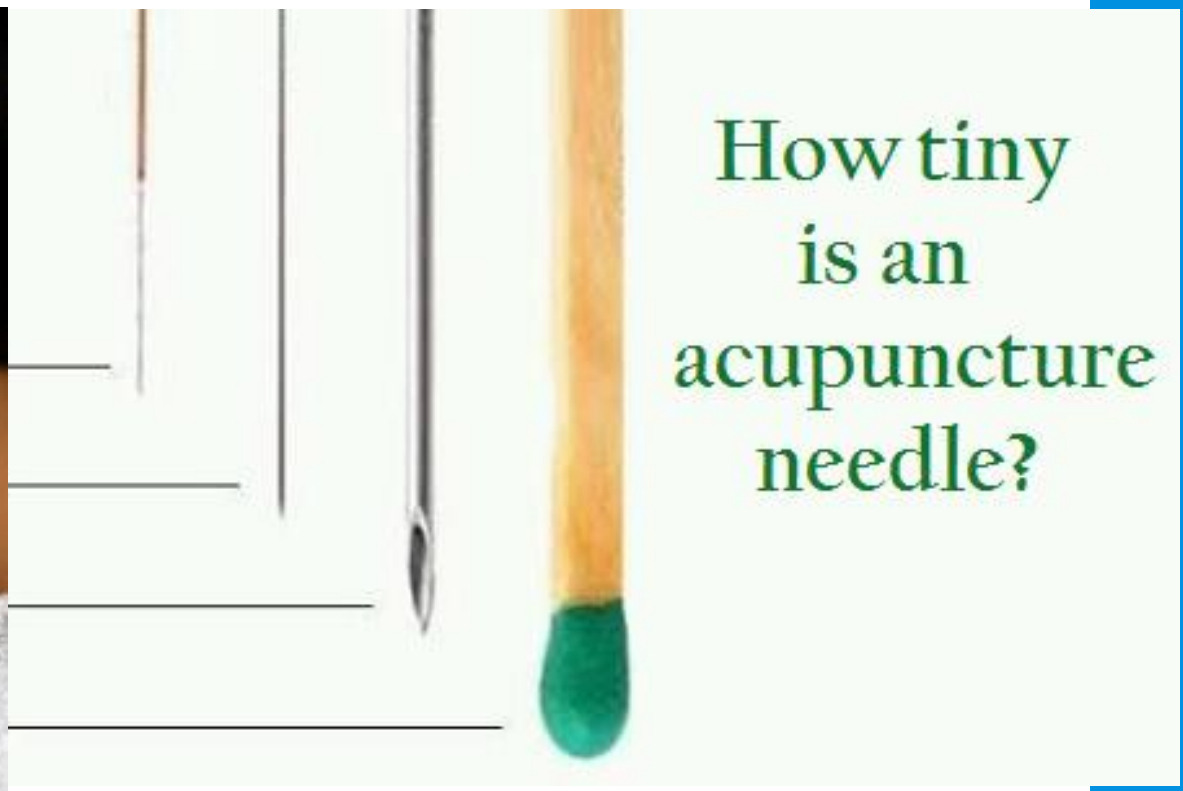


Figure 1. Acupuncture size comparison. Retrieved from Acupuncture FAQs | Bret ldenhauer | Acupuncture, Cupping, Pain Management, Sports | Norspring Cryotherapy, Chattanooga, TN; (instituteforacupuncture.com).

Acupuncture

- 12 main meridians and organs/officials:
  - Heart & Small Intestine
  - Bladder & Kidneys
  - Pericardium & Triple Burner
  - Gallbladder & Liver
  - Lung & Large Intestine
  - Stomach & Spleen
- 2 foundational meridians:
  - Governing and Conception Vessels
- Meridians give us access to pools, vortexes, or POINTS to manipulate qi

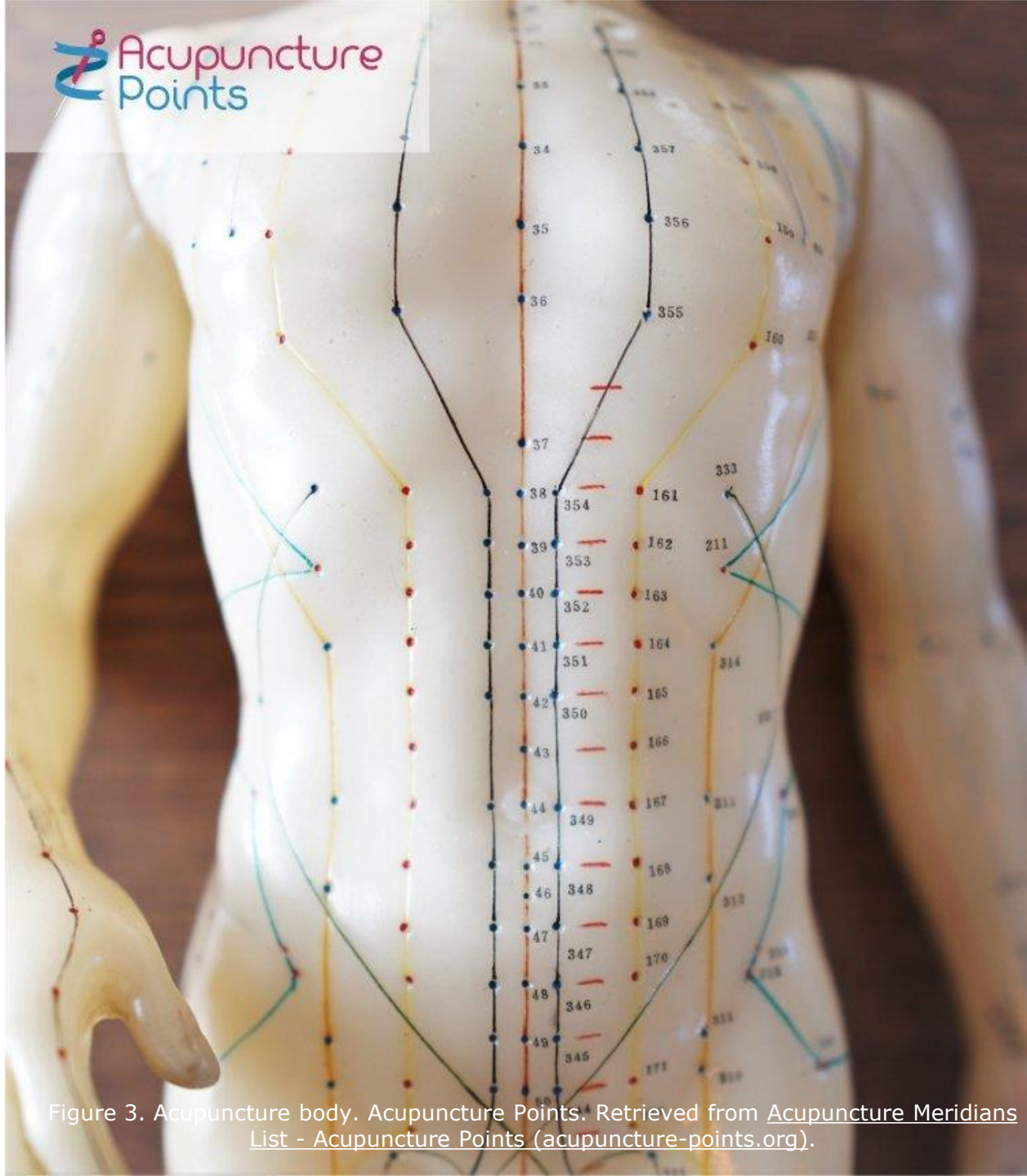


Figure 3. Acupuncture body. Acupuncture Points. Retrieved from Acupuncture Meridians List - Acupuncture Points (acupuncture-points.org).

Auricular Acupuncture

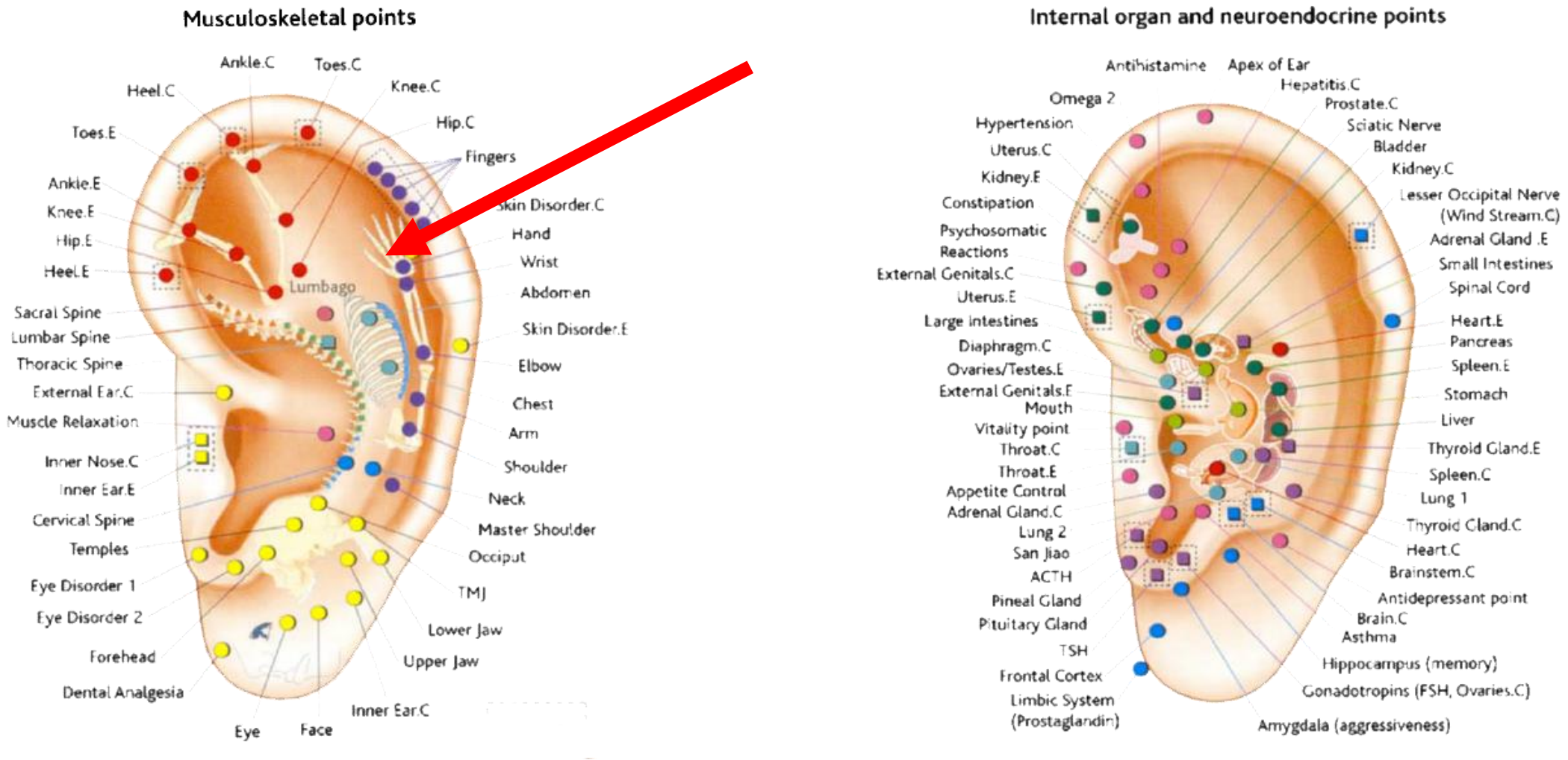
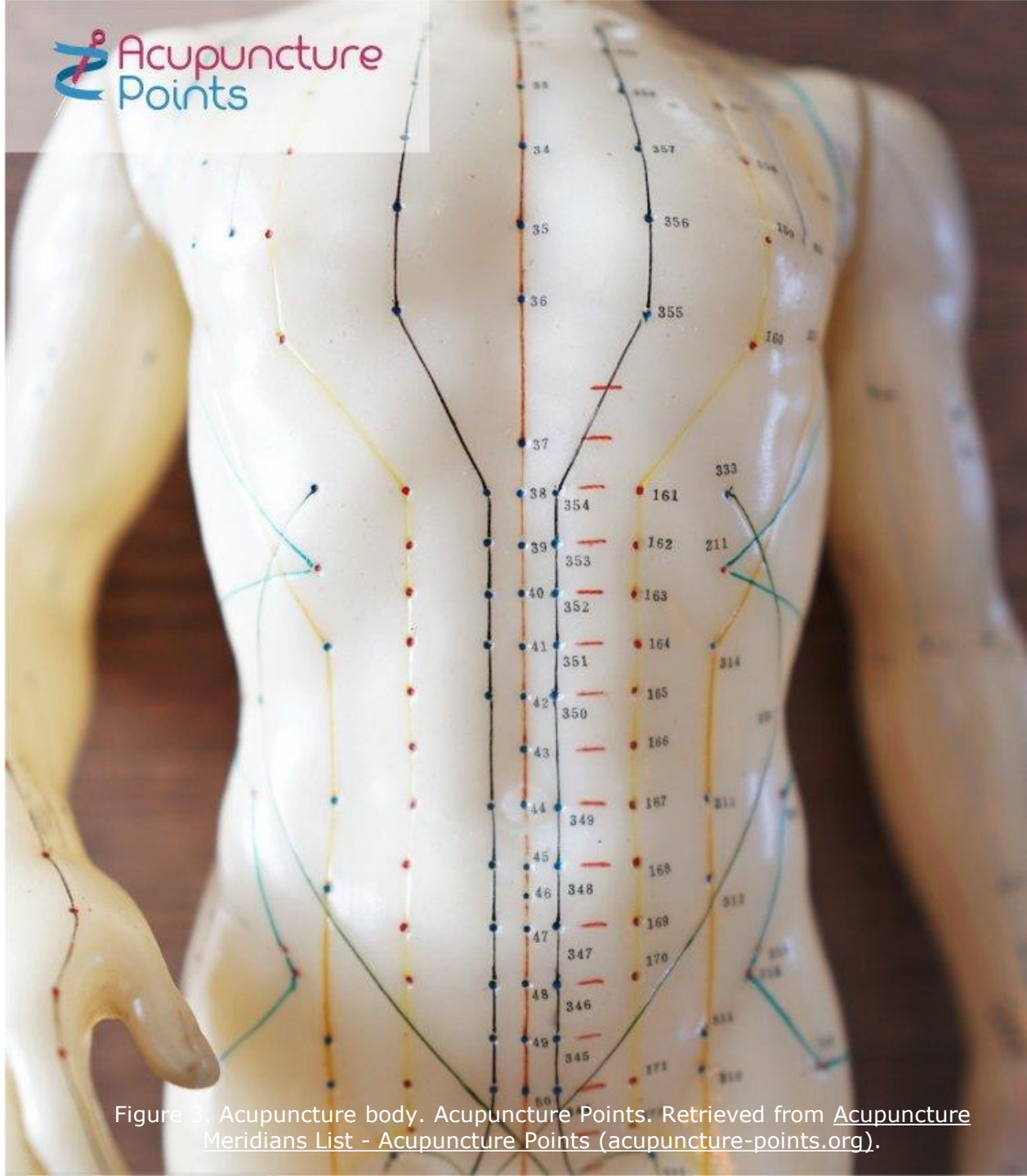


Figure 4. Auricular diagrams. Oleson, 2013

Variations, Synonyms, & Adjunctive therapies

- Traditional Chinese Medicine (TCM)
- Five Element
- Korean hand, Japanese
- Medical Acupuncture
- **Dry needling, trigger point, motor point**
- **Intramuscular stimulation**
- Guasha/Graston, Cupping, tuina massage
- 8 extraordinary meridians
- Microsystems (auricular, fascial, scalp)
- Medical Qi gong



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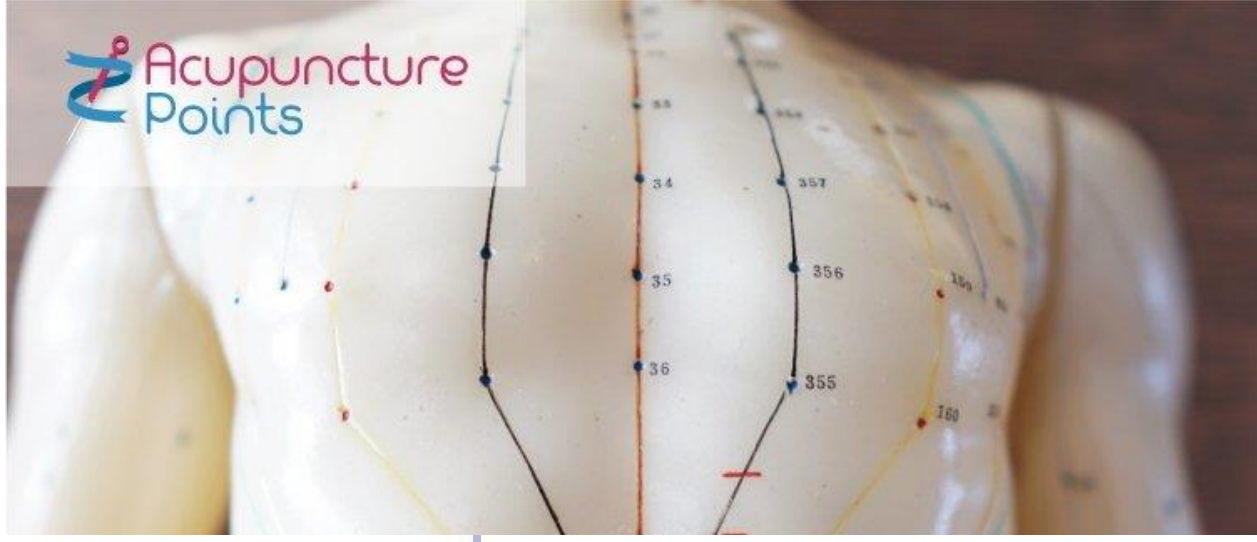
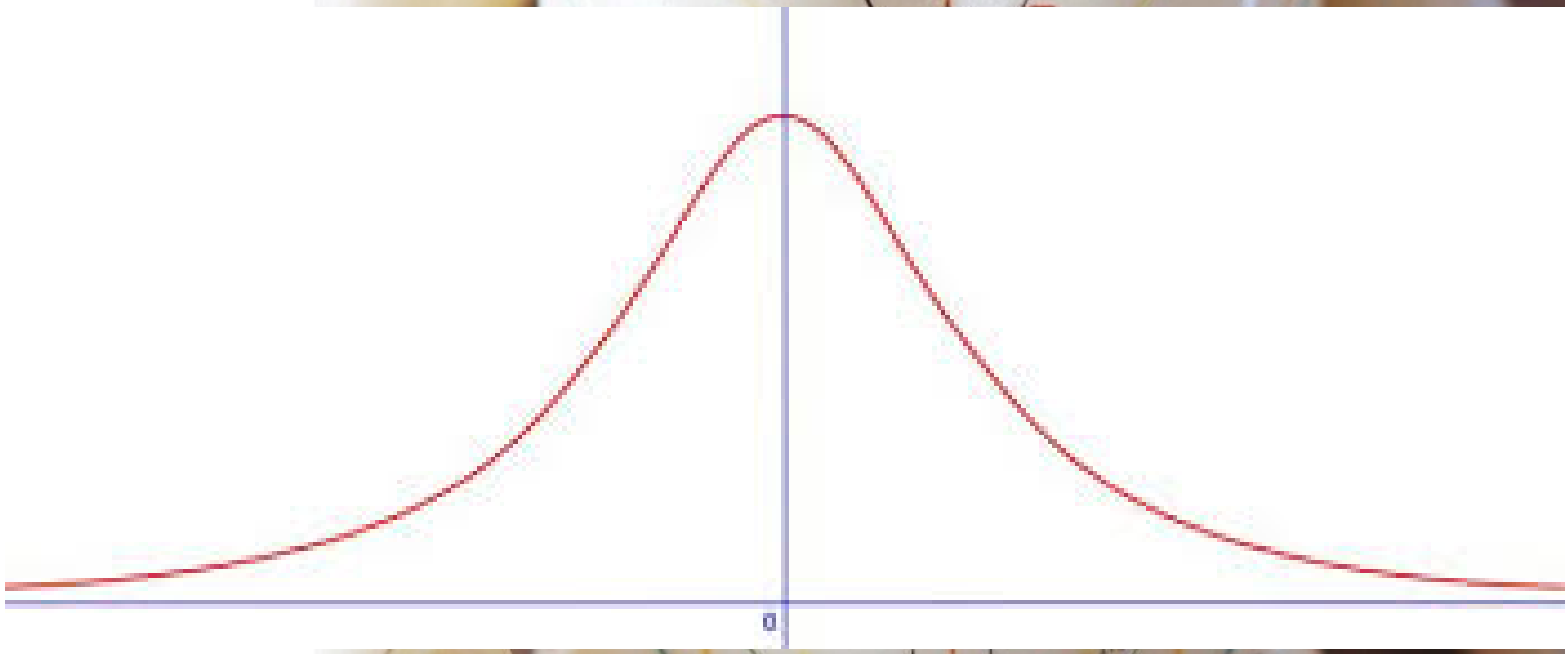
Treatment strategies

- Strategies:
  - Distal needling
  - Local needling
  - Auricular points
  - Acupressure
  - Electric stimulation vs. manual
  - Specific protocols, point combos
- Pragmatic:
  - Lifestyle, supplements, herbs
- Recommendations:
  - 6-10 treatments minimum to start
  - 1-2x per week
  - High responders, low responders, middle





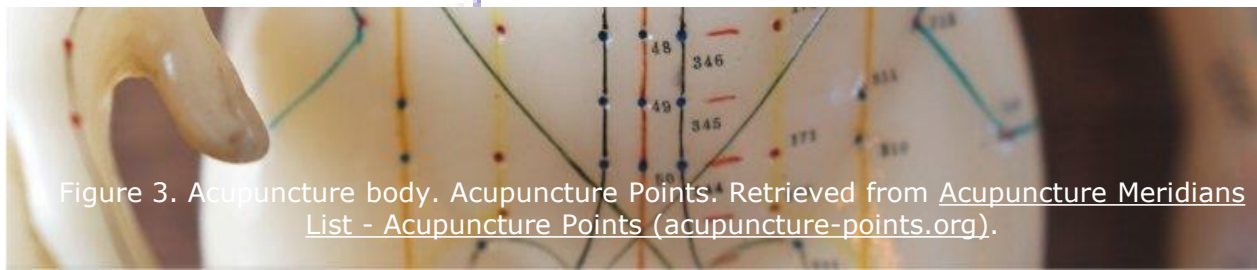
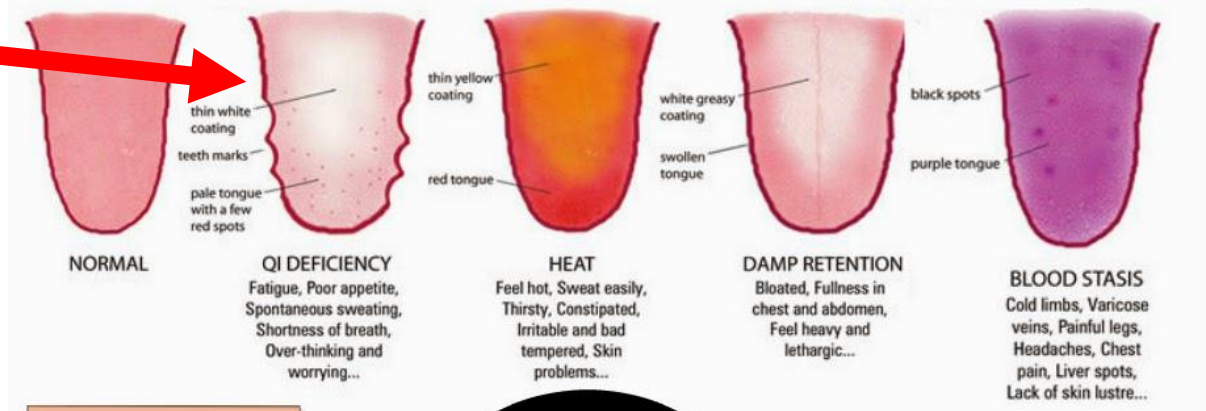


Figure 3. Acupuncture body. Acupuncture Points. Retrieved from Acupuncture Meridians List - Acupuncture Points (acupuncture-points.org).

Diagnostics

- Tongue
- Pulse
- "10 questions"
- Physical assessment
- Kidney yin deficiency
- Qi deficiency & phlegm
- Liver wind
- Running piglet syndrome



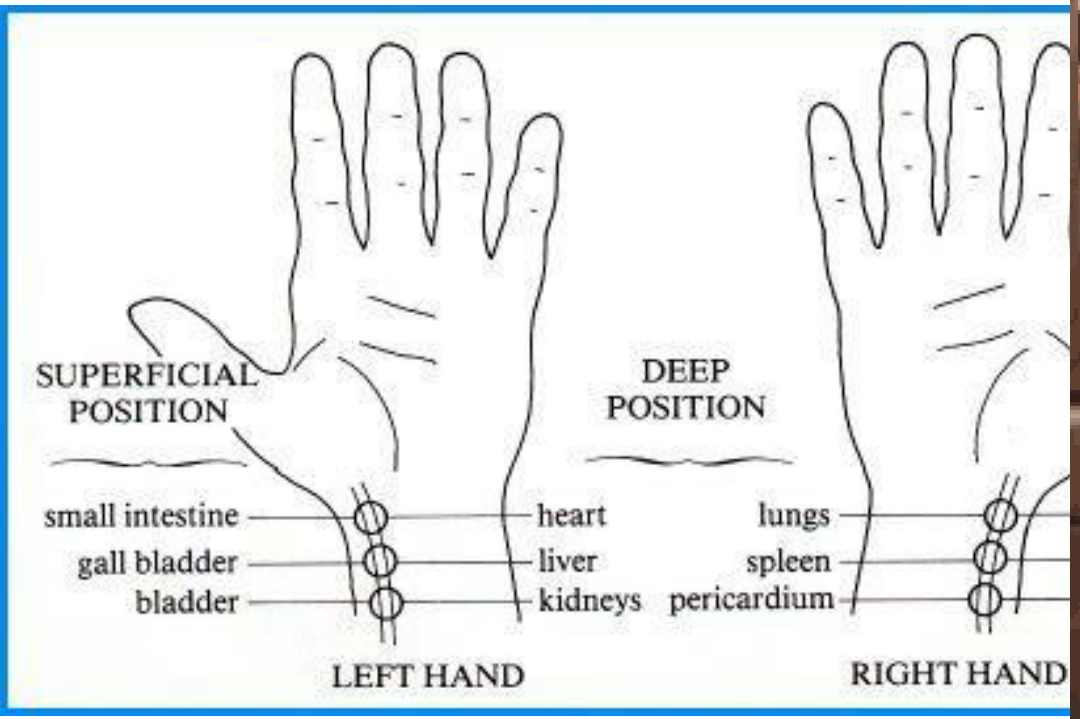


Figure 6. Pulse positio
Chinese pulse diagnosis
Chinese pulses|Electr
(doctoracupuncture.co.uk).

Gif 2. Running pig. Retrieved from https://tenor.com/view/running-pig-gif-7322609

e say about your body. Retrieved from What out our body..... - MEDizzy.

But how does acupuncture *REALLY* work!?

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Modern Interpretations

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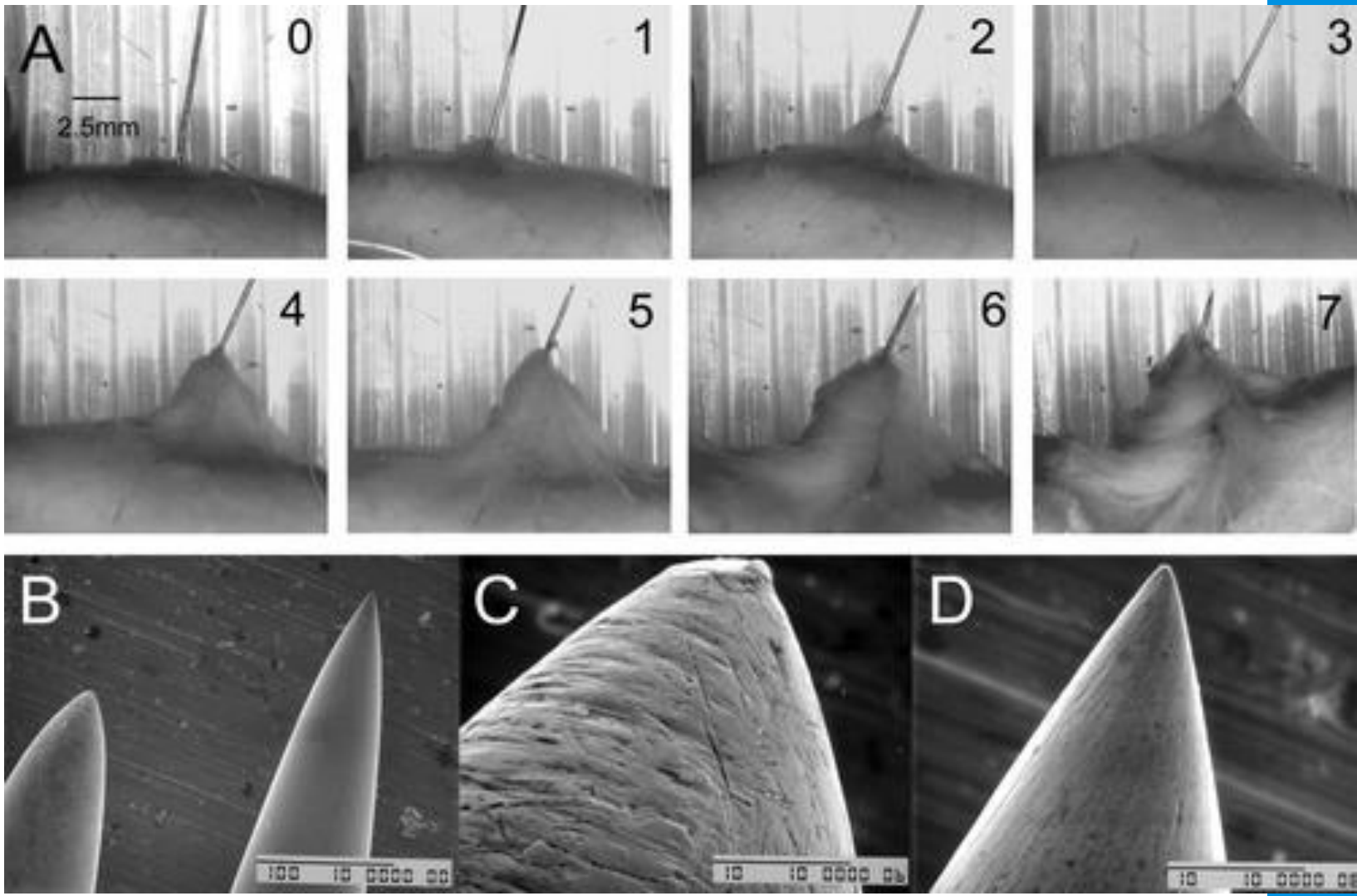
Pluripotent Mechanisms

Gate Control Theory	Endocrine Theory	Endorphin Theory	Neuro-immune Theory	Circulatory Theory
It generates a competing stimulus which blocks pain signals from reaching the brain.	It improves the immune system by raising levels of sex hormones, cortisol, somatostatin, vasoactive intestinal peptide, and cytokine levels.	It stimulates secretion of endorphins (Enkephalins) or regulates receptor activity (mu-opioids receptors) which naturally help with pain.	It affects neurotransmitter levels including serotonin substance P, dopamine, and Noradrenaline. This would explain the 'qi high. It also influences immune cells: WBCs, gamma globulins, exomes and mast cell production.	It dilates blood vessels increasing circulation of fresh RBCs and WBCs to an injured area usually by altering calcitonin gene-related peptide (CGRP), prostaglandins, bradykinin, histamine, and angiotensin II

Mechanical Mechanism

- Langevin & Yandow, 2002, *The Anatomical Record:*
  - Filiform needle presses passes the skin and applies pressure to nerves, connective tissue, fat, etc
    - .16x15mm (diameter: 160 micrometer µm
  - Whirling action
  - Myofascial Trigger Points
  - Motor Points
  - Up to 2mm – ~10mm insertion
    - Maybe 3-4 inches
  - Acupoint depth vs trigger point/MP

Figure 8. Connective tissue whorl. Langevin & Yandow, 2002.



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Mechanical Mechanism

- Langevin, 2013, *The Scientist*:
  - **Pressure & stretch** activate focal adhesion complexes to release **fibroblasts** (mediated by protein **Rho**)
  - Releases **ATP**
  - **ATP** >>> cell shape + analgesia
  - **Rho pathway** remodels adhesions

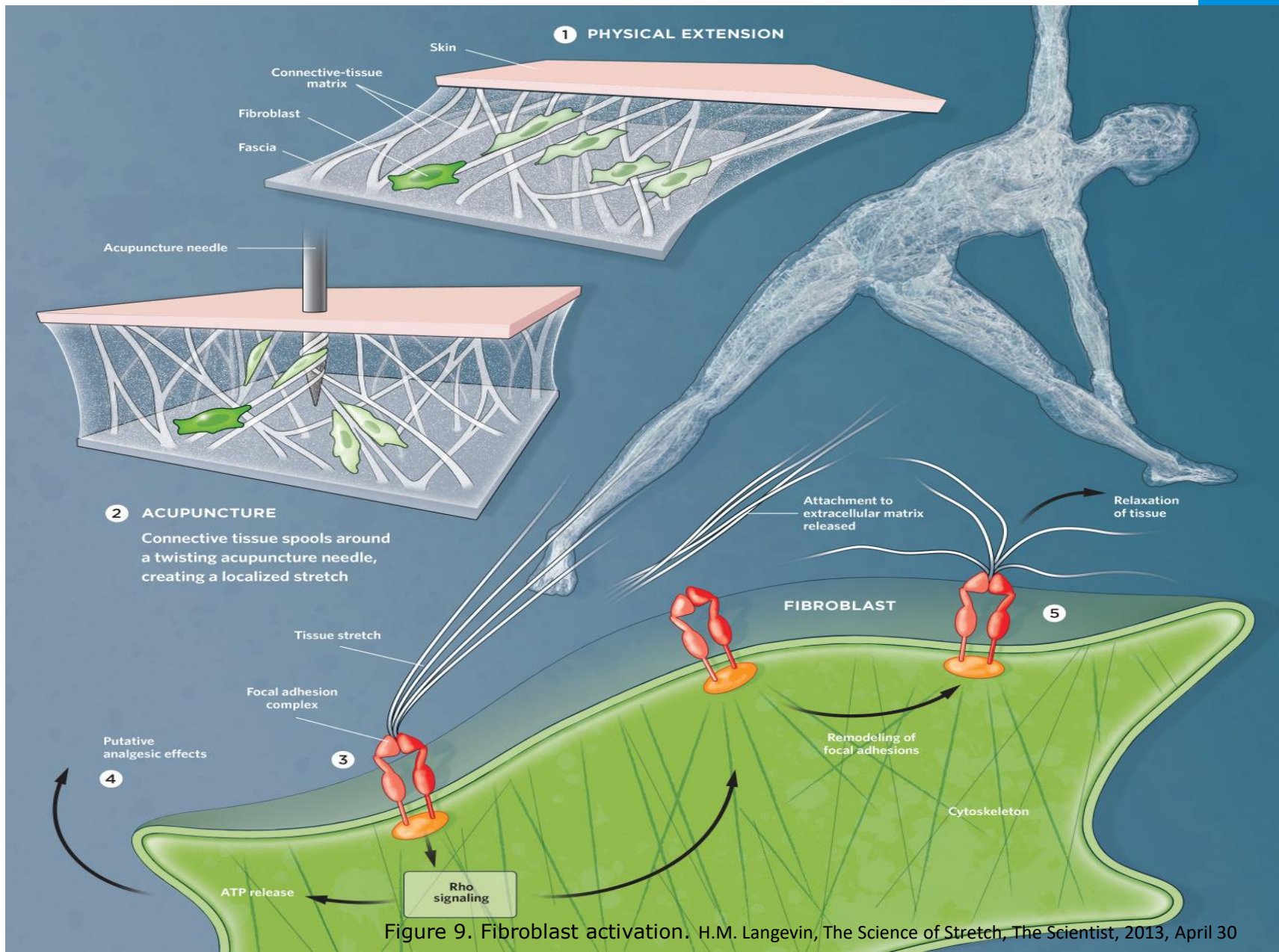

Figure 9. Fibroblast activation. H.M. Langevin, The Science of Stretch, The Scientist, 2013, April 30

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Mechanical Mechanism

- Langevin, Churchill, Cipolla, 2001, *The FASEB Journal*:
  - **Mechanical load signals** reorganize cytoskeletal tissue.
  - "Intracellular signaling pathways activate **phosphorylation** of **focal adhesion kinase** and **extracellular regulated kinase (ERK)**."
  - **ERKs** can change gene expression of **collagen XII, tenascin-C, and platelet derived growth factor** via nuclear binding proteins, i.e. NF-kB
  - I.e. ERKs imp for smooth muscle cell growth and epigenetic changes
  - Rec: seniors need more txs typically

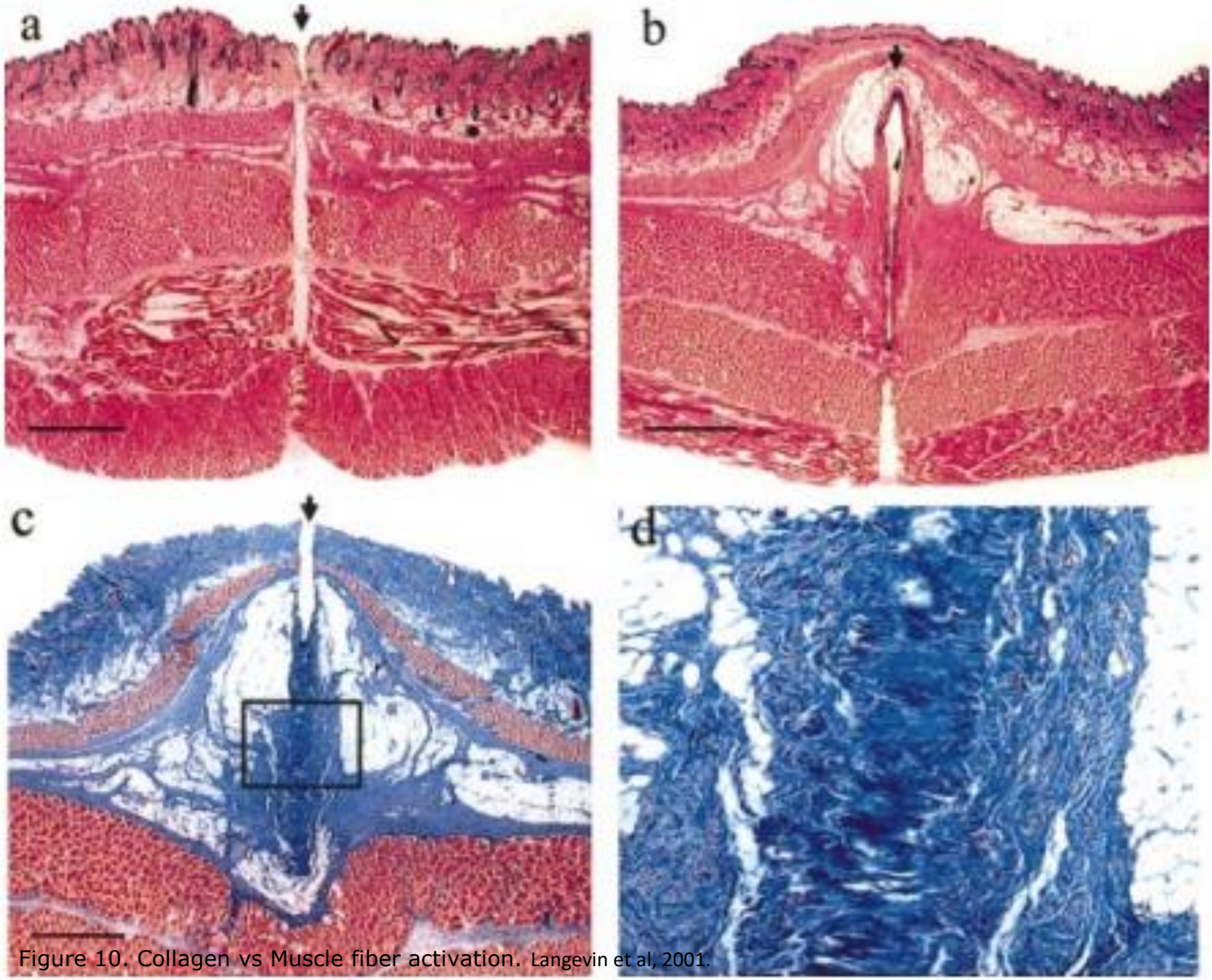

Figure 10. Collagen vs Muscle fiber activation. Langevin et al, 2001.

Mast Cell Mechanism

- Li et al., 2022, *Cells*:
- Local trauma activates **degranulation** of cells which release:
  - Histamine, bradykinin, prostaglandins, CGRP: smooth muscle relaxation via blood vessel dilation
  - Substance P
  - Serotonin
  - B-Tryptase
  - Vasoactive Intestinal Pep
  - Various: IL-1, IL-4, IL-5, IL-13

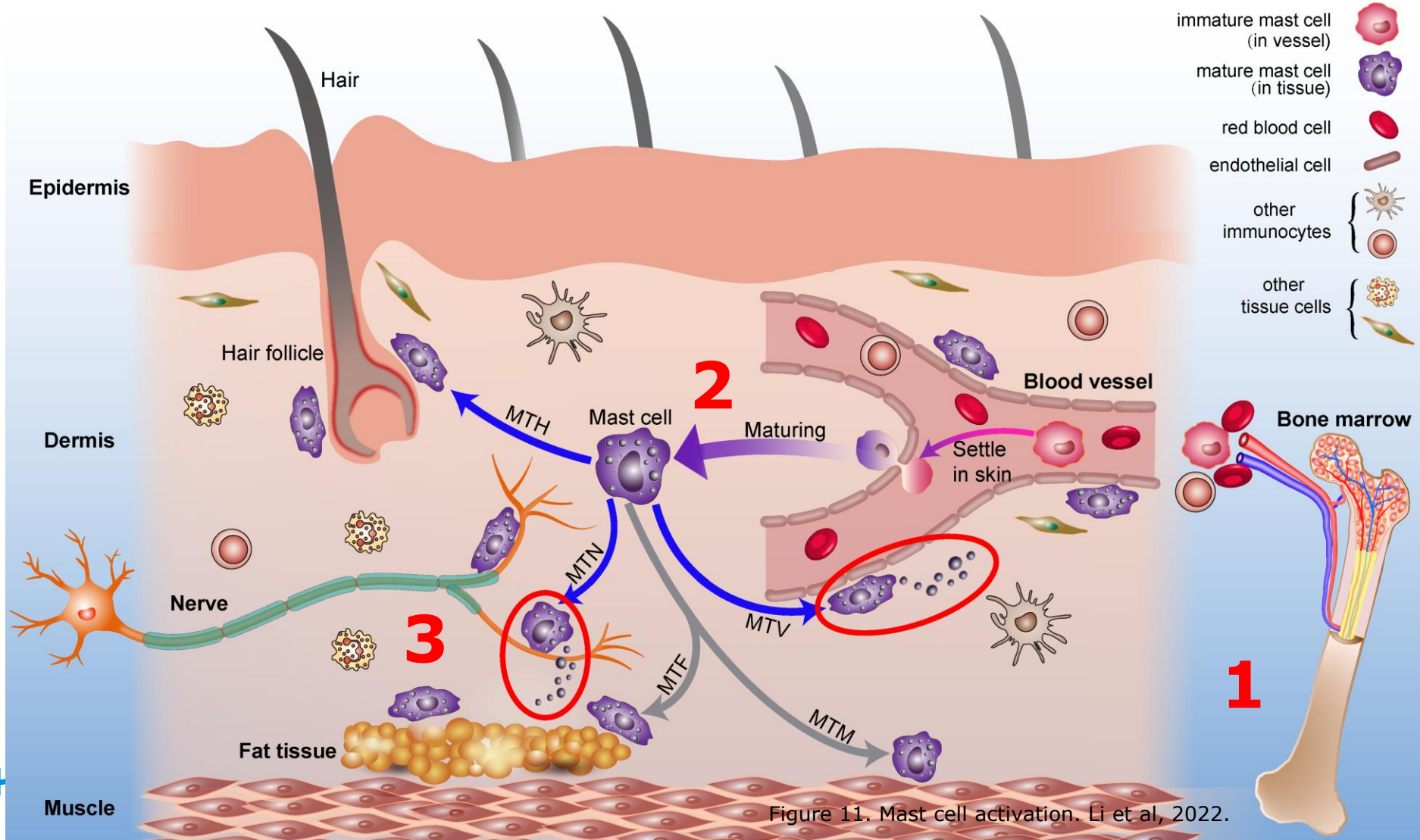

Figure 11. Mast cell activation. Li et al, 2022.

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Mast Cell Mechanism

- Li et al., 2022, *Cells*:
  - Local damage >>> **degranulation** of mast cells >>> **++ ATP, ADP, AMP, and adenosine** imp in neuropathic and inflammatory pain signaling
  - "**ATP** acts as an extracellular messenger to transmit sensory information both at the peripheral site of tissue damage and in the spinal cord." (Falk, Uldall, Heegaard, 2012)
  - **ADP** agonizes **P2Y1 receptor** >>> lowers nociceptive transmitters in spinal cord.
  - **Don't drink coffee before your acu treatment!**

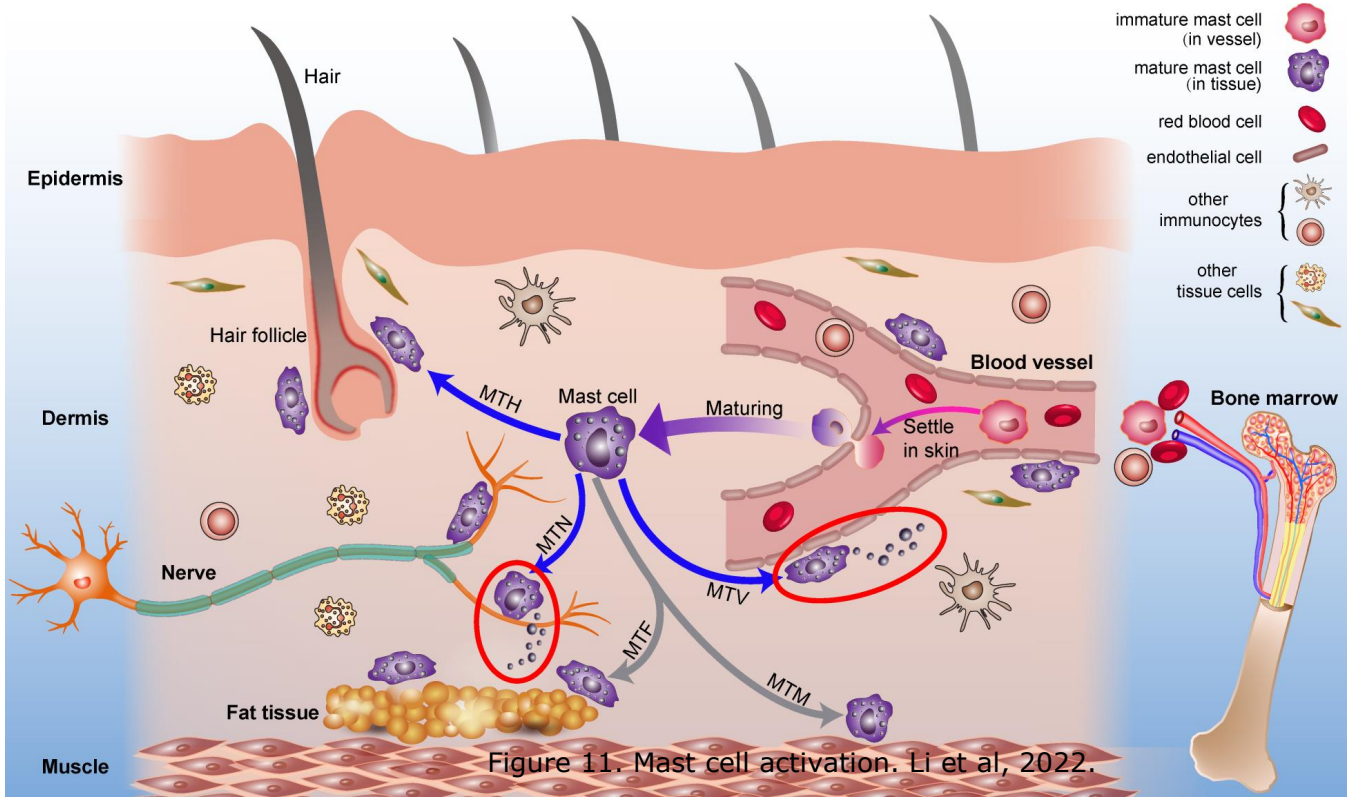


Figure 11. Mast cell activation. Li et al, 2022.

Exosomal Mechanism

- Bo et al., 2017, *Chinese Journal of Integrative Medicine*:
  - **Intercellular vesicle messenger** cells released from **mast cells** (<u>also B & T lymphocytes, and **all** cells</u>) that react to stress/invasion >>>>> delivers over **400 different kinds of proteins** that regulate our neuro-immune networks.
  - Stimulate sensory nerves to release **Substance P** (neuropeptide) >>> <u>positively reinforces more mast cell activation</u>

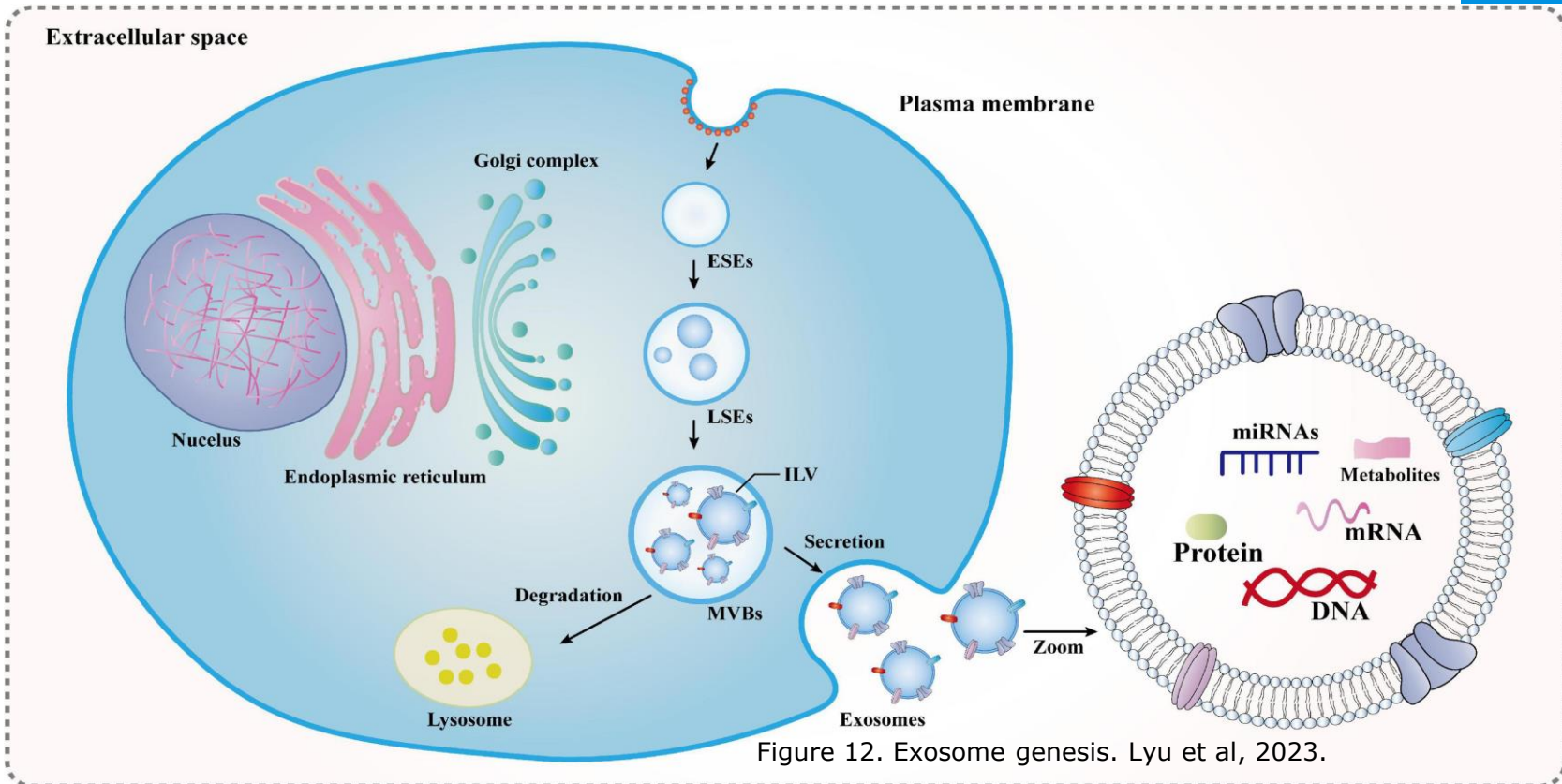


Figure 12. Exosome genesis. Lyu et al, 2023.

Mast Cell Mechanism

- Ming, 2022, *Medical Acupuncture*:
  - Jeimi Song studied mast cell activation, published in 1977 and 1980.
  - First major theory be proven
  - **Degranulation** sig higher in EA and Manual Acu cp to controls
  - Mechanical changes in **collagen fibers** further activate degranulation – positive reinforcing cycle
  - MC map and acu systems:
    - Higher density of MC are in periphery and head
    - ***Source points*** >>> easy access >>> greatest effect on whole body systems >>> **distal needling**
  - Systemic vasodilation effects: **dysmenorrhea**, **asthma**, etc

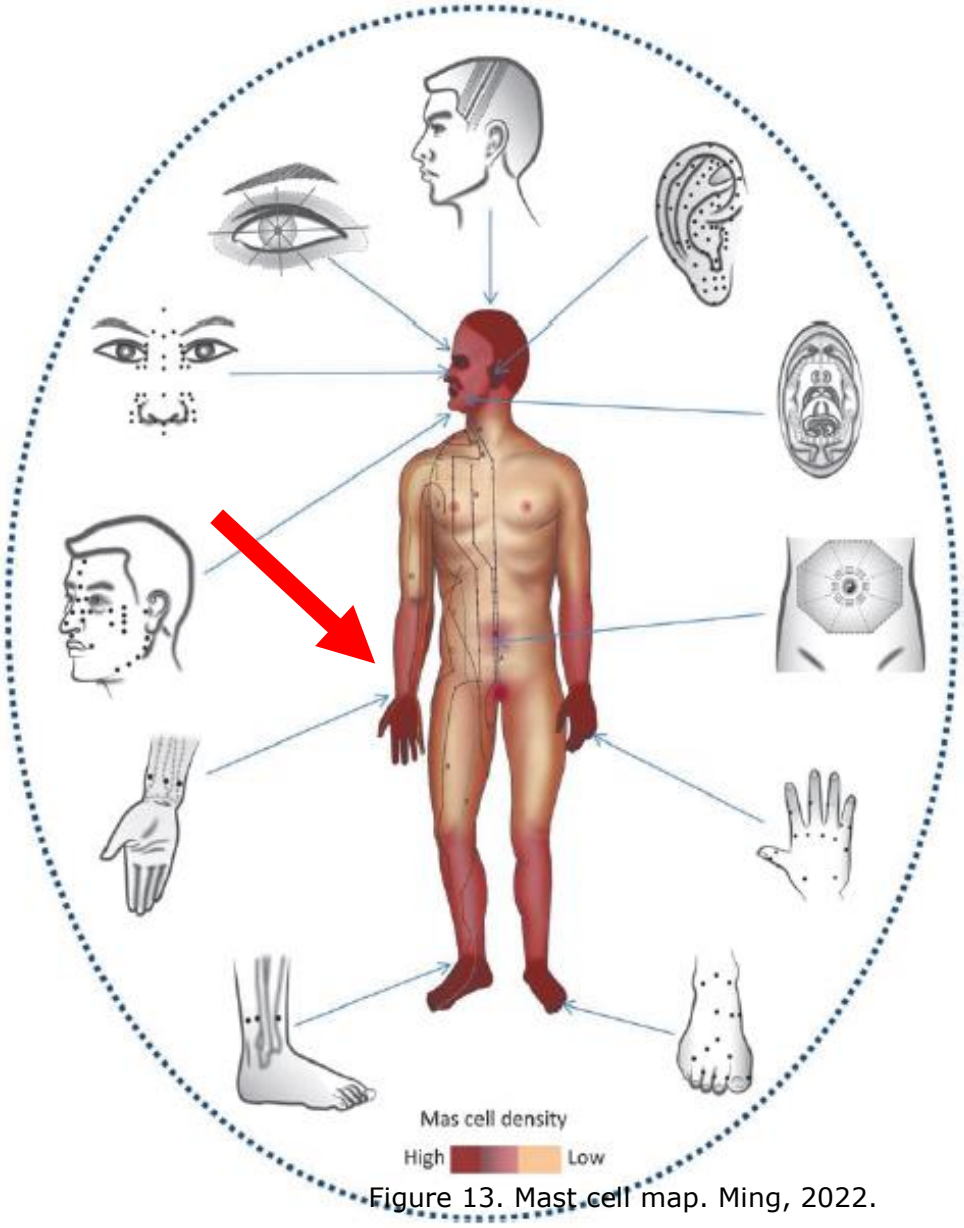


Figure 13. Mast cell map. Ming, 2022.

Neural Mechanism

- Ma et al., 2022, *Frontiers in Neuroscience*, REVIEW, 388 articles:
  - Midbrain and brainstem process nociceptive info via spinal cord
  - **Rostral anterior cingulate cortex** activates **PeriAquaductal Gray (PAG)**: Grand central for pain relay
  - **Rostroventral medulla, locus coeruleus** signals release of **GABA, 5-HT, Norepinephrine, and endogenous opioids**

- Opioid peptides enhance gene expression, more opioids express and remain in terminal…
  - **More txs** >>>> **greater effect**

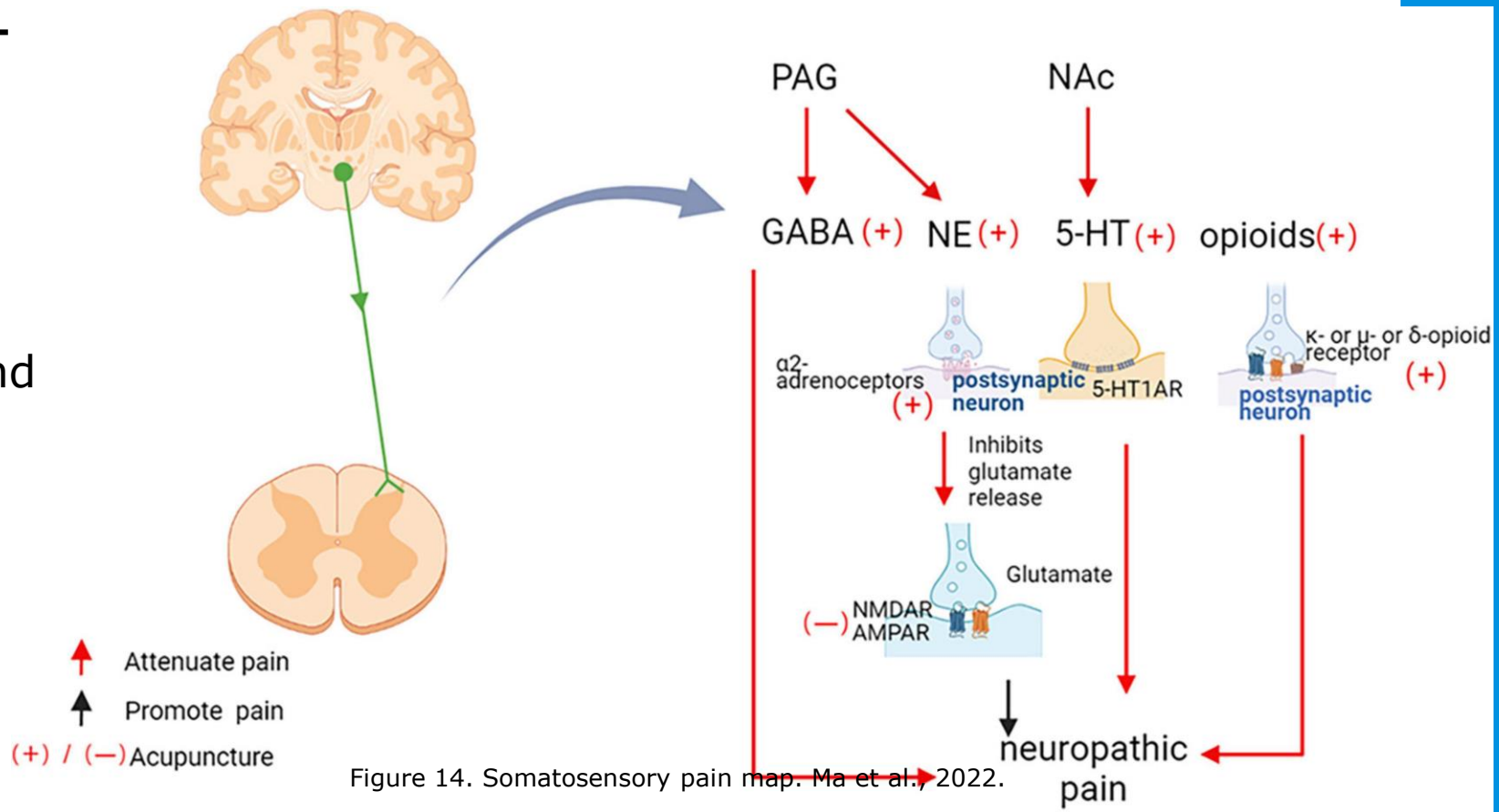


Figure 14. Somatosensory pain map. Ma et al., 2022.

Neural Opioid Receptor Mechanisms

- Harris et al, 2009, *NeuroImage*:
  - 20 fibromyalgia F patients: **μ-opioid selective radiotracer & PET** (C-carfentanil) to measure MOR sensitivity
  - Found short and long-term modulatory effects of μ-opioid receptor (MOR) binding potential in **amygdala**, **dorsal** and **perigenual anterior cingulate**, and **insular cortex**
  - Sham vs Verum: found differences in how μ-opioid receptors became either **MORE** or **less** sensitized
- MacDonald & Chen, 2021, *Frontiers in Neuroscience*:
  - 2 Hz EA associated w/ **met-enkephalin, β-endorphin, and endomorphin** (μ- and δ-opioid receptors) cp. 100 Hz EA stimulates **dynorphin** (κ-opioid receptor)
  - Relationship w/ CB1 and CB2 (cannabinoid) receptors and pain in the **PAG**

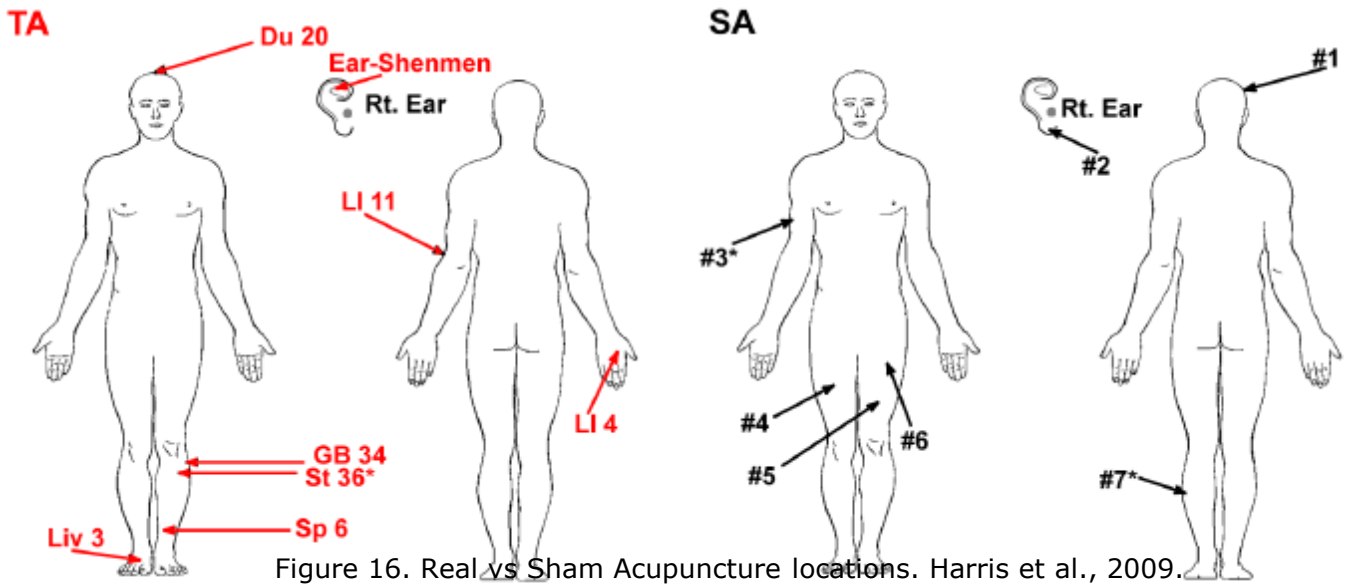


Figure 16. Real vs Sham Acupuncture locations. Harris et al., 2009.

Neural Mechanism

- Zhang et al, 2014, *Anesthesiology:*
  - EA versus manual, 10Hz cp to 100Hz:
  - "…electroacupuncture induces release of **endogenous opioids** from **lymphocytes, monocytes/macrophages, and granulocytes** into inflamed skin."
- Kim et al., 2017: What intrinsic factors influence responsiveness to acupuncture in pain?:…
  - High **CCK8** & **naloxone** inhibits effect
  - Some gene and gene expression for proinflam vs anti-inflam: **IL-6, TNF-α**
  - **PAG, hypothalamus, spinal cord, pituitary** have central role in mediating pain response

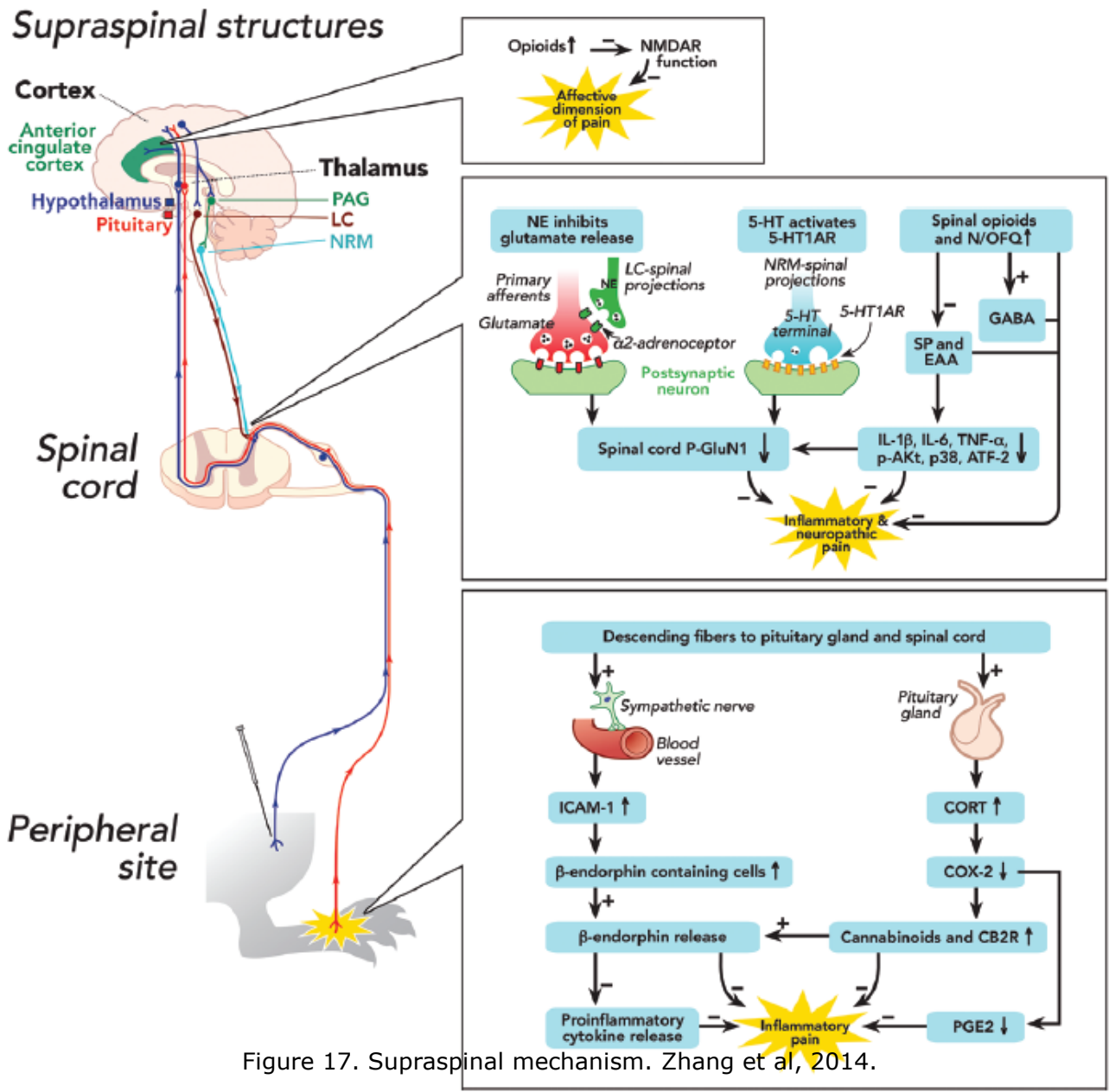


Figure 17. Supraspinal mechanism. Zhang et al, 2014.

What does it all mean?!!!!

- Pressure (**myelinated** A-delta) and pain (**unmyelinated** C) nociceptor neurons activate with needling
- Local stretch of connective tissue activates **fibroblasts, protein synthesis, ATP, & adaptive epigenetic responses** to reformat local cells
- At the same time the local tissue damage activates mast cells and **degranulation**, dumping their contents to deal with "invasion."
  - Neurotransmitters
  - Peptides
  - Cytokines
  - ATP, ADP, AMP, adenosine
  - Histamine, etc, etc, etc

What does it all mean?!!!!

- **CNS** responds via **brainstem** and **mid brain** structures, i.e. **PAG**.
- "I'm under attack!"
  - Mounts defense and repair mechanisms: **endogenous opioids, GABA**, **MOR regulation**, and cortical **functional connectivity (FC)** improves.
- Reduction of inflammatory markers (**IL-6, TNF-α**) and stress hormones (**cortisol**)
- Upregulation of anti-inflammatory **cytokines** like, **IL-10**, etc; and other positive systemic changes in heart rate, BP, HRV.
- EA might have some added benefit

Hormesis

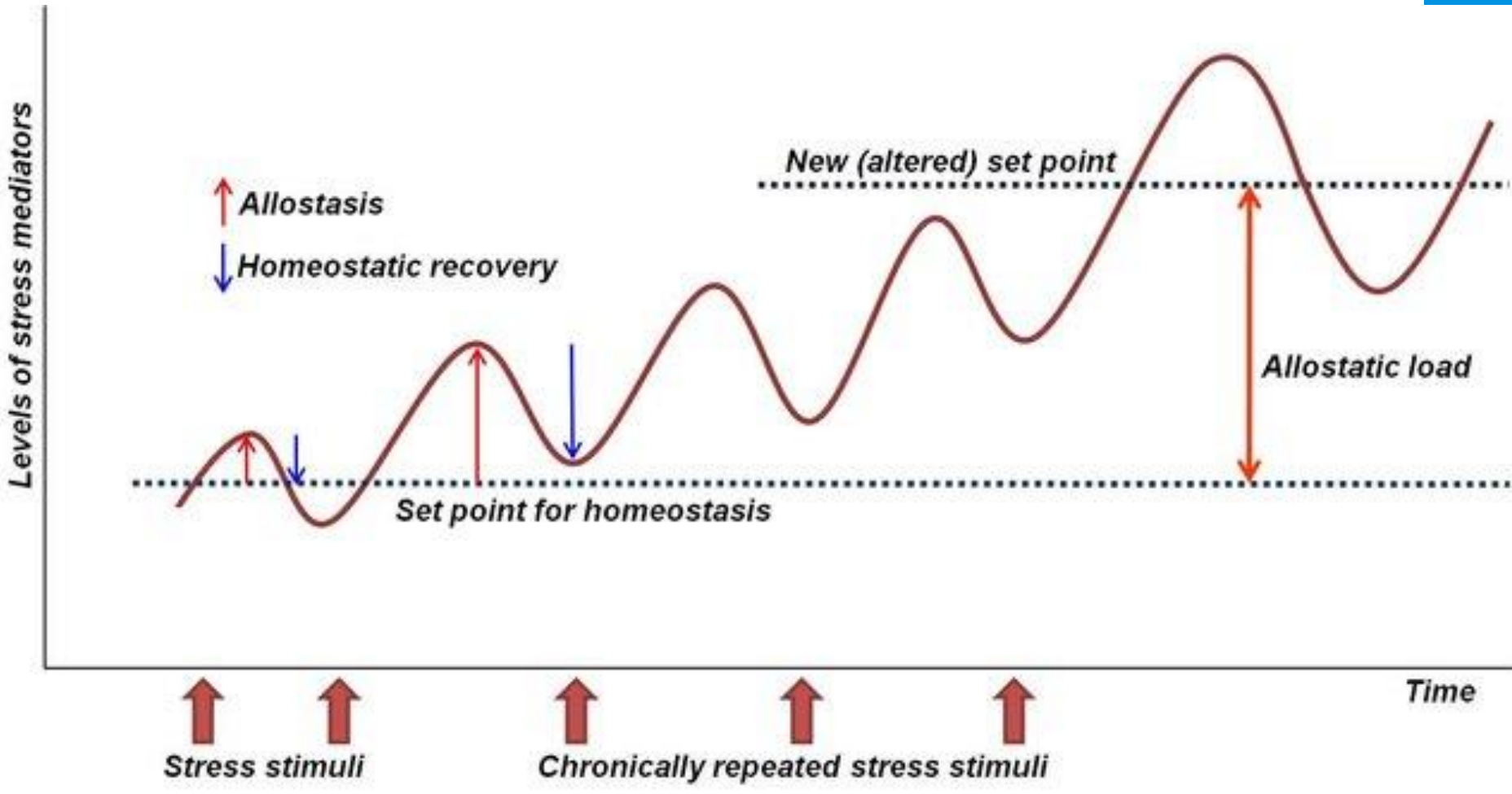
- Calabrese & Mattson, 2017:
  - "Hormesis refers to adaptive responses of biological systems to moderate environmental or self-imposed challenges through which the system improves its functionality and/or tolerance to more severe challenges."
  - What doesn't kill you makes you stronger
  - Regenerative medicine
- **<u>Examples:</u>**
  - Exercise
  - Fasting → Yoshinori Ohsumi – 2016 Nobel Prize in Physiology or Medicine
  - Saunas, heat exposure
  - Ice baths, cold exposure
  - Hyperbaric oxygen therapy
  - Cosmetic therapies: i.e. micro dermal abrasion therapy

ACUPUNCTURE!!!

Allostasis

- Lee, Kim, & Choi, 2014:
- Chronic stress, pain, disease, weakens ability to return to original homeostatic baseline
- Meanwhile, our ability to handle stress diminishes
- Acu *tricks* the body to produce ***slightly*** more inflammation to then downregulate
- Training the body to get "there" on its own

Figure 18. Allostasis. Lee, Kim, Choi, 2014.



Pluripotent Mechanisms

Classical

PAG, rostroventral medulla, locus coeruleus, hypothalamus, spinal cord, pituitary, amygdala, dorsal and perigenual anterior cingulate, insular cortex, etc etc

monocytes/macrophages

Norepinephrine

dynorphin

Changes in HRV and heart rate

BDNF

Nuclear binding proteins: NF-kB

Modern

Cytokines: IL-1β, IL-4, IL-5, IL-13, IL-10, IL-13, IL-14, IL-34, etc

Ca2+

Norepinephrine

5-HT

κ-opioid receptor

Met-enkephalins

Adenosine

ERKs

CGRP

Exosomes

GABA

β-endorphin

μ-opioid receptors

δ-opioid receptors

Fibroblasts

Mast cell activation

Endomorphins

TNF-α

Prostaglandins

Rho protein

Bradykinin

Histamine

ATP, ADP, AMP

Vasoactive Intestinal Peptide

CB1, CB2 receptors

B & T lymphocytes

Substance P

Serotonin

Gene transcription factors: collagen XII, tenascin-C, platelet derived growth factor, etc

Interferon-γ

B-Tryptase

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Vagal Mechanisms

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Vagal Mechanism

- Adaptive stress responses all processed by the VAGUS
- *Surgically* implanted stimulators (Afra et al., 2021):
  - First device implanted **1988** for epilepsy
  - FDA approval for epilepsy **1997**; depression **2005**
  - FDA approval for gastroparesis in **2000** (Levin, Ortiz, Katz, 2007)
  - FDA approval for stroke affecting up limb (FDA, 2021)

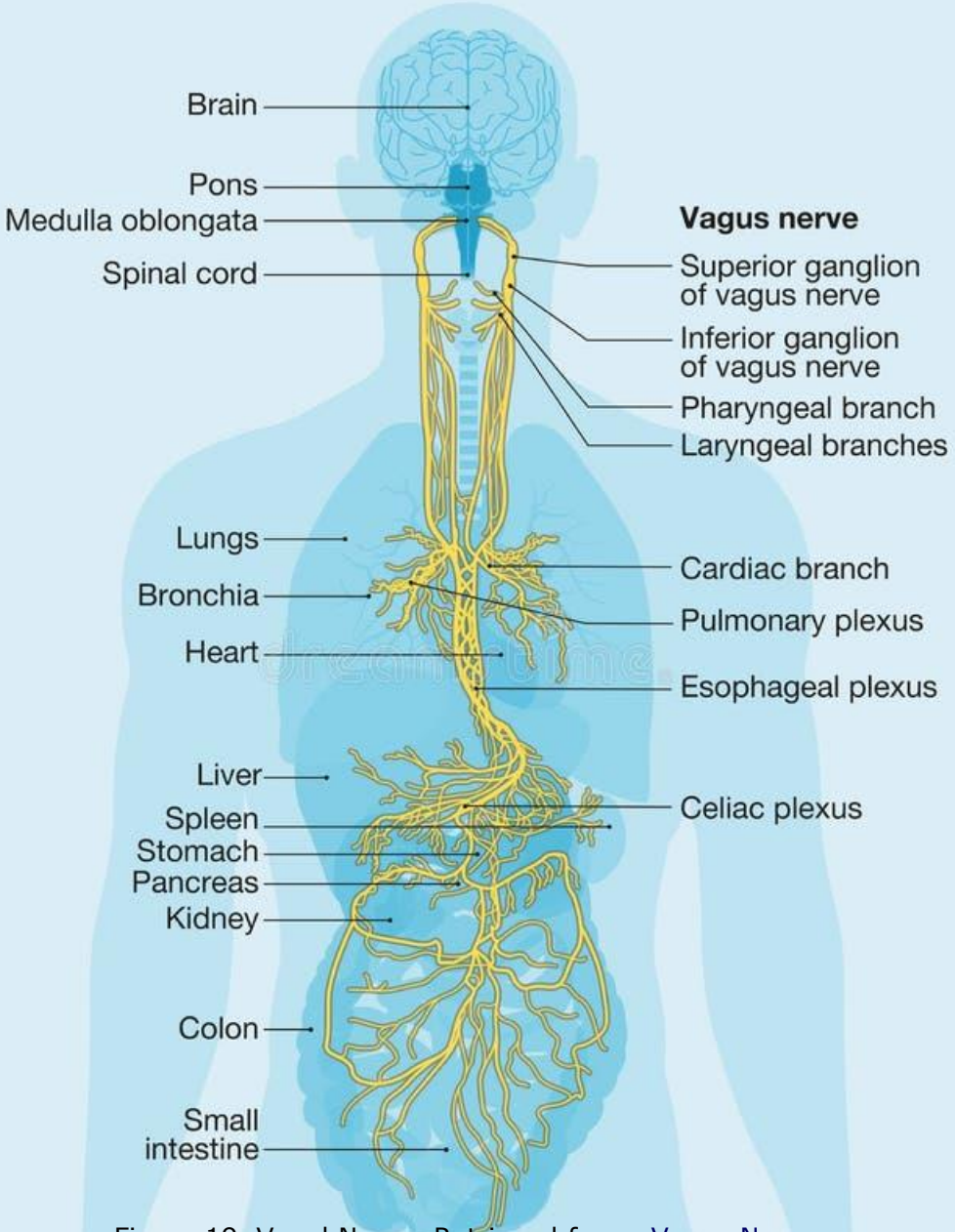

Figure 19. Vagal Nerve. Retrieved from: Vagus Nerve Labeled and Human Organs, Medically Illustration Stock Illustration - Illustration of front, cord: 215358768 (dreamstime.com).

Vagal Mechanism

- Auricular Branch of the Vagus Nerve (ABVN):
  - **Spinal trigeminal nuclei of the medulla** and **nucleus of the solitary tract (NTS),** provides regulation of **locus coeruleus (LC)** (Vargas-Caballero et al., 2022)
  - **LC**: Adaptation of stress, panic via noradrenaline regulation
- **Transcutaneous** *auricular* vagal stimulation:
  - Pain modulation (Greif et al., 2002)
  - Obesity (Clancy et al., 2014)
  - Migraines (Luo et al., 2020)
  - Depression (Wu et al., 2018)
  - Anxiety (Usichenko et al., 2022)
  - Insomnia (Jiao et al., 2020)
  - POTS (Diedrich et al, 2021)

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Figure 20. Auricular Branch of the Vagus Nerve. Clancy et al., 2014.

Vagal Mechanism

- *Transcutaneous* vagal stimulation:
  - Alzheimer's (Vargas-Caballero et al., 2022)
    - Lowered IL-1, IL-6, TNF-a; increased: BDNF
  - Sepsis (Torres-Rosas et al., 2014)
    - Lowered TNF-a, IL-6, MCP-1 and INF-γ
- Cervical stim:
  - **PTSD** (Bremner et al., 2020)
    - Blocked IL-6 and IFN-γ from rising in stressful situations
    - Do before schedule 1 drugs?
  - **TBI** (Zhou et al., 2014)
    - TNF-α, interleukin-1β (both fell) & IL-10 (rose)
  - Both might have neuroprotective effects

Figure 20. Auricular Branch of the Vagus Nerve. Clancy et al., 2014.

Vagal Mechanism

- Peng et al., 2017: Tinnitus

<u>AcuPUNCTURE + vagal stimulation</u>

- Napadow et al, 2012:
  - Endometrial pelvic pain patients, n = 15
  - ACU + VAGUS STIM w/ exhalation phase of breathing versus non-vagal stimulation
  - Pelvic pain decreased independent of anxiety decreasing
  - Measured: respiration, ECG (QST), HRV, and heart rate
- Case study: Hyperthyroid patient
  - 30Hz cp to ~5Hz

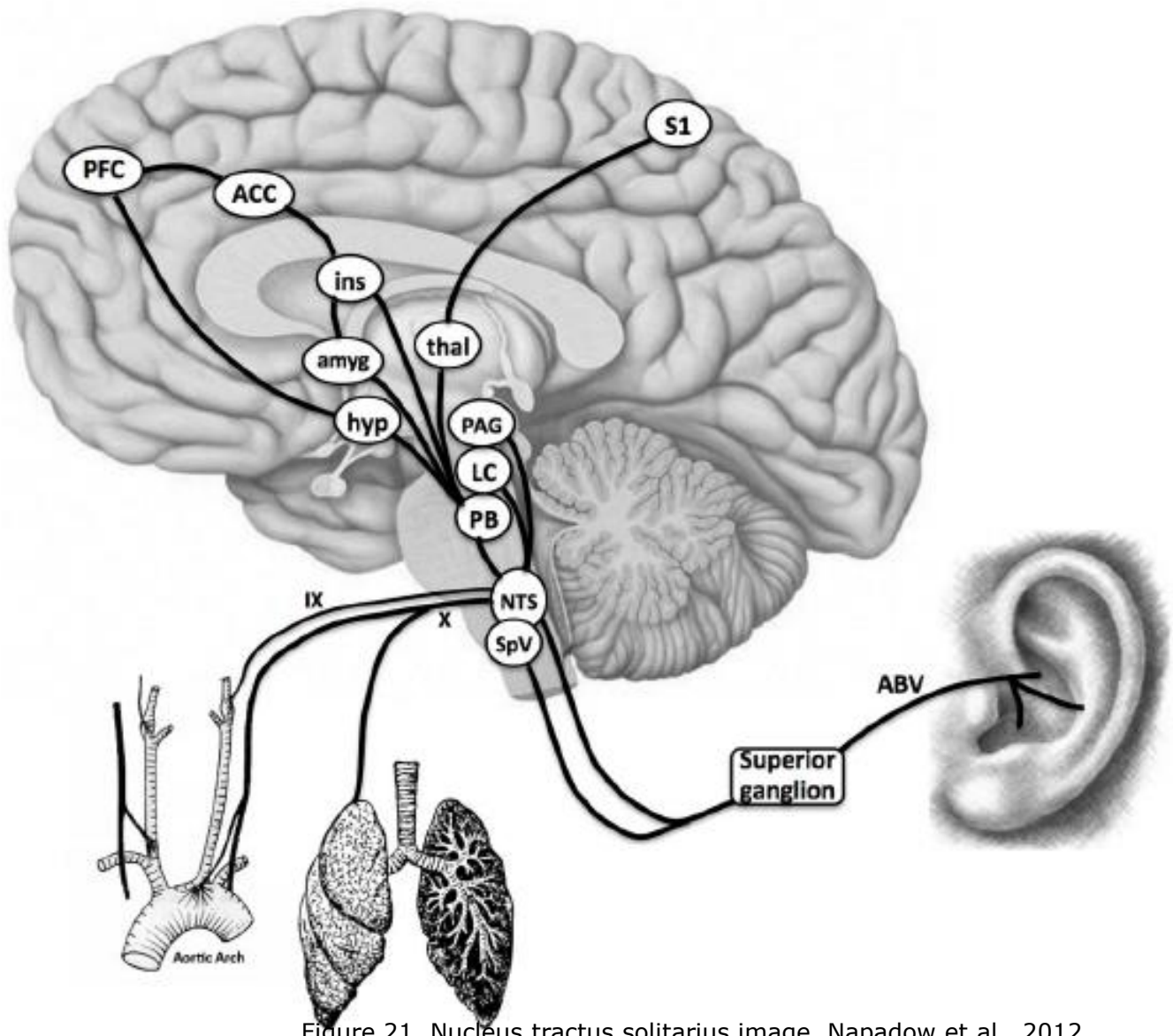

Figure 21. Nucleus tractus solitarius image. Napadow et al., 2012.

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Vagal Mechanism

<u>AcuPUNCTURE + vagal stimulation</u>

- Boehmer et al, 2020: found modest impact on HRV
- Winkler et al, 2021: somatic cell count lowered in cow mastitis
  - Love non-human studies, no placebo!

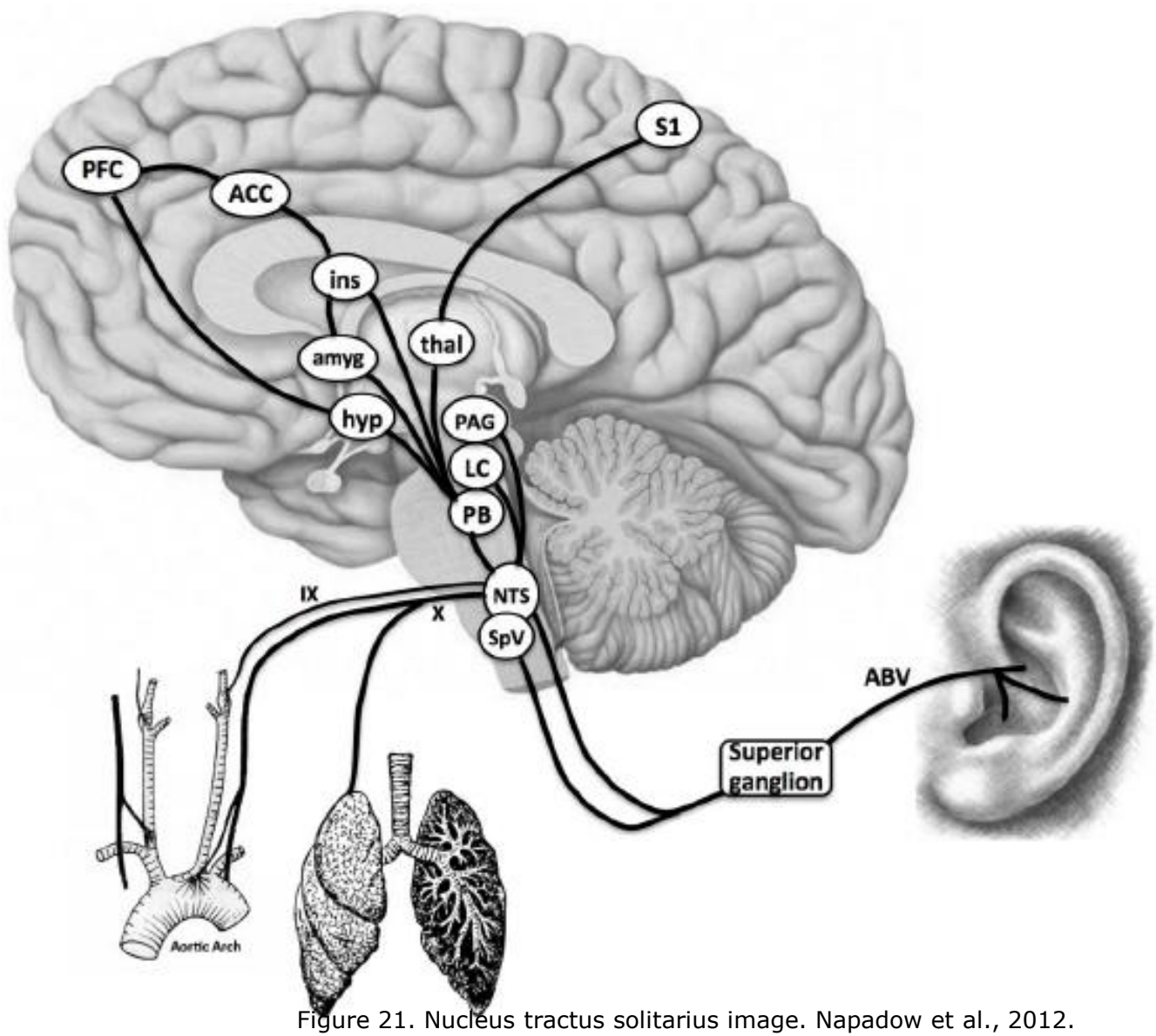

Figure 21. Nucleus tractus solitarius image. Napadow et al., 2012.

But wait! There’s more!

Vagal Mechanism

- Liu et al, 2021 in *Nature*
  - EA at ST36 lowered TNF and IL-6 via vagal adrenal axis, but not in **genetically ablated PROKR2Cre-gene** marked sensory neurons, in mice
  - Cp to ST25, an abdominal point, sympathetic reflex was activated
  - Demonstrates specificity of reactions at different regions
- Notable mention:
  - Du & Liu, 2015: EA at ST36 induced enteric neuro regeneration, rat model

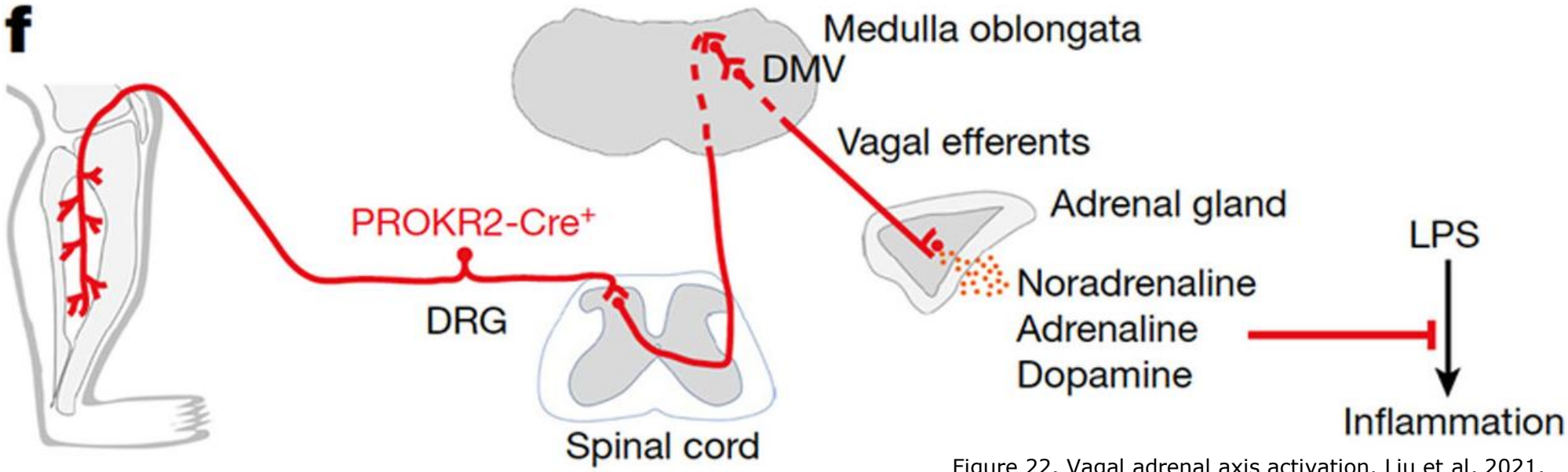

Figure 22. Vagal adrenal axis activation. Liu et al, 2021.

Why is this important?

- Can the body heal when in chronic fight/flight/freeze?
  - Full body acupuncture
  - Auricular acupuncture
  - Transcutaneous stimulation
  - Breathing exercises, i.e. qi gong, martial arts
- Body remembers emotions and higher states of being

Integrative Care & Other Translations

HENRY FORD HEALTH®

Comfortable with Translations

Classical

Complementary

Modern

CGRP

Exosomes

β-endorphin

μ-opioid receptors

δ-opioid receptors

Mast cell activation

TNF-α

Fibroblasts

Bradykinin

Histamine

Vasoactive Intestinal Peptide

ATP, ADP, AMP

Endomorphins

Cytokines: IL-1β, IL-4, IL-5, IL-13, IL-10, IL-13, IL-14, IL-34, etc

B & T lymphocytes

Substance P

BDNF

dynorphin

Changes in HRV and heart rate

monocytes/macrophages

Interferon-γ

Norepinephrine

κ-opioid receptor

Norepinephrine

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Dry Needling Translations

- Legge, 2014:
  - Dr. Janet Travell published in 1941
  - Brav & Sigmond's 1941 paper references acupuncture's role in low back and sciatic issues
- SI12 over supraspinatus MP
  - Indications, intention
- Quiz time:

A. Stuck qi in Small Intestine

B. Tendinopathy in the supraspinatus

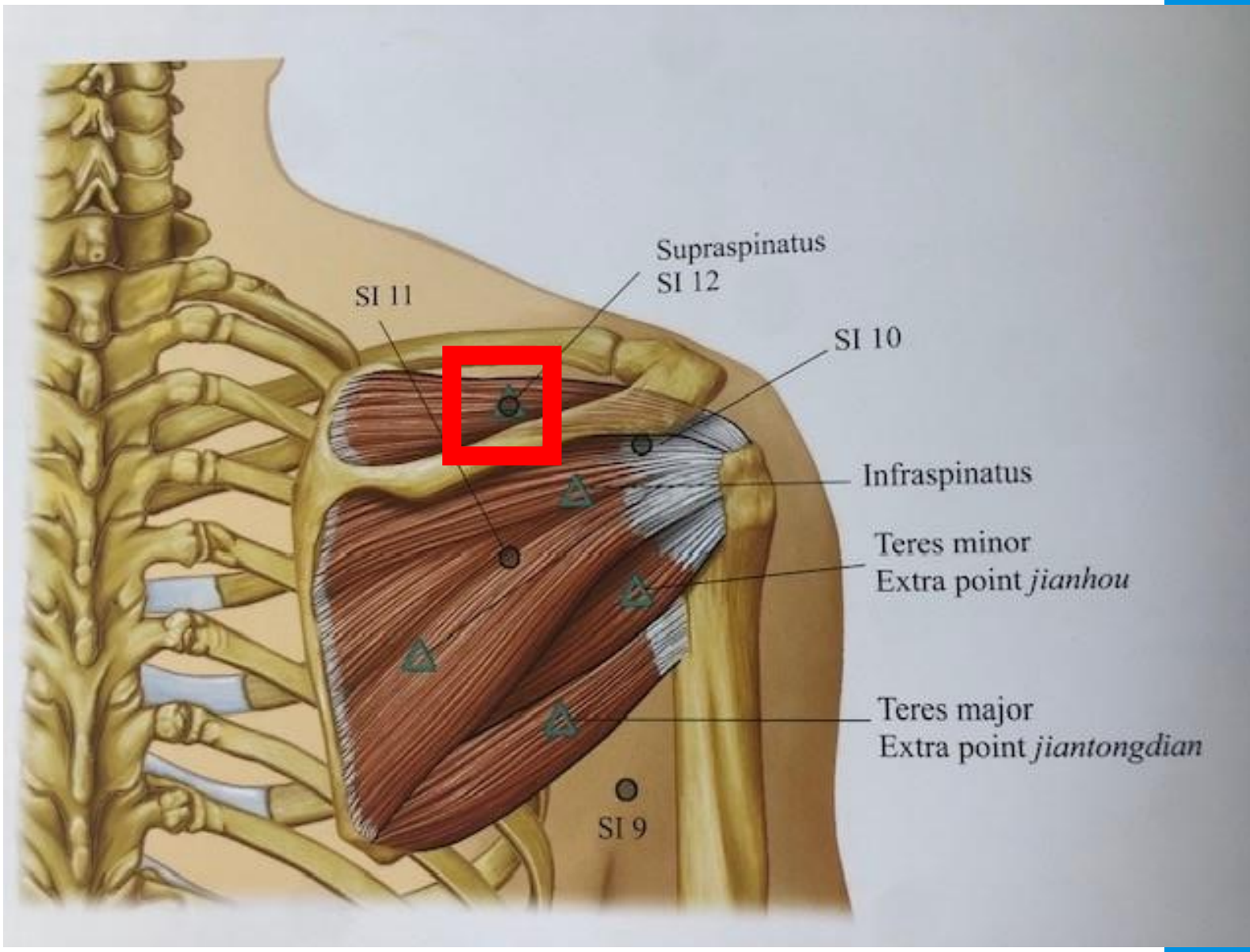


Figure 23. Scapula muscles. Callison, 2019.

Translations

- Posterior Tibial Nerve Stimulation (PTNS) for **Over Active Bladder (OAB)**:
  - Dr. McGuire developed from acupuncture techniques in **1983**
  - L4-S3 nerve root pathway:
    - PTN
    - Pelvic floor
    - Bladder sphincters
    - Bladder detrusor muscle
  - (Al-Danakh et al., 2022)
- CMS reimbursable

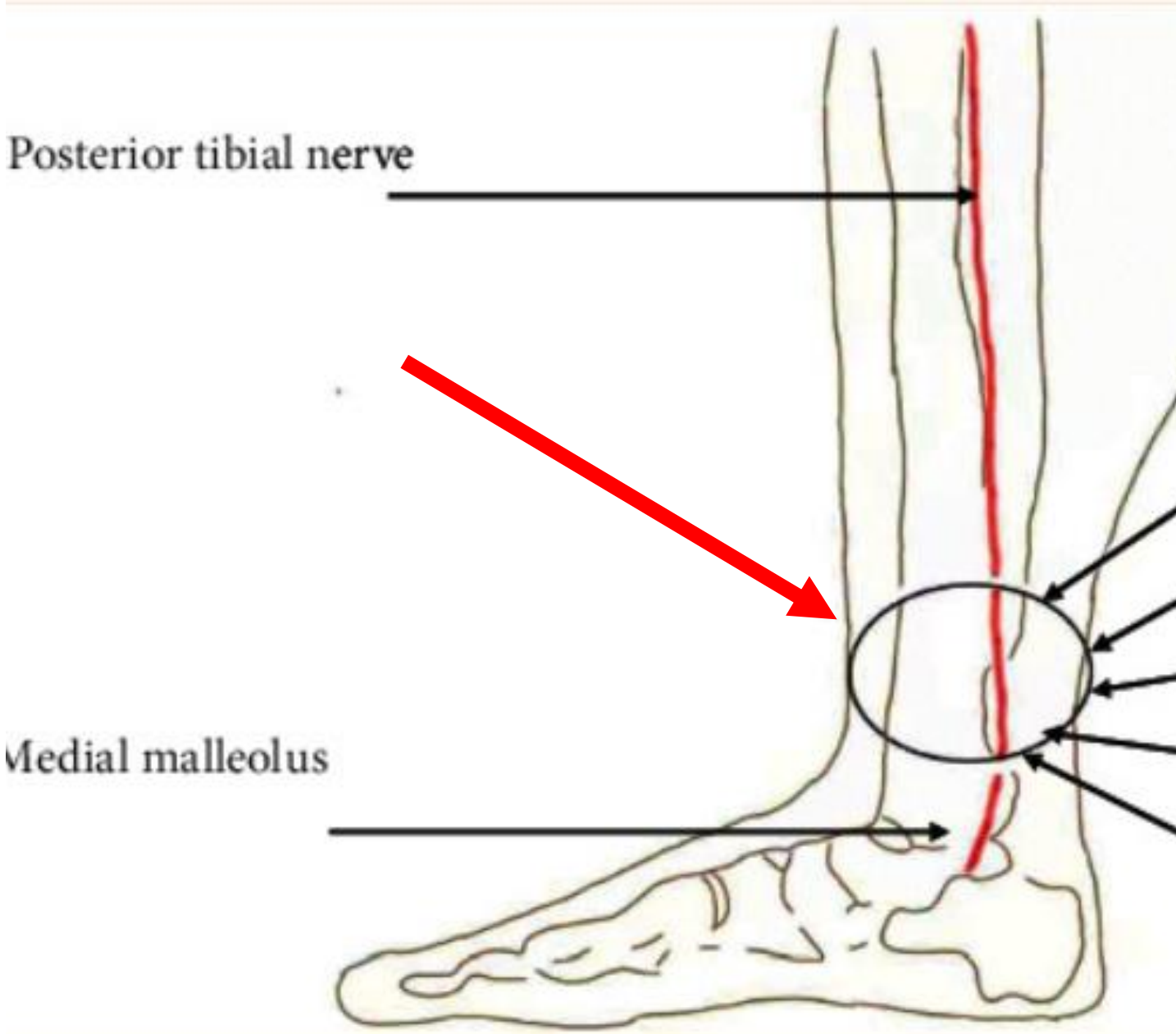
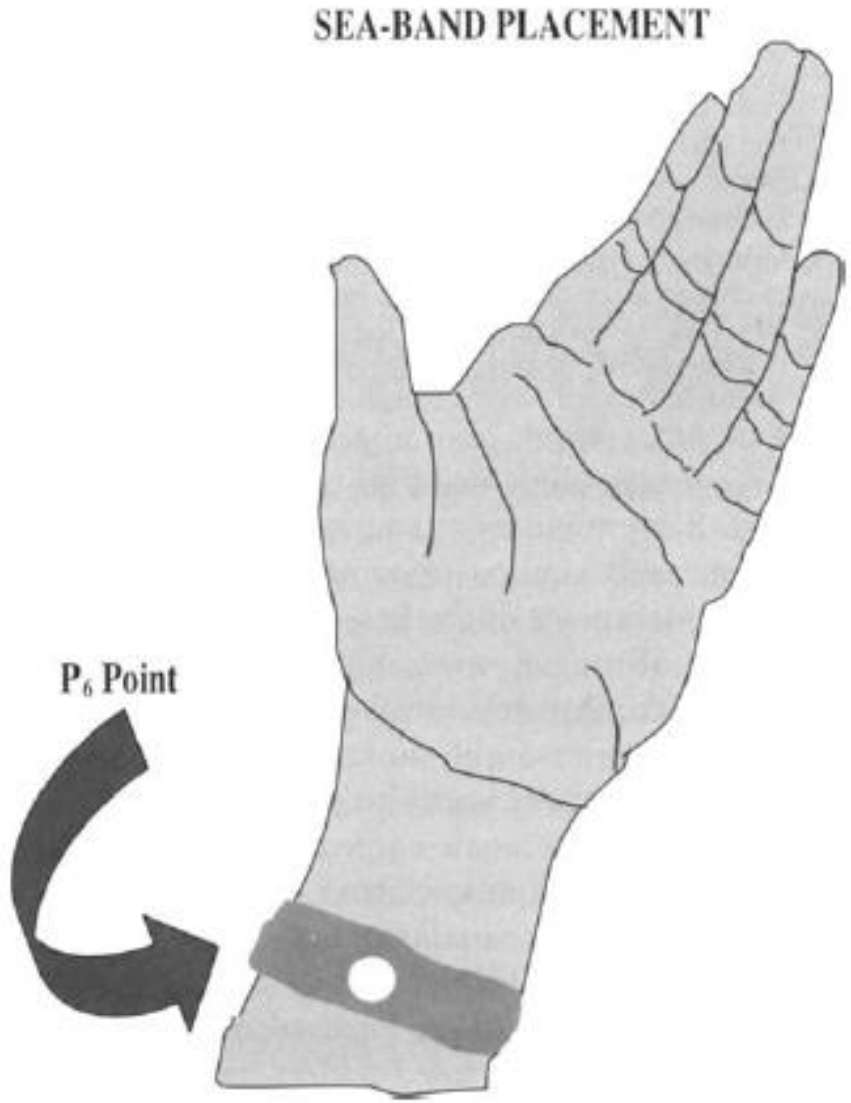


Figure 25. PTNS. Al-Danakh et al., 2022.

Translations

- Sea Bands:
  - Pericardium 6 >>> pressure on median nerve
  - **Motion sickness**, nausea, **pregnancy nausea/vomiting**, post-operative nausea, CT nausea
- Steele et al, **2001**, *Journal of Obstetric, Gynecologic, & Neonatal Nursing*

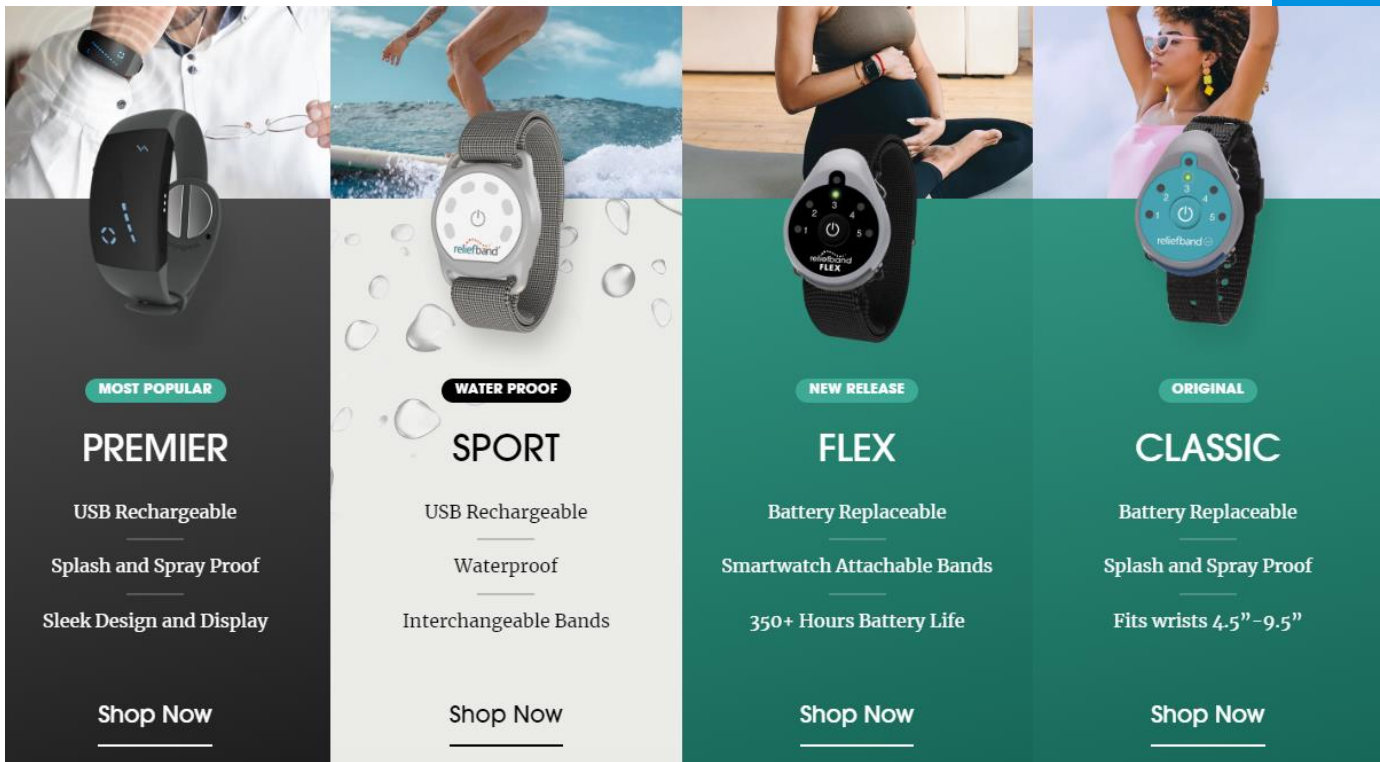
Figure 26. Sea-band placement. Steele et al, 2001.



Translations

- ReliefBand, "FDA-cleared":
  - Coloma et al., **2002**, *Anesthesiology*:
    - Acustim + Zofran = enhanced efficacy 40% vs 73%
- Bai et al., 2010, *Journal of Magnetic Resonance Imaging*:
  - Evidence of activation: "cerebellar-hypothalamus and insula"
  - Vestibular receptors and proprioceptors

Figure 27. *Reliefband device product lineup* .
Retrieved from Reliefband®



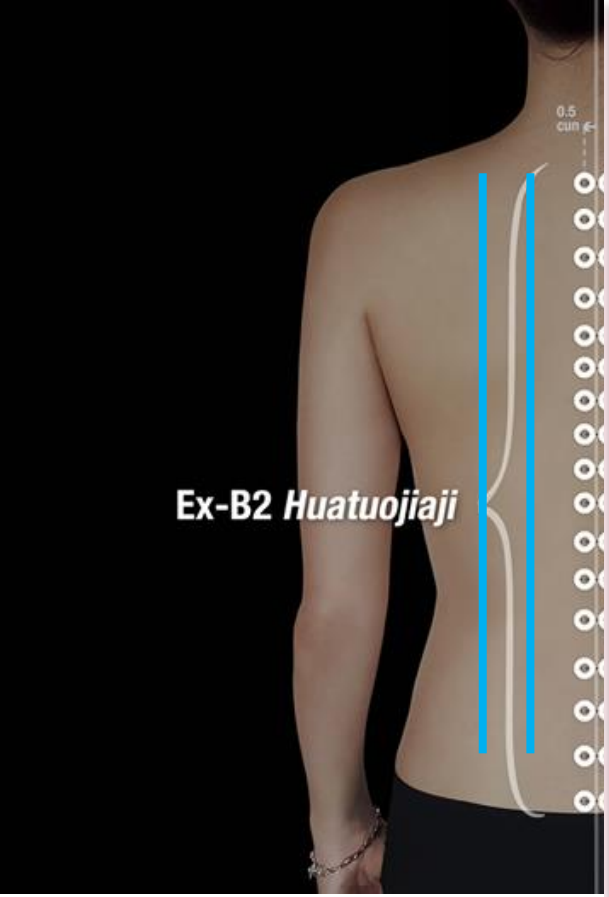


Figure 28. Hua tou jia ji point location. Retrieved from Huatuojiaji (Ex-B2) | Master Tung's Acupuncture | eLotus CORE (mastertungacupuncture.org).

Figure 29. Dorsal rami and fascial layer diagram. Chin et al, 2021.

More on acupuncture informing biomedicine…

- Society of Acupuncture Research's (SAR) White Paper, (MacPherson et al., 2016):
  - Endorphins and endogenous opioids
  - Connective tissue research
  - Placebo response:
    - Provider-patient relationship
    - ID'd biomarkers related to placebo
    - Animal studies
  - **Acupuncture devices:**
    - TENS was developed by Dr. C. Norman Shealy, MD in the 1970s
      - Later created non-penetrating devices

Looking towards future understanding

- **National Center for Complementary and Integrative Health (NCCIH)** lead by Dr. Helene Langevin
- Topological Atlas and Repository for Acupoint research (TARA):
  - "1) an acupoint ontology using both Traditional East Asian Medicine (TEAM) and conventional biological nomenclature systems,
  - 2) male and female standardized human and rat body atlases with 3D coordinate system, and
  - 3) an easily searchable database, curated by an expert committee, that contains previously published physiological data associated with acupoint stimulation."
    - (National Institutes of Health, n.d.)
- Important for future Acu research…

Summary and Safety

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QUIZ!

A. Mechanical
B. Neuro
C. Immune
D. Vagal, restore parasympathetic dominance
E. All the above
F. All that we don’t yet know

Key Takeaways

- We HAVE evidence to show effect!
- Difficult to translate when speaking different languages
- Hormetic, adaptive, regenerative, salutogenic
- Durability of symptom relief if systemic changes happen
- Don’t wait to refer when traditional therapies are refractory

Patient Responsiveness

- Various:
  - Age, general health and established lifestyle
  - Complexity of history
  - Medications: Hurdle OR Synergistically
  - Might not be the right therapy for the patient at this given time
  - MS and erythromelalgia px
  - Don’t let this stop you from considering acu, we never know how someone responds until after a few treatments

Safety

- Adverse events are **low** (Chan et al., 2017, *Scientific Reports, Nature)*
  - Auricular Vagal
    - Could benefit heart failure pts: Boosts Nitric Oxide & enhanced peripheral perfusion (Kaniusas et al., 2019)
- Cautions:
  - Pregnancy, certain points avoided
  - Post surgical timeframe varies
- Contraindications:
  - Pacemaker or implanted stimulators, will avoid EA but manual acu is fine

Pricing & Insurance

- Cash rates: $139 initial
  - $88 for follow up / $440 for 6 visits
- Smoking package: 5 for $200
- Insurances:
  - Private health plans might have benefits, in- and out- of network
  - Superbills
  - VA, WC, MVA
  - Medicare

Learn More

- National Center for Complementary and Integrative Health
  - www.nccih.nih.gov
- Acupuncture Now Foundation
  - www.acunow.org
- Acupuncture Evidence Project, full report:
  - https://acupuncture.org.au/publicassets/1c94b136-802d-ed11-9115-00505687f2af/Acupuncture-Evidence-Project_Mcdonald-and-Janz_-Revised-Edition-07-02-17-Referenced.pdf
- *Neuropuncture: A Clinical Handbook of Neuroscience Acupuncture*
  - By Michael Corradino
- *The Web That Has No Weaver* by Ted Kaptchuck

Thank you

mkulas1@hfhs.org

- Sit up straight
- Eat your vegetables
- Get enough sleep and water
- Call a loved one

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