Herzratenvariabilität in der Schmerzphysiotherapie

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PÄDAGOGISCHE HOCHSCHULE KÄRNTEN

OLYMPIAZENTRUM KÄRNTEN

KÄRNTEN University of Applied Sciences

… The International Association for the Study of Pain (IASP) definiert Schmerz als:

"An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage,"
(Raja et al., 2020)
www.iasp-pain.org


The revised International Association for the Study of Pain ... : PAIN

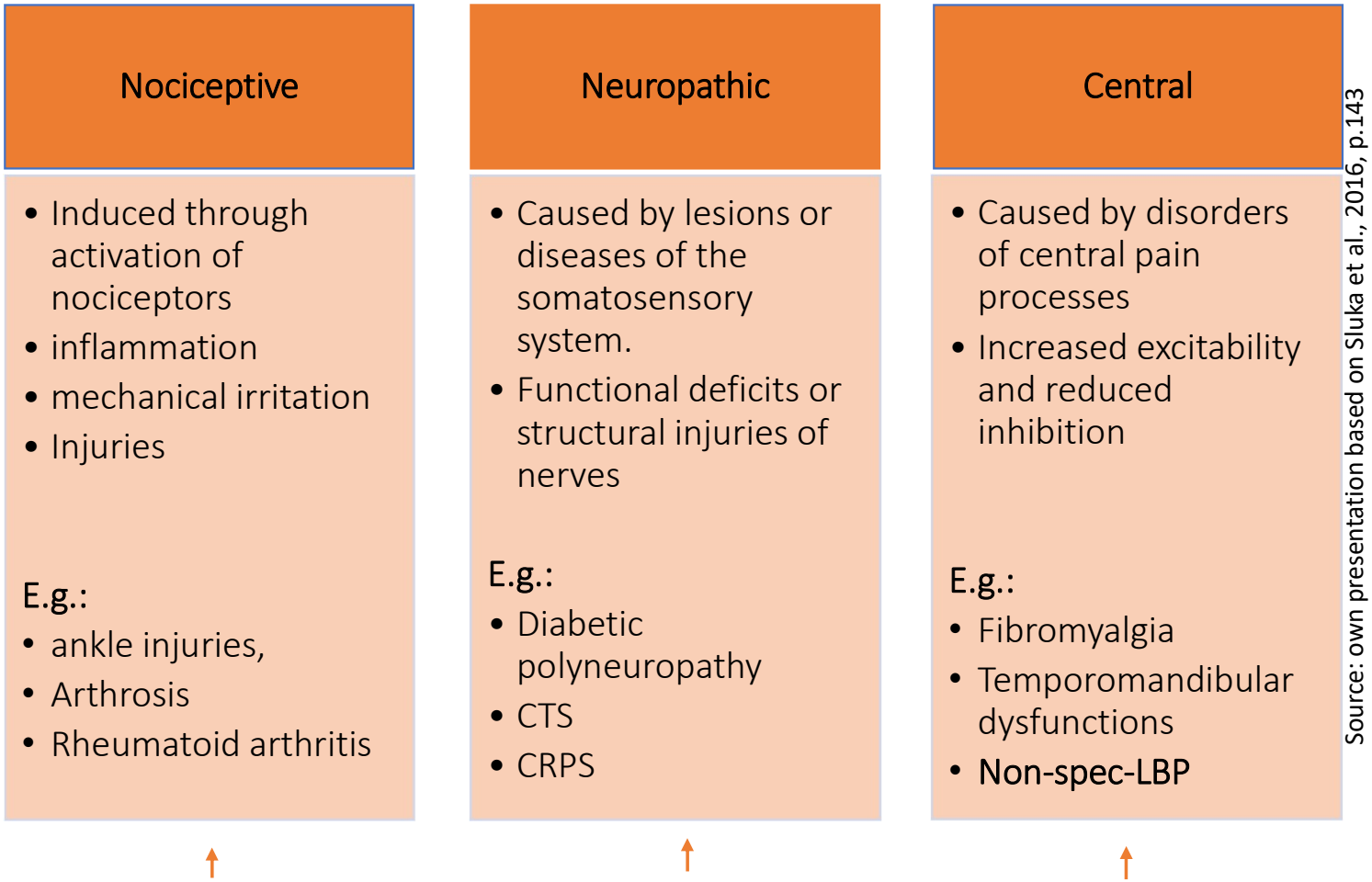
The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises

Raja, Srinivasa N.[a,*]; Carr, Daniel B.[b]; Cohen, Milton[c]; Finnerup, Nanna B.[d,e]; Flor, Herta[f]; Gibson, Stephen[g]; Keefe, Francis J.[h]; Mogil, Jeffrey S.[i]; Ringkamp, Matthias[j]; Sluka, Kathleen A.[k]; Song, Xue-Jun[l]; Stevens, Bonnie[m]; Sullivan, Mark D.[n]; Tutelman, Perri R.[o]; Ushida, Takahiro[p]; Vader, Kyle[q]

Author Information

PAIN: September 2020 - Volume 161 - Issue 9 - p 1976-1982

Schmerzkategorien der IASP:



Source: own presentation based on Sluka et al., 2016, p.143

akut – 6 W,
subakut 6 – 12 W,
chronisch >3 Monate

… The International Association for the Study of Pain (IASP) und die ICD – 11 definieren „chronischen Schmerz“ als:

The definitions listed here can be accessed in the ICD-11. ICD-11 is licensed under the CC BY-ND 3.0 IGO, or the "ICD-11 License", available here.

Reference: International Classification of Diseases, Eleventh Revision (ICD-11), World Health Organization (WHO) 2019/2021 https://icd.who.int/browse11. Licensed under Creative Commons Attribution-NoDerivatives 3.0 IGO licence (CC BY-ND 3.0 IGO).

Chronic pain is pain that persists or recurs for longer than 3 months. Such pain often becomes the sole or predominant clinical problem in some patients. As such it may warrant specific diagnostic evaluation, therapy and rehabilitation. Chronic pain is a frequent condition, affecting an estimated 20% of people worldwide. It is multifactorial: biological, psychological and social factors contribute to the pain syndrome.

To learn more about chronic pain and the ICD-11 chronic pain classification in general, see Treede et al., 2019.

MG30 Chronic pain

MG30.0 Chronic primary Pain

MG30.1 Chronic cancer related pain

MG30.2 Chronic postsurgical or post traumatic pain

MG30.3 Chronic secondary musculoskeletal pain

MG30.3 Chronic secondary visceral pain

MG30.5 Chronic neuropathic pain

MG30.6 Chronic secondary headache or orofacial pain

https://www.iasp-pain.org/advocacy/definitions-of-chronic-pain-syndromes/

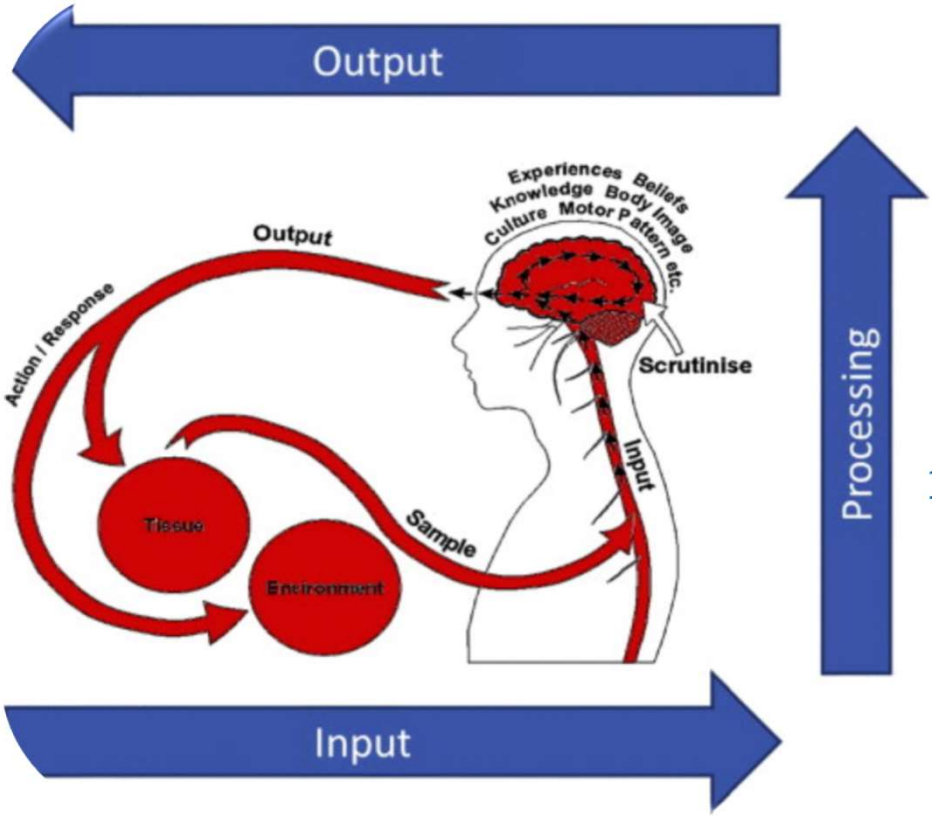
… Bio-Psycho-Soziale-Modelle:

MG30.0 Chronic primary Pain

Chronic primary pain is chronic pain in one or more anatomical regions that is characterized by significant emotional distress (anxiety, anger/frustration or depressed mood) or functional disability (interference in daily life activities and reduced participation in social roles). Chronic primary pain is multifactorial: biological psychological and social factors contribute to the pain syndrome. The diagnosis is appropriate independently of identified

https://www.iasp-pain.org/advocacy/definitions-of-chronic-pain-syndromes/

Mature-Organism-Modell
(Gifford)



Source: http://www.aaronswansonpt.com/wp-content/uploads/2012/11/Gifford-1998-Pain-Mechanisms.jpg ; 26.09.21

…Bio-Psycho-Soziale-Modelle:

Source: mod.n. www.pexels.com, 2021

Consequence 1:

- How can we get things out of your cup?

Consequence 2:

- How can we make your cup bigger?

What‘s in your Cup? Identify your SIMS & DIMS

SIMS:

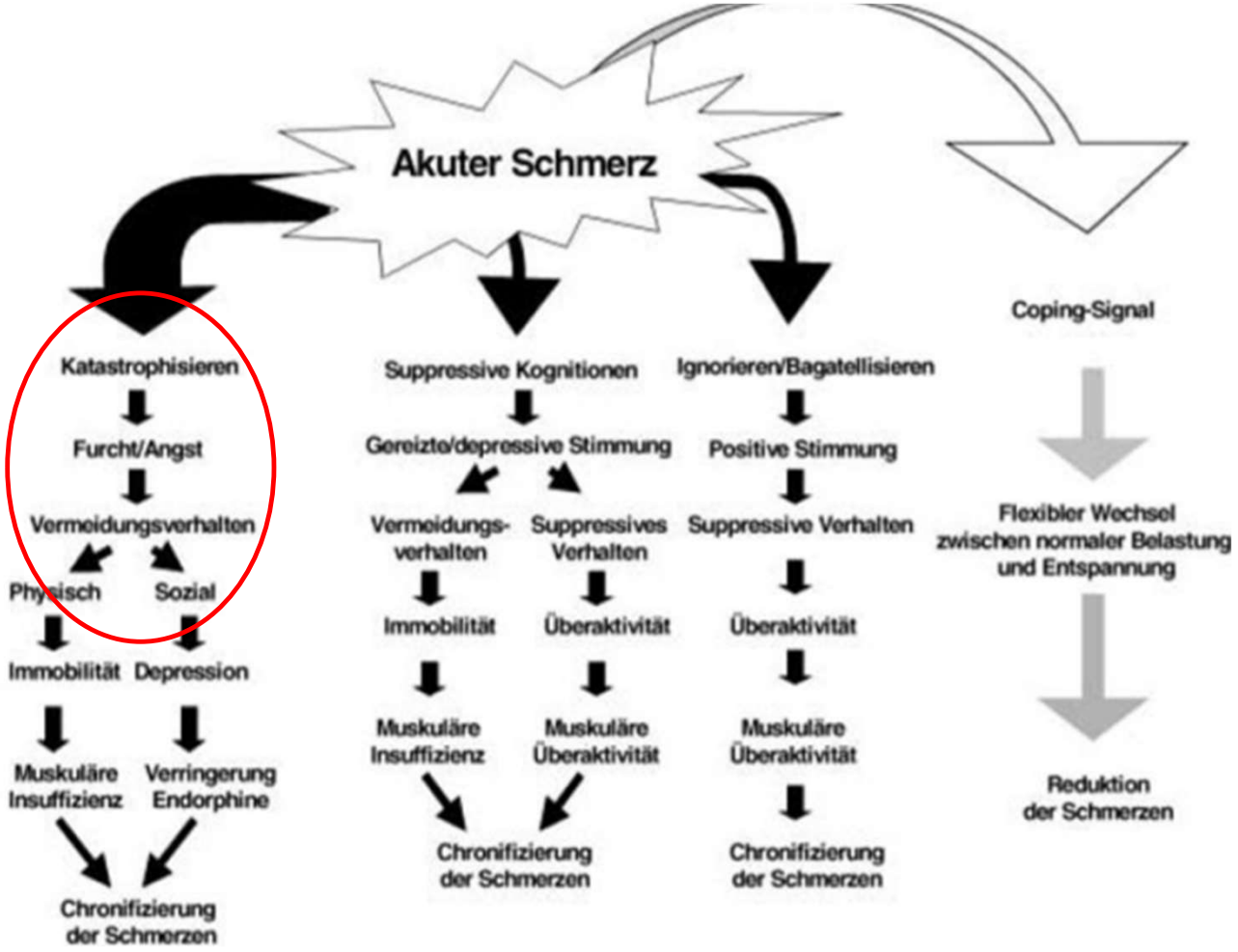
-
-
-
-
-
-

Things you hear, see, touch, taste
What you do
What you say
Who you think you believe
Places where you are and where you go
People you meet and who surround you
Things that happen in your body

DIMS:

-
-
-
-
-
-

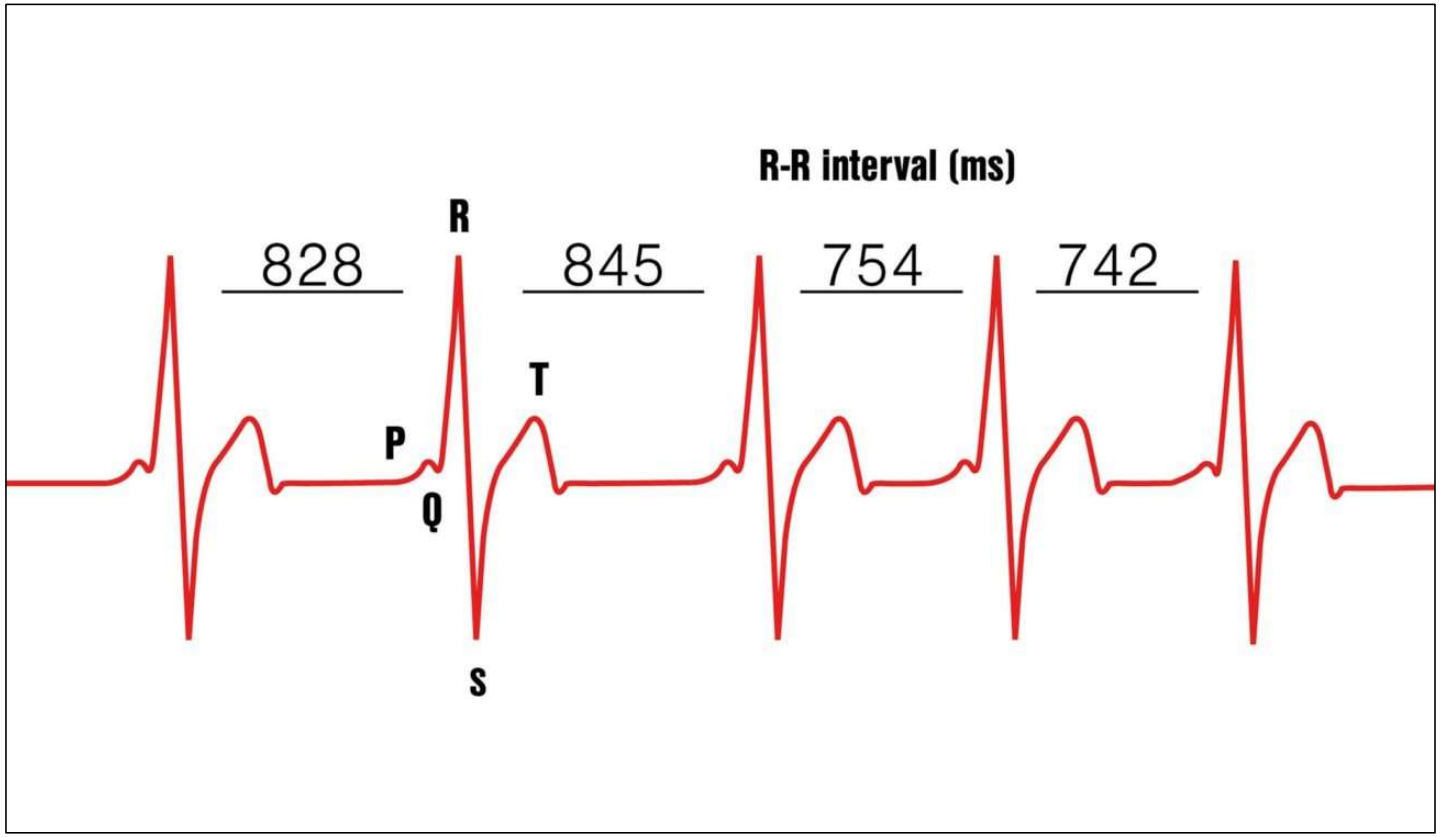
Wege von akuten zu chronischen Schmerzen:



Source: mod.n. Horel, 2019, p.7 – based on the Avoidance Endurance model n. Hasenbring (2000)

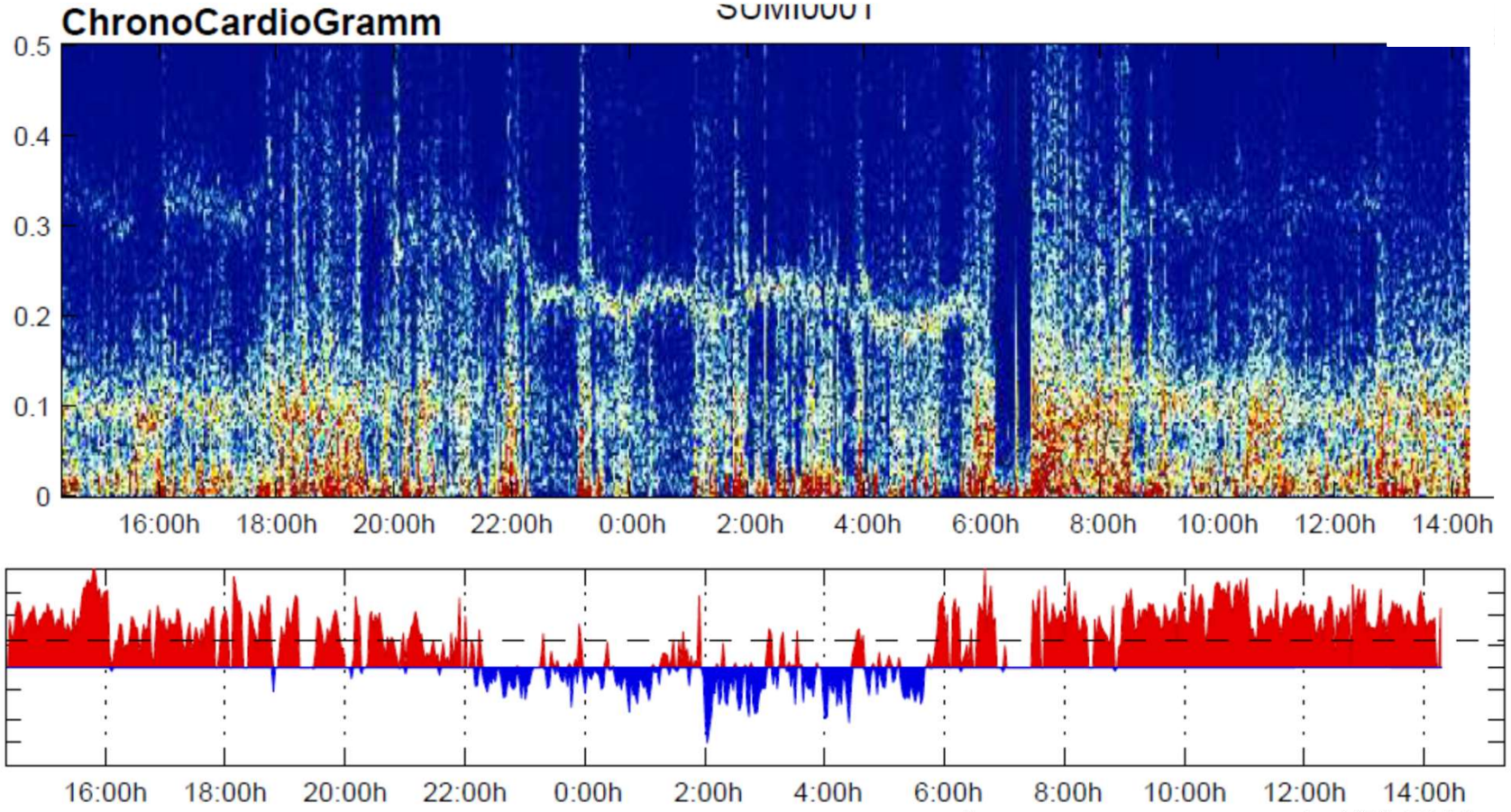
Fear-Avoidance
↓
Graded Exposure

... Schmerzphysiologie & das vegetative Nervensystem - Messung der Herzratenvariabilität:



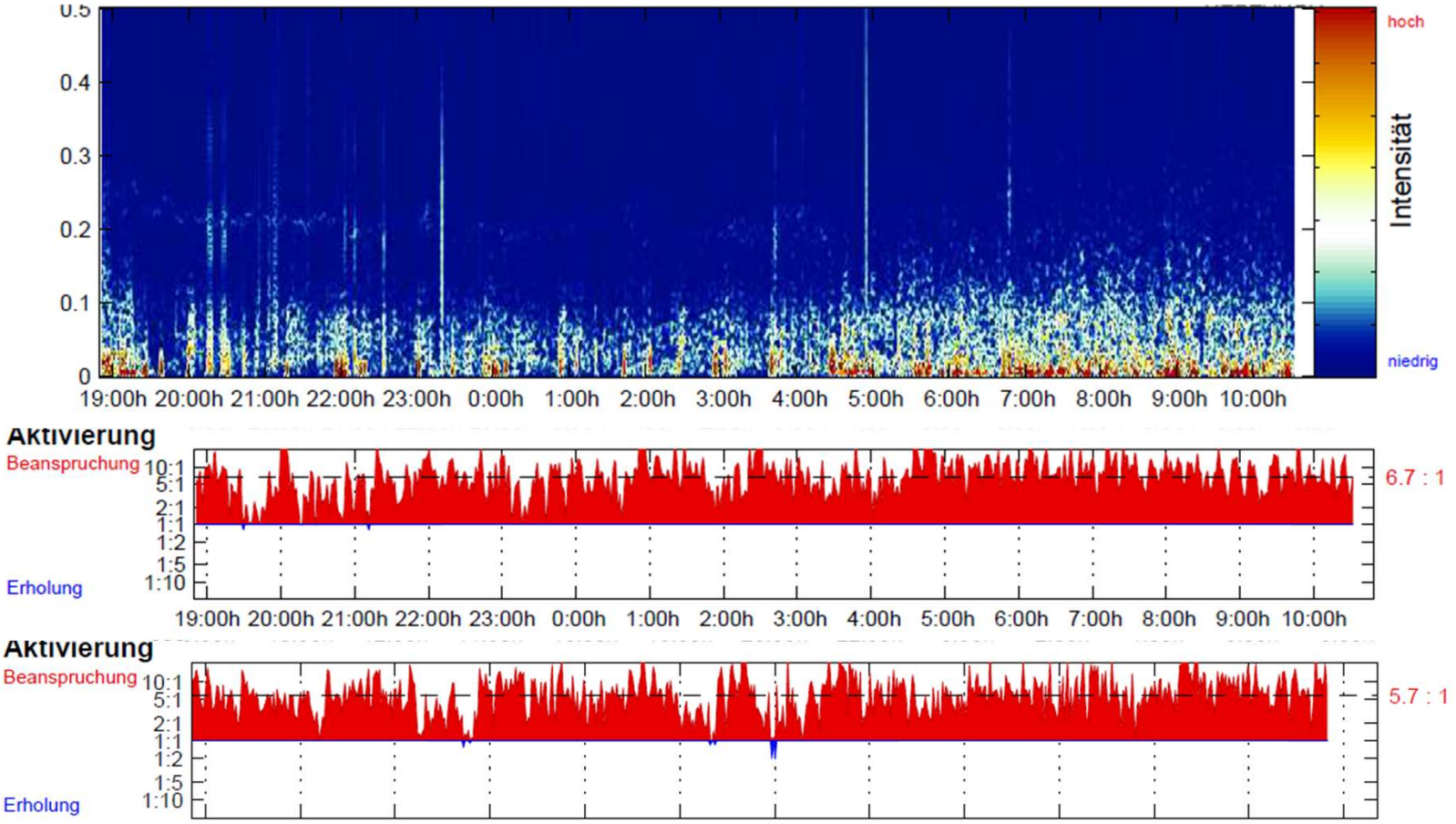
- Ein wichtiger Marker ist der SD+-
- Ein hoher SD repräsentiert die parasympathische Aktivität
- Ein kleiner SD stellt die sympathische Aktivität dar

... Schmerzphysiologie & das vegetative Nervensystem - Messung der Herzratenvariabilität:



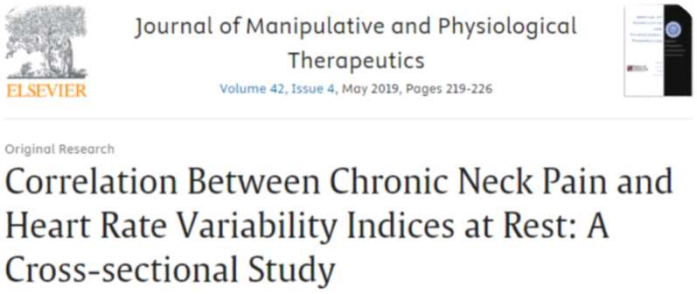
Source: own measurement - HRI, 2014

... Schmerzphysiologie & das vegetative Nervensystem
- Messung der Herzratenvariabilität:



Quelle: Privat; HRI, 2015

... Schmerzphysiologie & das vegetative Nervensystem



- Blinded cross-sectional study with 15 chronic neck pain and 15 healthy sedentary participants aged 18-45.
- Pain assessed using Numerical Rating Scale (NRS), Neck Disability Index, Catastrophic Thoughts about Pain Scale, and Tampa Scale of Kinesiophobia.
- Significant correlations found between NRS, Neck Disability Index, Catastrophic Thoughts about Pain Scale, and HRV indices ($p < .05$, $r \geq 0.362$).
- Worse HRV indices associated with more intense and disabling neck pain.
- HRV indices significantly associated with pain intensity, disability, and catastrophizing in chronic neck pain individuals (de-Araújo et al., 2019)

... Schmerzphysiologie & das vegetative Nervensystem

HHS Public Access
Author manuscript
J Pain. Author manuscript; available in PMC 2021 March 01.

Published in final edited form as:
J Pain. 2020 ; 21(3-4): 306–323. doi:10.1016/j.jpain.2019.07.003.

The role of heart rate variability in mindfulness-based pain relief

- Increased parasympathetic nervous system (PNS) activity is linked to pain relief with cognitive manipulations.
- Study aimed to assess role of high-frequency heart rate variability (HF HRV) during mindfulness vs. sham-mindfulness pain relief.
- Thermal stimulations applied before and after training. Pain intensity and unpleasantness ratings collected.
- Primary analysis showed higher HF HRV associated with lower pain unpleasantness during mindfulness vs. sham-mindfulness. No significant difference in pain intensity ratings.
- Secondary analysis found both meditations reduced pain ratings, decreased respiration rate, and increased HF HRV. (Adler-Neal et al., 2019)

... Schmerzphysiologie & das vegetative Nervensystem

Scand J Pain 2021; 21(3): 426–433 DE GRUYTER

Systematic Review

Pamela M. Bandeira, Felipe J.J. Reis*, Vanessa C.C. Sequeira, Anna C.S. Chaves, Orlando Fernandes, Jr. and Tiago Arruda-Sanchez

Heart rate variability in patients with low back pain: a systematic review

- Sys.Rev on non-specific CLBP patients, age 18-65, comparison with healthy controls.
- Just two studies meeting inclusion criteria,
- Main findings: CLBP patients show significant reduction in HRV with sympathetic predominance.
- Conclusions: Limited evidence suggests lower vagal activity evidenced by HRV in CLBP patients compared to healthy controls.
- Further research needed to explore HRV parameters as a useful measure in chronic pain and as an outcome in clinical trials focusing on emotion regulation interventions (Bandeira et al., 2021)

... Schmerzphysiologie & das vegetative Nervensystem

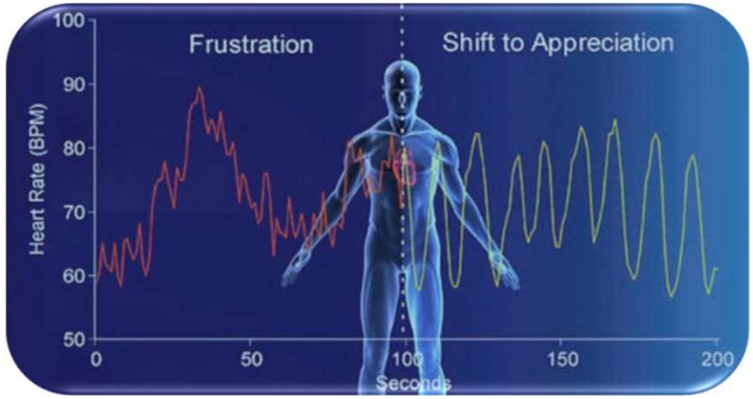
- Case-control study with 47 CLBP participants and 47 asymptomatic individuals.
- Passive visualization task using 27 pictures from PHODA. (Photograph Series of Daily Activities)
- HRV frequency domains measured before, during, and after the task.
- Pressure pain threshold and intensity measured before and after the task.
- Statistically significant differences in HRV frequency domains during visualization task.
- Decrease in pressure pain threshold and increase in pain intensity after task in CLBP group.
- HRV reflects perceptions of threat and safety.
- CLBP participants showed changes in sympathovagal balance, higher pain sensitivity, and intensity during passive visualization of daily activity pictures. (Bandeira et al., 2021)

... Schmerzphysiologie & das vegetative Nervensystem

- Purpose: Compare heart rate variability (HRV) responses at rest in adults with chronic musculoskeletal pain to healthy controls.
- 20 studies of poor-to-moderate quality met inclusion criteria out of 4893 screened.
- Findings suggest increased sympathetic and decreased parasympathetic modulation in adults with musculoskeletal pain compared to controls.
- Conclusions: Adults with musculoskeletal pain show decreased HRV compared to controls, but evidence is heterogeneous and of moderate quality. (Rampazo et al., 2024).

Möglichen Anwendungsfelder von HRV-Messungen:

- zum Monitoring
- zur Individualisierung von pot. Behandlungsansätzen
- als Feedbacksystem
- zur Evaluierung



Mögliche Atemübungen zur HRV-Optimierung:

FACHHOCHSCHULE KÄRNTEN

Boxatmung oder 4-2-6-Atemtechnik:

- Atmen Sie tief in den Bauch ein und zählen Sie bis vier.
- Halten Sie den Atem für zwei Sekunden.
- Atmen Sie langsam aus und zählen Sie dabei bis sechs.
- Wiederholen Sie diese Übung für fünf bis zehn Minuten täglich.

Die 4-7-8-Atmung:

- Atmen Sie ruhig durch die Nase ein und zählen Sie dabei bis vier.
- Halten Sie den Atem an und zählen Sie bis sieben.
- Atmen Sie komplett durch den Mund aus, während Sie bis acht zählen.
- Wiederholen Sie den Zyklus drei bis viermal.

Wechselatmung:

- Schließen Sie das rechte Nasenloch mit dem rechten Daumen.
- Atmen Sie tief durch das linke Nasenloch ein.
- Schließen Sie dann das linke Nasenloch mit den Fingern und atmen Sie durch das rechte Nasenloch aus.
- Atmen Sie durch das rechte Nasenloch ein, schließen Sie es, und atmen Sie durch das linke aus.
- Wiederholen Sie dies für mehrere Minuten. (https://www.gesundheits-lexikon.com/Therapie/Biofeedback-und-physiologische-Kontrolle/Heart-Rate-Variability-HRV-Training; Zugriff am 16.09.2024)

Mögliche Entspannungsübungen zur HRV-Optimierung:

FACHHOCHSCHULE KÄRNTEN

Geführte Visualisierung

- Konzentrieren Sie sich auf Ihre Atmung und versuchen Sie, Ihren Herzschlag zu spüren. Visualisieren Sie eine beruhigende Szene, wie einen ruhigen Wald oder Strand.
- Blue-Sky-Übung

Body-Scan-Meditation:

- Lenken Sie Ihre Aufmerksamkeit langsam durch Ihren Körper, beginnend bei den Füßen und endend am Kopf. Achten Sie dabei auf jede Empfindung, ohne zu urteilen oder zu versuchen, etwas zu ändern.

Mindfulness-Meditation:

- Konzentrieren Sie sich vollends auf den gegenwärtigen Moment, indem Sie Ihre Aufmerksamkeit auf Ihren Atem lenken oder ein Mantra wiederholen. Wenn Gedanken aufkommen, erkennen Sie diese an und lenken Sie Ihre Aufmerksamkeit sanft zurück auf den Atem oder das Mantra. (https://www.gesundheits-lexikon.com/Therapie/Biofeedback-und-physiologische-Kontrolle/Heart-Rate-Variability-HRV-Training; Zugriff am 16.09.2024)

Hilfreiche Links und weitere Tipps:

FACHHOCHSCHULE KÄRNTEN

Physiologie und Wirkmechanismen:

- https://www.neuropsychiater.ch/blog/2021/6/06/herzratenvariabilitaet

Weitere Übungen und Lifestylemodifikation:

- https://xn--hrv-herzratenvariabilitt-dcc.de/2019/09/mit-einfachen-uebungen-die-hrv-verbessern/

HRV im sportlichen Training:

- https://www.marathonfitness.de/herzfrequenzvariabilitaet-verbessern-hrv/

Integration in den physiotherapeutischen Prozess:

Box 2 Consistent recommendations across musculoskeletal (MSK) pain conditions

1. Care should be patient centred. This includes care that responds to the individual context of the patient, employs effective communication and uses shared decision-making processes.
2. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions.
3. Assess psychosocial factors.
4. Radiological imaging is discouraged unless:
   i. Serious pathology is suspected.
   ii. There has been an unsatisfactory response to conservative care or unexplained progression of signs and symptoms.
   iii. It is likely to change management.
5. Undertake a physical examination, which could include neurological screening tests, assessment of mobility and/or muscle strength.
6. Patient progress should be evaluated including the use of outcome measures.
7. Provide patients with education/information about their condition and management options.
8. Provide management addressing physical activity and/or exercise.
9. Apply manual therapy only as an adjunct to other evidence-based treatments.
10. Unless specifically indicated (e.g. red flag condition), offer evidence-informed non-surgical care prior to surgery.
11. Facilitate continuation or resumption of work.

Source & Link: Lin et al., 2020; https://bjsm.bmj.com/content/bjsports/54/2/79.full.pdf

Thanks for listening

FH Kaernten - Gesundheitscampus

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9020 Klagenfurt am Wörthersee

https://www.fh-kaernten.at/en/study-program/health-sciences-and-social-work/bachelor/physiotherapy

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