Statens arbeidsmiljøinstitutt

Smertefysiologiske målinger – klinisk nytte

Dagfinn Matre
forsker, PhD
Avd for arbeidspsykologi og -fysiologi
Statens arbeidsmiljøinstitutt

Statens arbeidsmiljøinstitutt (STAMI)

Avdeling for arbeidspsykologi og –fysiologi	
Gruppe for arb.relaterte muskelskj.lidelser	Gr. for org.og psykososialt arb.miljø
Avd.dir: Stein Knardahl 7 forskere, 12 studenter/-stipendiater, 4 ingeniører/rådgivere	

- Det nasjonale forskningsinstituttet på arbeidsmiljøområdet, underlagt Arbeidsdepartementet
- Budsjett på ca. 115 mill. pr. år; ~85% grunnbevilgning
- Ca. 120 ansatte, tverrfaglighet; Medisinere, naturvitere, samfunnsvitere, personell i støttefunksjoner
- 35 ansatte med dr.grad, 15 pågående dr.gradsstipendiater
- Faglig og strategisk rådgiver og samarbeidspartner for Arbeidstilsynet og Petroleumstilsynet

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Forskning ved STAMI

Eksponeringer

Kjemiske
Biologiske
Fysiske
Psykologiske
Sosiale
Organisatoriske

Standardisert kvantifisering av eksponering

Mekanismer

Psykologiske + Biologiske mekanismer

Konsekvenser

Helse (eks smerter)
Sykefravær
Arbeidsevne
Uførhet

Standardiserte smertefysiologiske målinger

Smertefysiologiske målinger

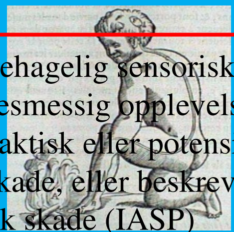
Frisk person

Kronifisering

Psykologiske og sosiale faktorer

Forventning, 'pain beliefs', 'stress', katastrofetenking, distraksjon, krav,

Smerte

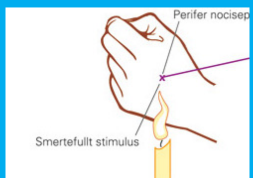


En ubehagelig sensorisk eller følelsesmessig opplevelse assosiert med faktisk eller potensiell vevsskade, eller beskrevet i former for slik skade (IASP)

René Descartes

Aktivering av nociseptorer

Aδ og C-fibre



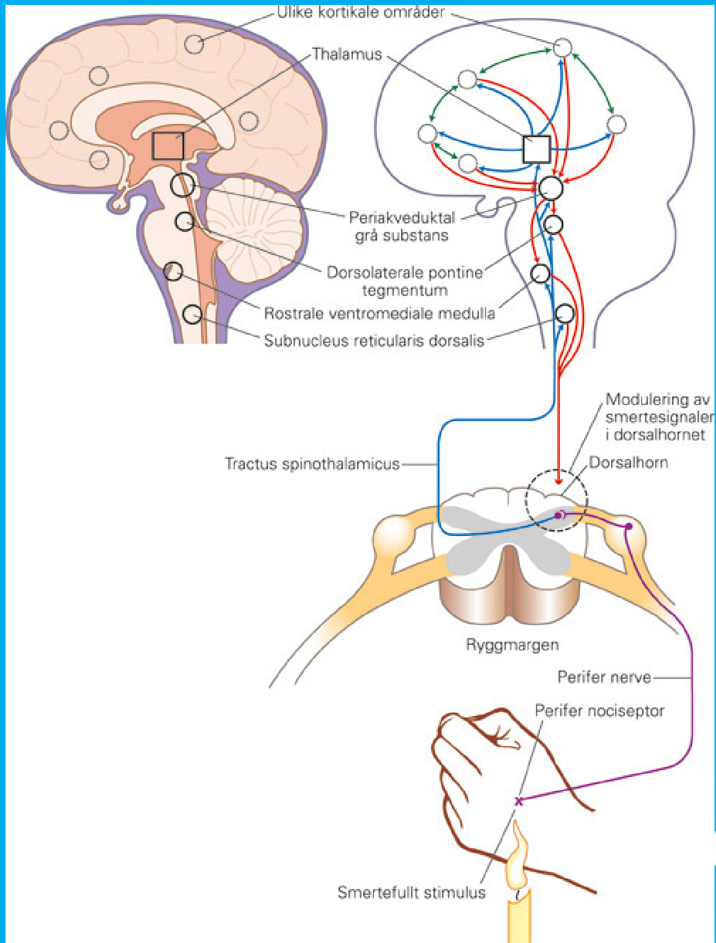
Psykologiske og sosiale faktorer ?

Smerte

Individuell sårbarhet

Aktivering av nociseptorer ?

Smertefysiologi



Nedadstigende baner (smertemodulering)

Oppadstigende baner (nocisepsjon)

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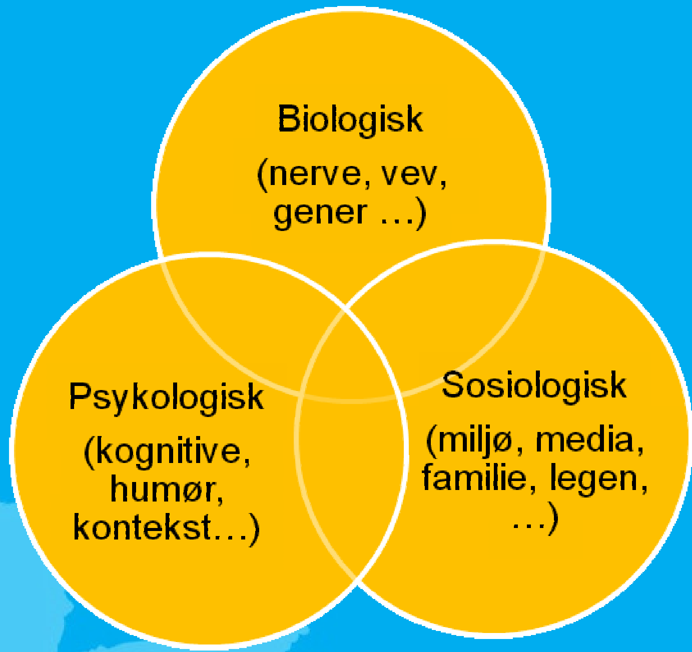
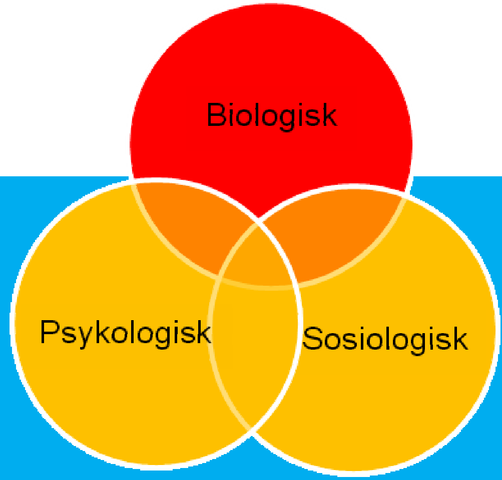
Utfordringer med smerte

- Forstå hvordan smertesystemet fungerer ved aktivering av perifere reseptorer
  - A-deltafibre
  - C-fibre
- Forstå hvordan smerteoppfattelsen moduleres av andre faktorer
  - Psykologiske forhold (f.eks. arb.miljø)
  - Sosiale forhold
- En biopsykososial modell



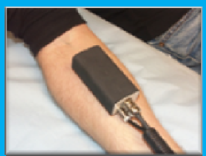
- Smertefysiologiske målinger nyttig verktøy

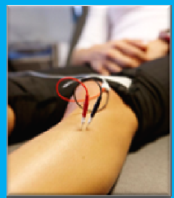
Eksperimentelle smertemodeller

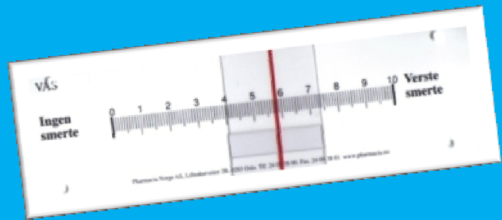


- Standardisert aktivering av nociceptorer
- Standardisert måling av respons

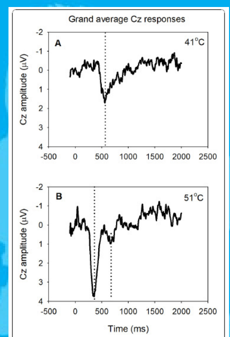
Stimulus → **Smerte** → Respons







Psykofysiologiske utfallsmål



Nevrofysiologiske utfallsmål

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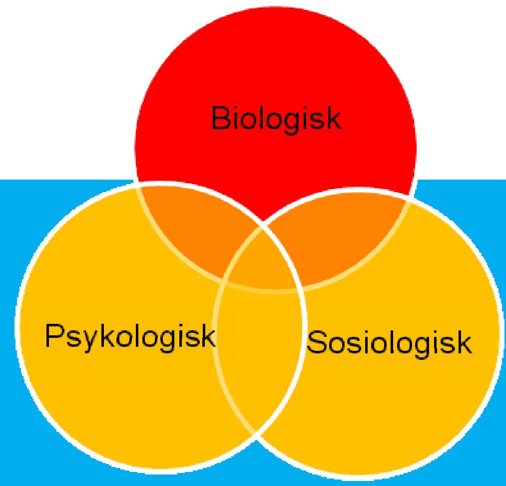
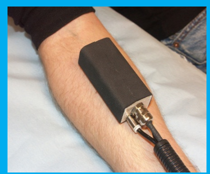
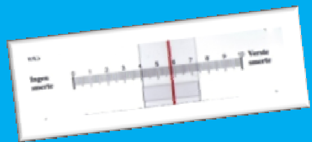
Stor variasjon i opplevd smerte





46°C

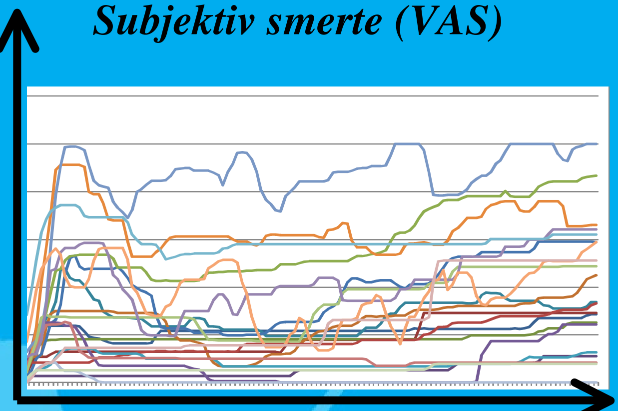
5 min



Subjektiv smerte

Subjektiv smerte (VAS)

10

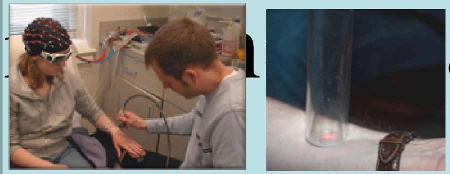


0

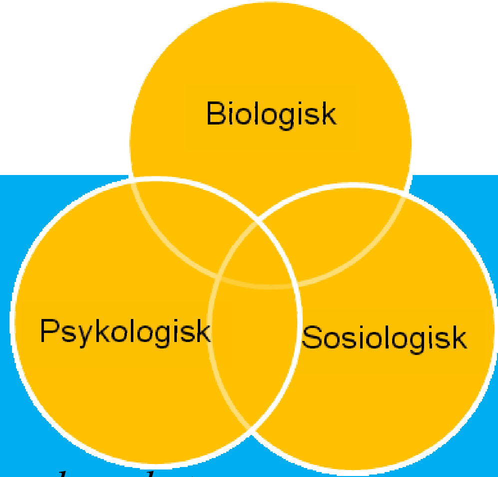
0 - 5 min

(Matre et al, unpublished)

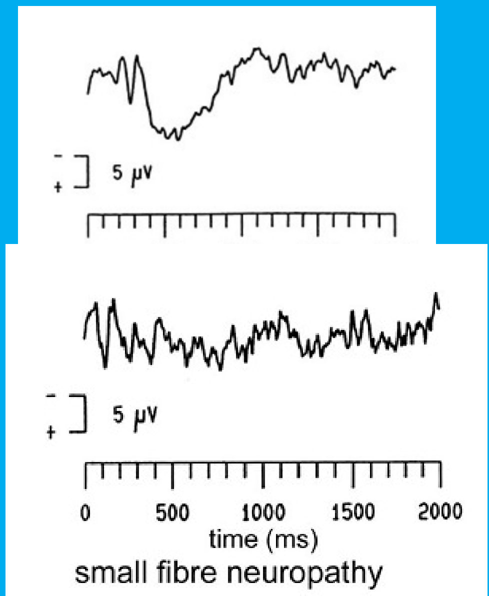
Framkalte åvirkes



*Laser-
aktivering,
Aδ og C-fibre*

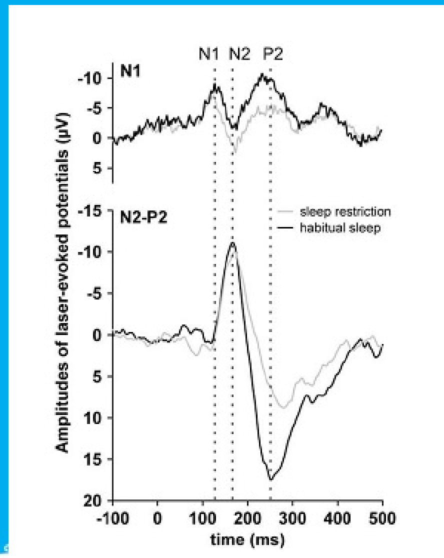


Tynnfiber-nevropati



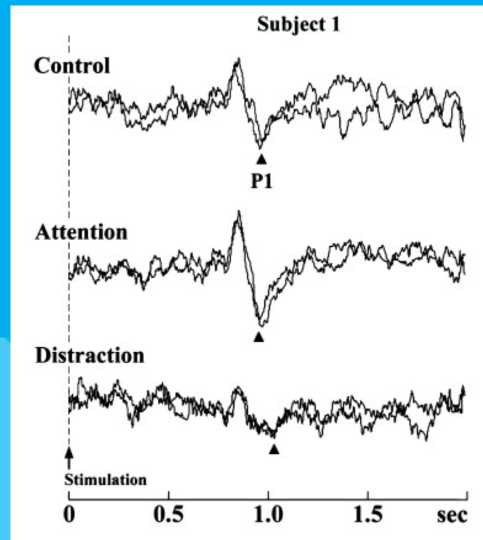
(Treede et al 2003)

Søvn



(Tiede et al 2010)

Oppmerksomhet



(Qiu al 2002)

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Eksempler på forskning fra STAMI

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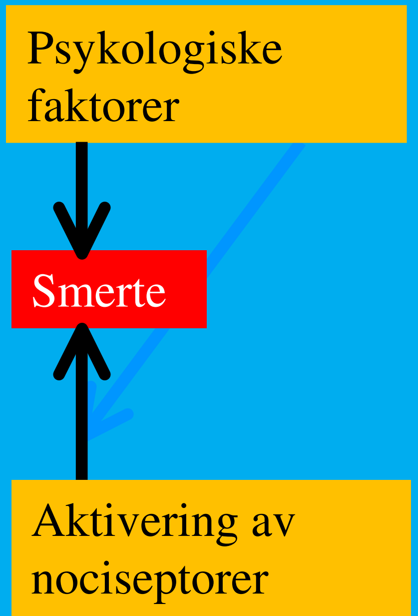
Forventning demper smerte og nocisepsjon



The Journal of Neuroscience

January 11, 2006 • Volume 26 Number 2 • www.jneurosci.org

The Journal of Neuroscience, January 11, 2006 • 26(2):559–563 • 559

Brief Communication

Placebo-Induced Changes in Spinal Cord Pain Processing

Dagfinn Matre,[1,2,3] Kenneth L. Casey,[2,3] and Stein Knardahl[1,4]

[1]Department of Physiology, National Institute of Occupational Health, N-0033 Oslo, Norway, [2]Neurology Research Laboratory, Veterans Affairs Medical Center, and [3]Department of Neurology, University of Michigan, Ann Arbor, Michigan 48105, and [4]Department of Psychology, University of Oslo, N-0317 Oslo, Norway

- **Forventning om mindre smerte demper nervesignalene til hjernen**
- **Mekanismene som ble påvirket har betydning for akutt → kronisk smerte**

- Synaptotagmin IV and Hippocampal Synapses
- Visualizing Axonal Defects in *Frizzled3*
- Localizing the Placebo Effect
- Amyloid Angiopathy in an AD Mouse

SOCIETY FOR NEUROSCIENCE

Statens arbeidsmiljøinstitutt

Sentral sensitivisering

- Forklaringen på ”alt ondt”?

Scandinavian Journal of Pain 3 (2012) 230–235

Contents lists available at SciVerse ScienceDirect

ELSEVIER

journal

Human experimental study

‘Central sensitization’ in cl

Dagfinn Matre*, Stein Knardahl

Department of Work Psychology and Physiology, National

Klinisk nakke/skuldersmerte

- Sentral sensitivisering forklarer ikke nakke/skuldersmerte som varierer mellom dager
- Trolig perifer årsak

A R T I C L E I N F O

Article history:
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Keywords:
Central sensitization
Secondary hyperalgesia
Musculoskeletal disorders
Neck pain

A B S T R A C T

Background and purpose: ‘Central sensitization’ (CS) may play a major role in maintaining several chronic pain conditions. CS has been proposed to play a significant role in a range of musculoskeletal pain conditions, such as trapezius myalgia, fibromyalgia, temporomandibular disorders, and low back pain. Whether CS varies over time within an individual is not known. This study evaluated (1) whether there is an intra-individual association between clinical pain and signs of CS, and (2) whether there is an inter-individual association between clinical pain and signs of CS.
Methods: Twenty-seven sedentary workers (19 women, 8 men) with varying neck/shoulder pain participated in a pre-test and in two test sessions. On one of the test sessions the subjects had weak (or no) clinical pain (*weak-pain day*). On the other test session the subjects had stronger clinical pain (*strong-pain day*). As an indicator of ‘central sensitization’, we assessed the area of secondary pinprick hyperalgesia (tested by 84.4 g/mm^2 Von Frey hairs) in response to a first-degree burn to the volar fore-arm (contact heat, 46 °C, 5 min). While in the lab, the subjects’ current clinical pain intensity (0–10 cm VAS) and distribution was assessed ($PINT_{lab}$ and $PDIST_{lab}$). The subjects also rated their pain intensity and distribution retrospectively from the past 30 days ($PINT_{30d}$ and $PDIST_{30d}$).
Results: $PINT_{lab}$ was lower on the weak-pain day (1.7 ± 1.5 cm) than on the strong-pain day (4.3 ± 1.6 cm). This was also the case for the other clinical pain measures ($PDIST_{lab}$, $PINT_{30d}$ and $PDIST_{30d}$) and indicated that the participants were successfully recruited at days that differed in clinical pain severity. Despite a

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European Journal of Pain xxx (2008) xxx–xxx

Contents lists available at ScienceDirect

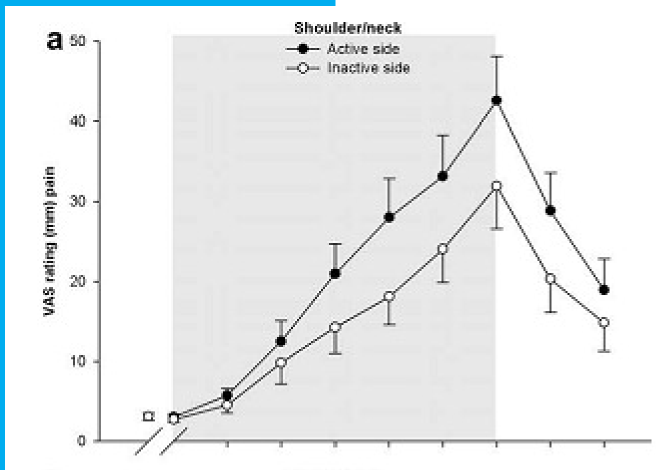
European Journal of Pain

journal homepage: www.EuropeanJournalPain.com

Pain induced by a single simulated office-work session: Time course and association with muscle blood flux and muscle activity

Vegard Strøm[a,*], Stein Knardahl[a,c], Johan K. Stanghelle[b], Cecilie Røe[a,d]

[a] National Institute of Occupational He
[b] Sunnaas Rehabilitation Hospital, Oslo
[c] Institute of Psychology, the University
[d] Department of Physical Medicine and



Simulert kontorarbeid

- Høye krav til presisjon og hurtighet
- Friske deltakere uten smerter

- Utvikler betydelige nakke/skuldersmerter i løpet av 90 min
- Relatert til blodgjennomstrømming i trapezius-muskelen

1. Introduction

The use of computers is common among the majority of the people and may present a risk for developing musculoskeletal

muscle-fiber activity is an essential factor in the mechanism of the development of pain. It has been hypothesized that muscle pain may originate from "overload" of low-threshold muscle-fibers (Hägg, 1991). Low-threshold motor units can be activated for sev-

PAIN® xxx (2010) xxx–xxx

IASP

PAIN®

www.elsevier.com/locate/pain

Work and neck pain: A prospective study of psychological, social, and mechanical risk factors

Jan Olav Christensen [a,b,*,1], Stein Knardahl

[a] The National Institute of Occupational Health, Norway
[b] Department of Psychology, University of Oslo, Norway

Øker risiko for nakkesmerter

- Arbeid hvor man må løfte armene til skuldernivå
- Rollekonflikter

Reduserer risiko for nakkesmerter

- Kontroll over beslutninger
- Bemyndigende ledelse

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Article history:
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Available online xxxx

Keywords:
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Occupational
Psychosocial
Prospective
Mechanical
Exposure

ABSTR

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1. Introduction

Neck pain is a widespread health problem in the working population. The annual prevalence has been reported to be above 40% [1,3,24]. Neck pain may severely disrupt the well being and productivity of the individual. Hence, it is a major public health issue, even if the medical consequences for each individual are not severe.

known, and several studies have reported very low levels of trapezius muscle activity during office work (e.g. [45]). During psychological challenge, active coping behavior includes a cardiovascular response pattern in which blood flow to muscles increases [45]. It has been hypothesized that factors involved in the regulation of muscle blood vessels may activate nociceptors [30,31]. However, it is also possible that the pain may originate from tendons or periostea or other components outside the muscle tissue

Smertefysiologiske målinger og klinisk nytte

- Smerte er en subjektiv opplevelse som påvirkes av en rekke forhold
- Enkeltfaktorer (og kombinasjoner av faktorer) kan studeres i et ”friskt smertesystem”
  - Bottom-up
  - Top-down
- Bedrer forståelsen av mekanismer; viktig for forebygging og behandling

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stami.no

- Pågående smerteprosjekter ved STAMI
  - Psykososial eksponering i arbeid ("Den nye arbeidsplassen")
  - Mekanisk eksponering, bl.a. helse-omsorg, bygg-anlegg
  - Skiftarbeid, søvn og smerte
  - Skiftarbeid og subjektive helseplager
  - Placebo og nocebo
  - Genetisk sårbarhet og utvikling av kroniske isjiassmerter

- Velkommen til samarbeid!

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- Takk for oppmerksomheten ☺