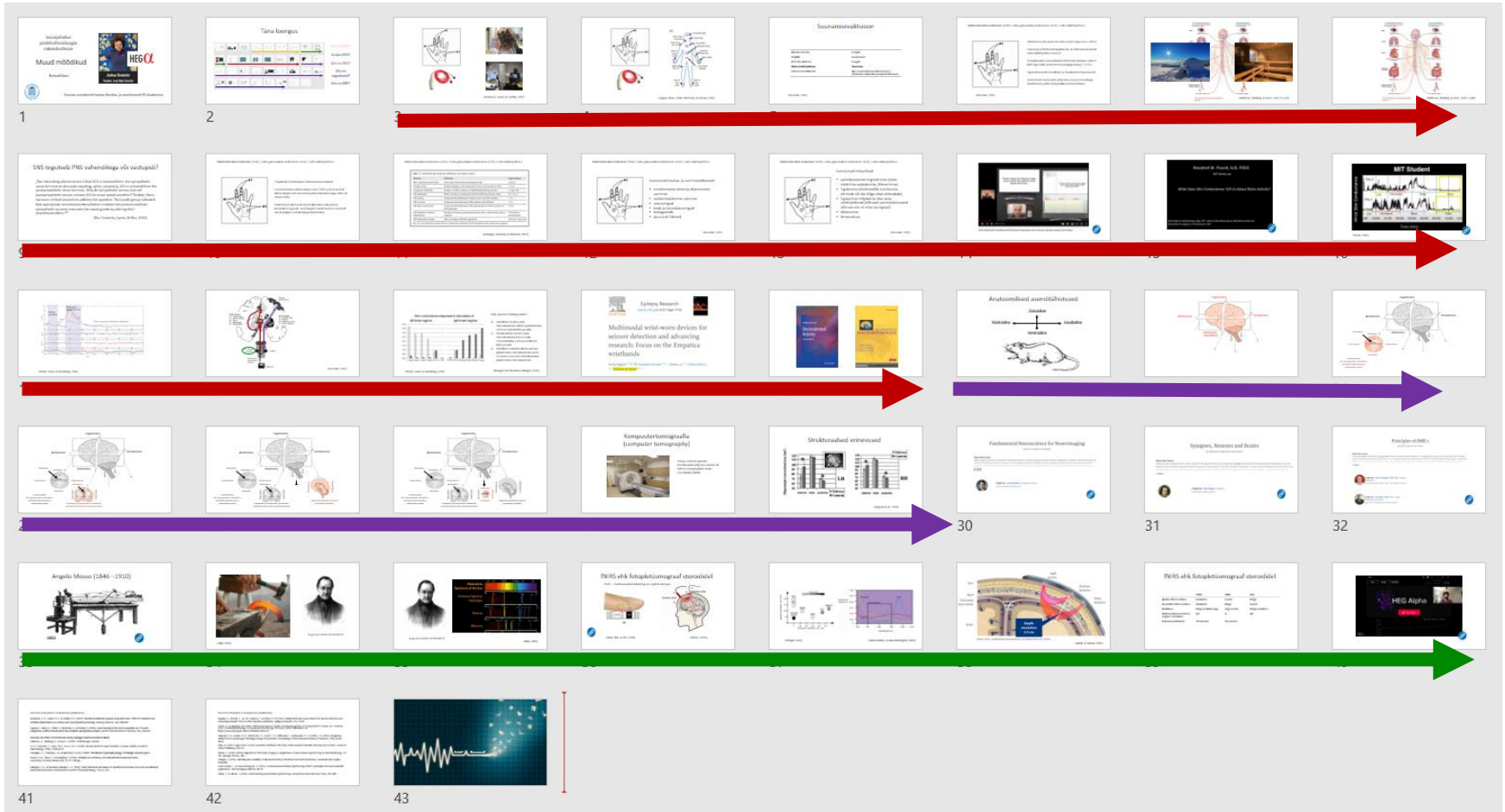
Sissejuhatus psühhofüsioloogia rakendustesse

Muud mõõdikud

Richard Naar

Kursuse arendamist toetas Haridus- ja noorteameti IT-akadeemia

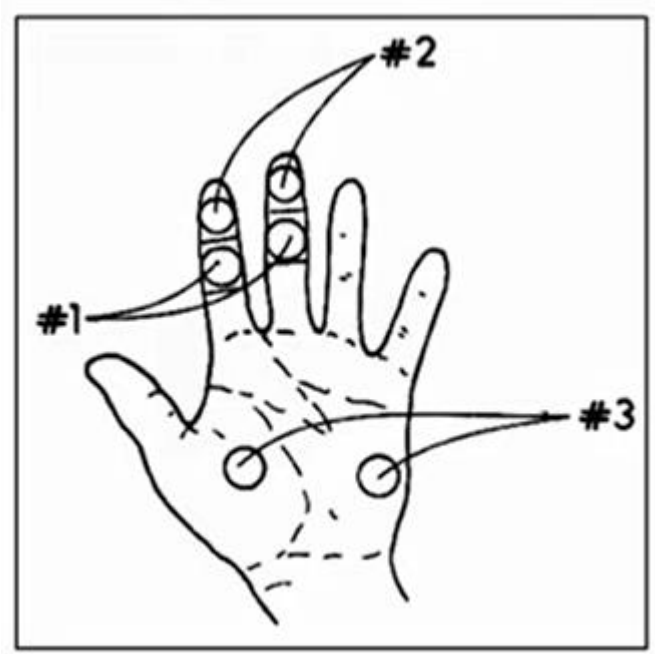
Täna loengus



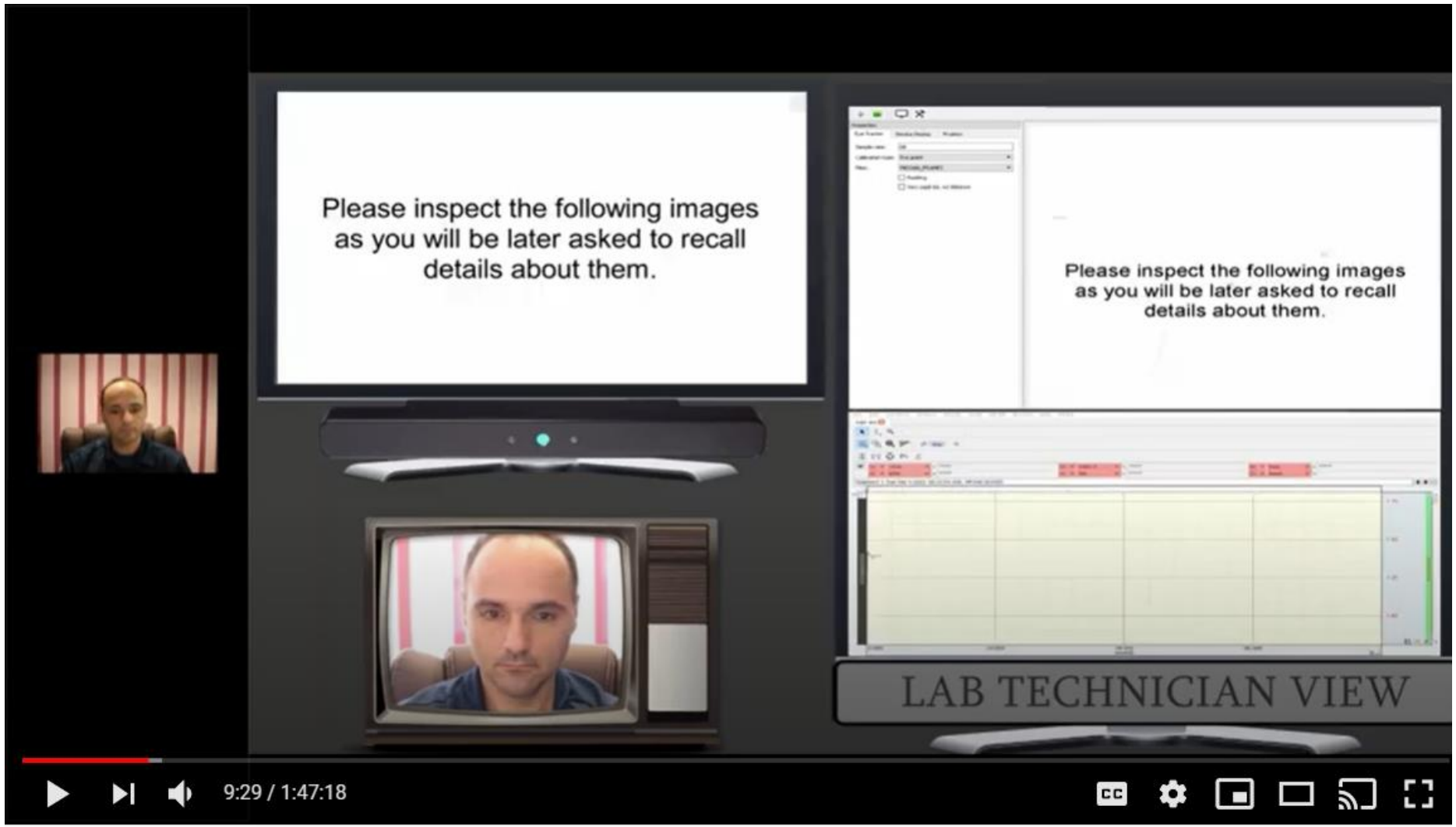
EDR

Asenditähistused

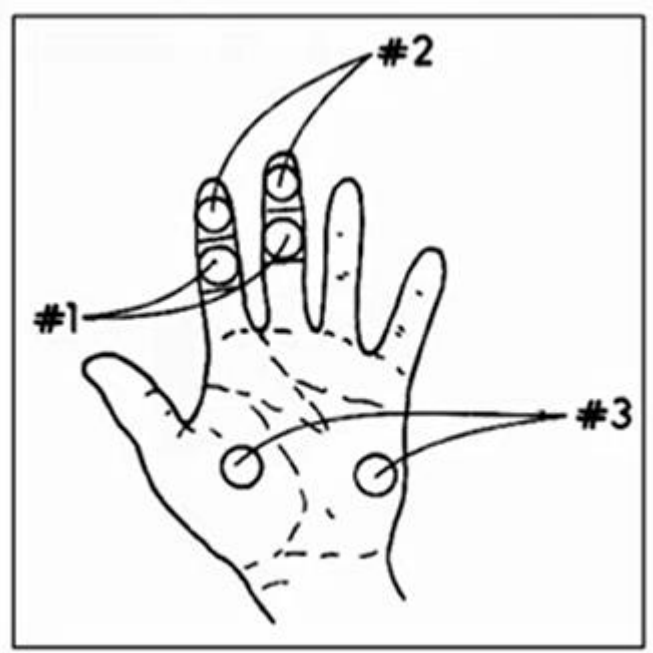
fNIRS

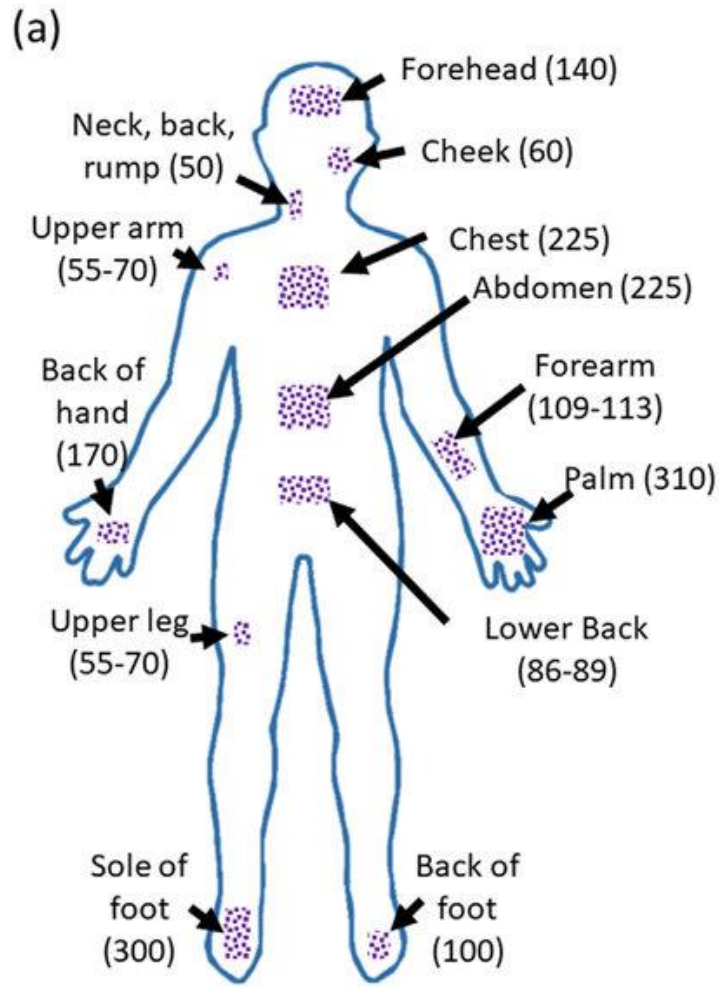


(Anderson, Lazard, & Hartley, 2017)



Event related EDA Combined with Stimulus Presentation How to Set up, Optimize Quality and Analyze

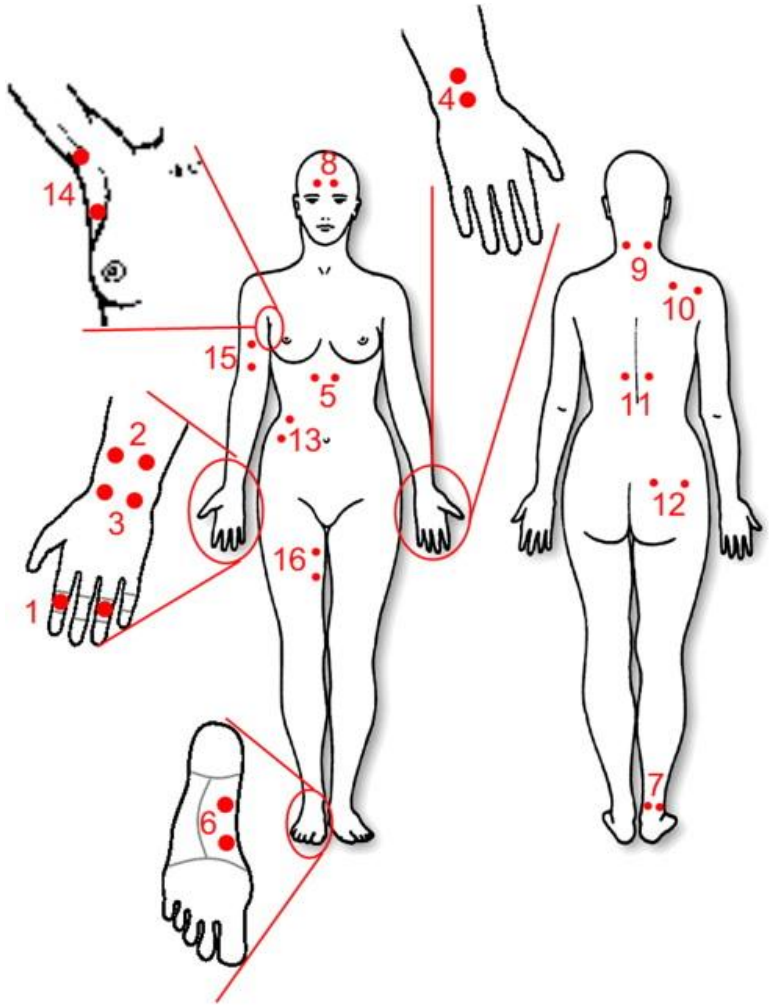




(Legner, Kalwa, Patel, Chesmore, & Pandey, 2019)

Table 2
Means and SEs of the correlation assessing similarity with the finger. The positions are sorted from highest to lowest correlation.

Position	Correlation	
	M	SE
Foot (instep)	.680	.071
Thighbone	.588	.077
Shoulders	.577	.074
Wrist (central)	.574	.066
Forehead	.566	.083
Wrist (vertical)	.563	.081
Wrist (distal)	.546	.069
Neck	.528	.083
Chest	.502	.088
Calf (sock)	.496	.092
Buttock	.449	.094
Arm	.411	.097
Armpit	.382	.099
Back	.342	.129
Abdomen	.294	.081



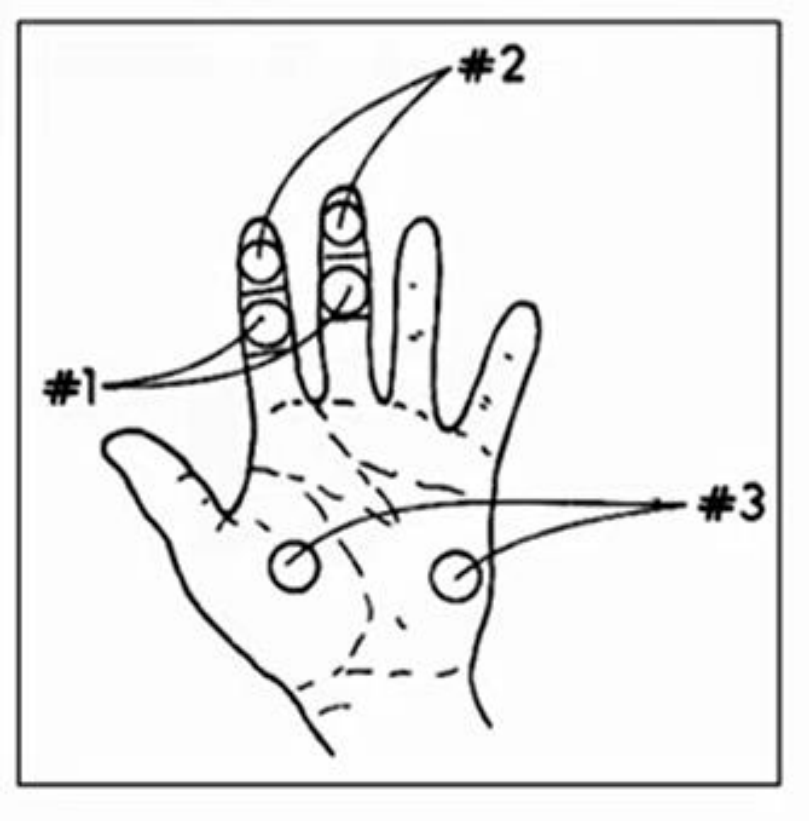
(van Dooren, & Janssen, 2012)

Suunamisreaktsioon

Absoluutne lävi	Langeb
Pupillid	Suurenevad
EEG alfa amplituud	Kahaneb
Naha elektrijuhtivus	**Suureneb**
Veresoonte läbimõõt	Ajus suureneb (vasodilatatsioon) / Jäsemetes väheneb (vasokonstriktsioon)

(Boucsein, 2012)

Elektrodermiline reaktsioon (EDR) / naha galvaaniline reakatsioon (GSR) / naha elektrijuhtivus



(Boucsein, 2012)

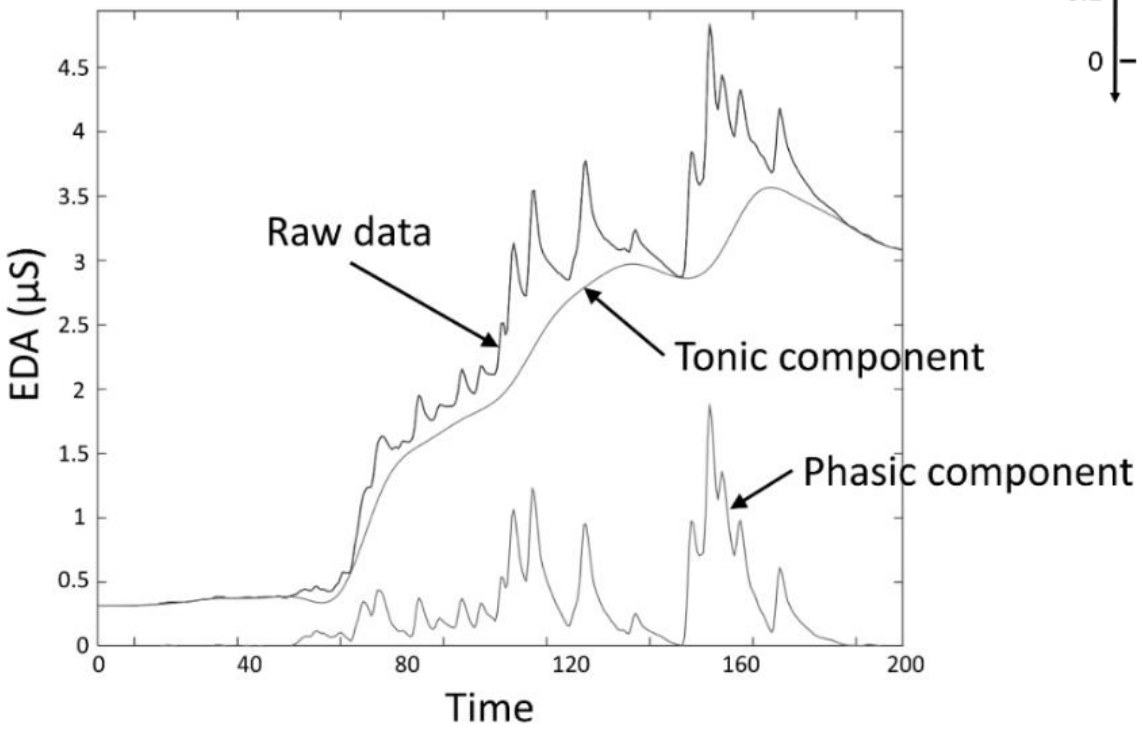
Mõõdetud juba enam kui 140 aastat (Vigouroux, 1879)

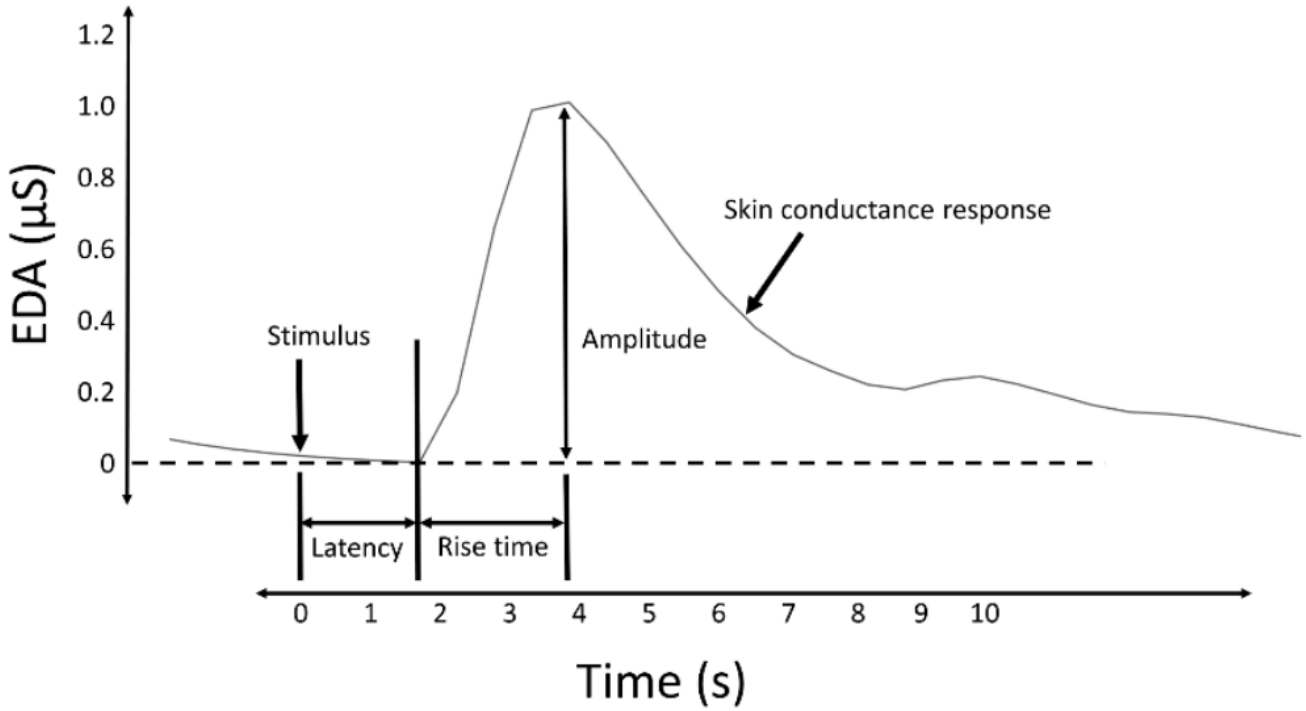
Esimesed mõõtmised kirjeldavad, et stiimuli esitamisel naha elektrijuhtivus kasvas

Tüüpilisel eksosomaatilisel mõõtmisel juhitakse nahast läbi väga väike ja konstantse pingega laeng (~ 0,5V)

Signaal koosneb toonilisest ja faasilisest komponendist

Seostub emotsionaalse intensiivsuse ja motoorikaga (reaktsiooni juhib sümpaatiline närvisüsteem)





(Posada-Quintero, & Chon, 2020)

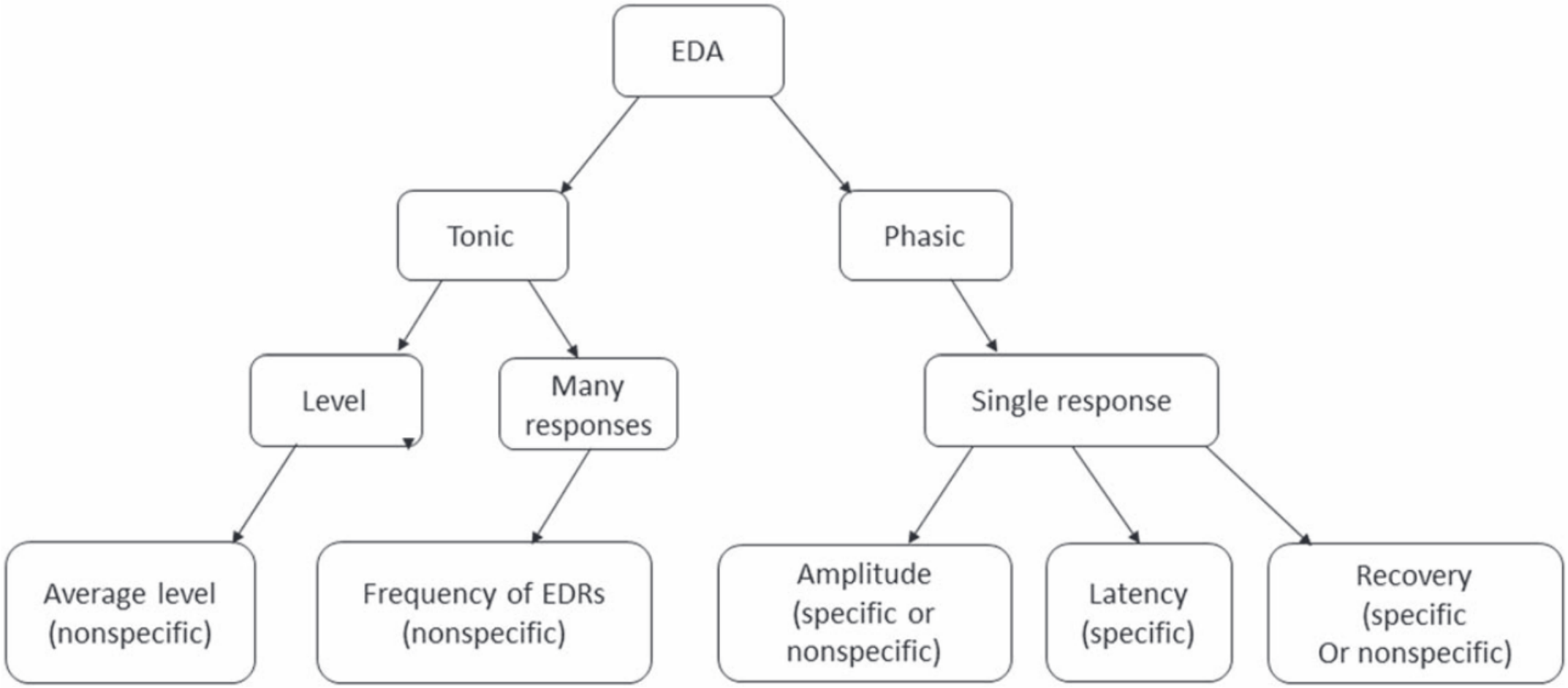
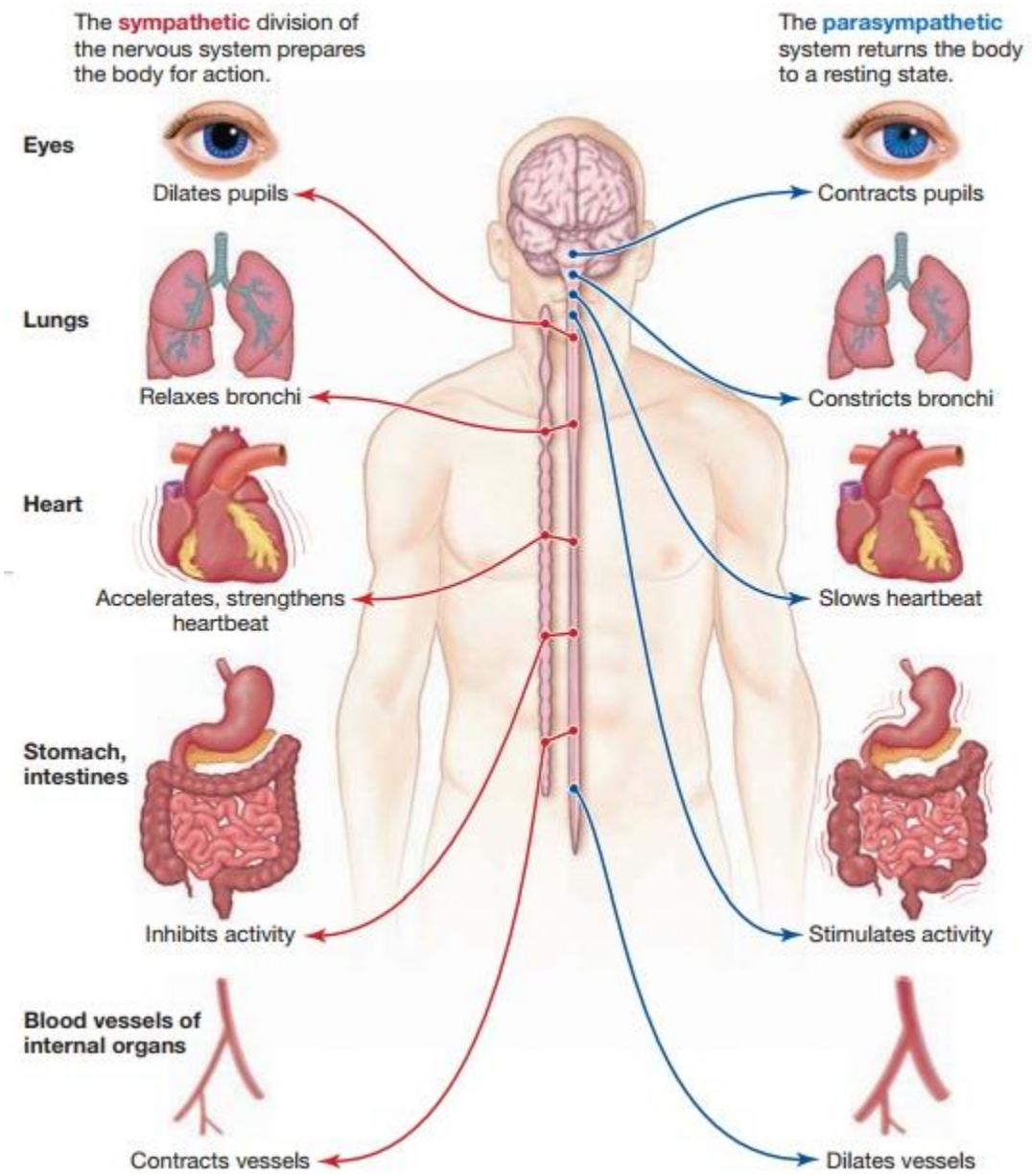


Figure 1. Overview of components of EDA and conventional parameters used to characterize electrodermal levels and responses.

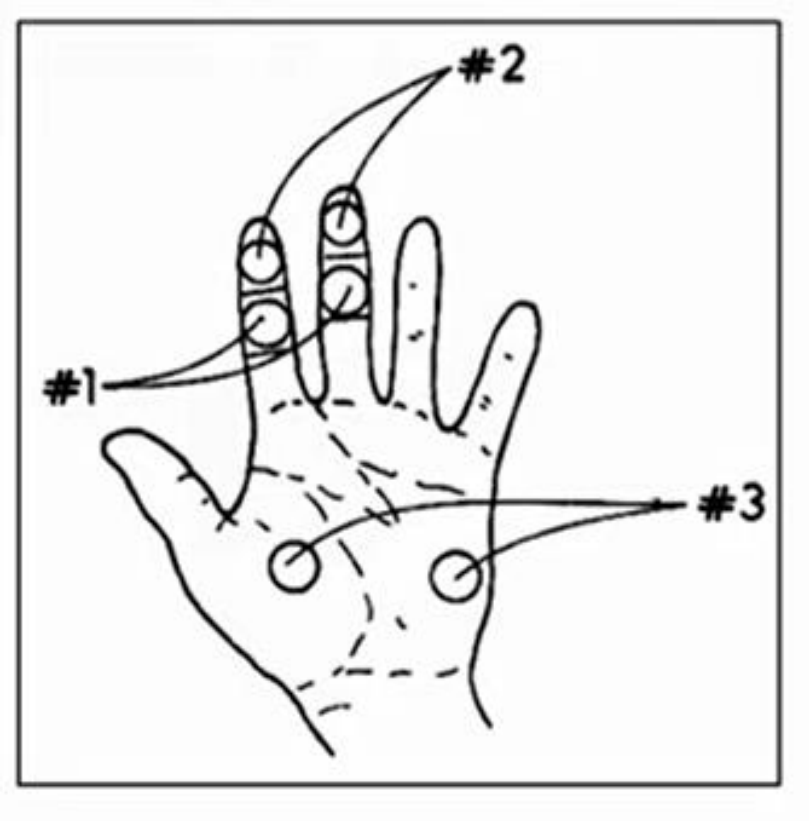
(Tronstad, Amini, Bach, & Martinsen, 2022)



3.26 Sympathetic and parasympathetic systems

(Gleitman, Reisberg, & Gross, 2003, 3. ptk)

Elektrodermiline reaktsioon (EDR) / naha galvaaniline reakatsioon (GSR) / naha elektrijuhtivus



Tüüpiliselt mõõdetakse mittedominantsel käel

Suured individuaalsed erinevused (~10% puhul seostub labori tingimustes emotsionaalse intensiivsusega vähe või üldse mitte)

Reaktsiooni olemasolu kontrollimiseks võib paluda katseisikul sügavalt, sisse hingata (reaktsiooni suurendab see kui hiljem natuke hinge kinni hoida)

Elektrodermiline reaktsioon (EDR) / naha galvaaniline reakatsioon (GSR) / naha elektrijuhtivus

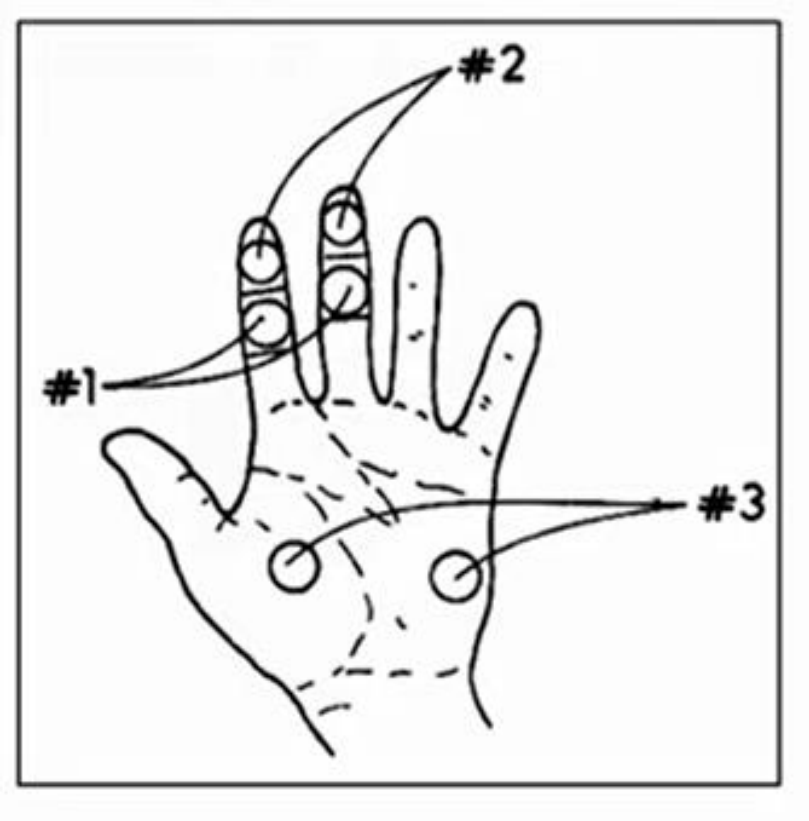
Table 7.1. Electrodermal measures, definitions, and typical values

Measure	Definition	Typical Values
Skin conductance level (SCL)	Tonic level of electrical conductivity of skin	2–20 μS
Change in SCL	Gradual changes in SCL measured at two or more points in time	1–3 μS
Frequency of NS-SCRs	Number of SCRs in absence of identifiable eliciting stimulus	1–3 per min
SCR amplitude	Phasic increase in conductance shortly following stimulus onset	0.1–1.0 μS
SCR latency	Temporal interval between stimulus onset and SCR initiation	1–3 s
SCR rise time	Temporal interval between SCR initiation and SCR peak	1–3 s
SCR half recovery time	Temporal interval between SCR peak and point of 50% recovery of SCR amplitude	2–10 s
SCR habitation (trials to habituation)	Number of stimulus presentations before two or three trials with no response	2–8 stimulus presentations
SCR habituation (slope)	Rate of change of ER-SCR amplitude	0.01–0.5 μS per trial

Key: SCL, skin conductance level; SCR, skin conductance response; NS-SCR, nonspecific skin conductance response.

(Cacioppo, Tassinary, & Berntson, 2007)

Elektrodermiline reaktsioon (EDR) / naha galvaaniline reakatsioon (GSR) / naha elektrijuhtivus



Levinuimad kasutus- ja uurimisvaldkonnad:

- emotsionaalse stressi ja depressiooni uurimine
- valetamiskäitumise uurimine
- uneuuringud
- toote ja turundusuuringud
- biotagasiside
- aju-arvuti liidesed

(Boucsein, 2012)

Psychology

- Quantification of aversive learning (Bach and Melinscak 2020).
- Stress detection (Setz *et al* 2010, Hernandez *et al* 2011, Ruiz-Robledillo and Moya-Albiol 2015, Martínez-Rodrigo *et al* 2016, Momin *et al* 2020).
- Teaching and learning effectiveness (Pijeira-Díaz *et al* 2016, Potter *et al* 2019).
- Autism examination (Hubert *et al* 2009, Schupak *et al* 2016, Prince *et al* 2017).
- Recognizing emotional states and emotional sensing (Westerink *et al* 2009, Jang *et al* 2015, Jaques *et al* 2015).
- Detecting the orienting response (Boucsein *et al* 2012).
- Studies on panic disorder (Roth *et al* 1998, Wendt *et al* 2008).
- Detection or differentiation of depression (Straub *et al* 1985, Straub *et al* 2003, Kim *et al* 2018a, 2018b)
- Schizophrenia prognosis (Dawson and Schell 2002, Schell *et al* 2005).
- Cognitive research (Tranel 2000).
- Affective computing (Lanatà *et al* 2012, Henriques *et al* 2013).

(Tronstad, Amini, Bach, & Martinsen, 2022)

Physiology

- Studies on pain mechanisms or detection (Storm 2008, Dubé *et al* 2009, Munsters *et al* 2012, Susam *et al* 2018, Sugimine *et al* 2020).
- Sleep studies and monitoring (Johnson and Lubin 1966, Sano *et al* 2014, Romine *et al* 2019, Kim *et al* 2021).
- Hypoglycemia detection in diabetes (Johansen *et al* 1986, Elvebakk *et al* 2019).
- Assessment of hyperhidrosis (Tronstad *et al* 2014, Ho *et al* 2020).

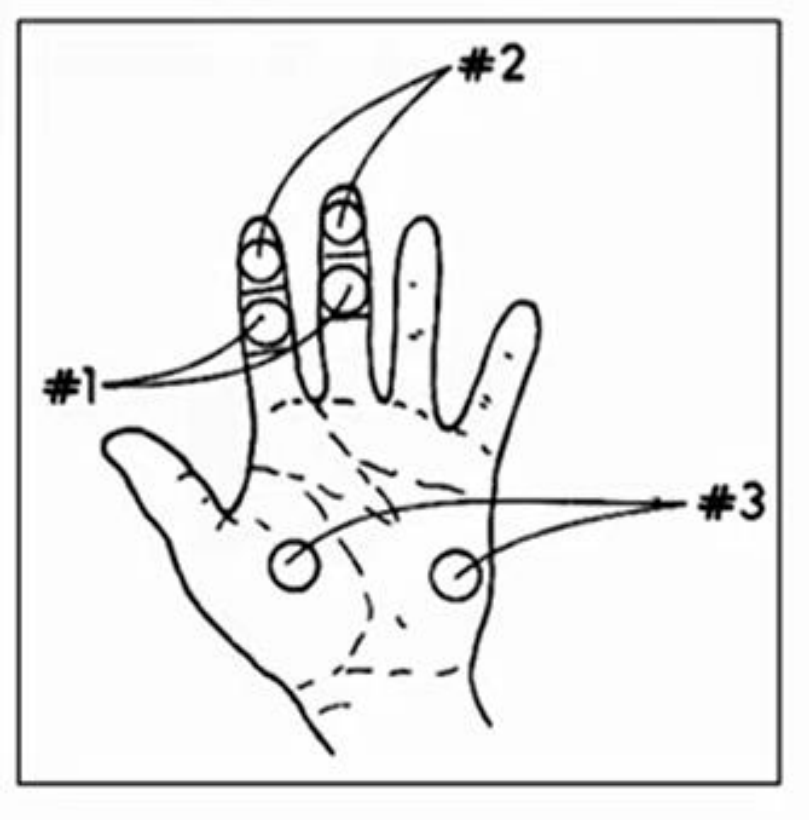
(Tronstad, Amini, Bach, & Martinsen, 2022)

Neurology

- Seizure detection (Poh *et al* 2010a, Poh *et al* 2012).
- Parkinson's disease monitoring (Esen *et al* 1997, Lagopoulos *et al* 1997, Lagopoulos *et al* 1998).
- Studying traumatic brain injury (O'Keeffe *et al* 2004).
- Dementia monitoring (Perugia *et al* 2017, Melander *et al* 2018).
- Biofeedback for epilepsy mitigation (Nagai *et al* 2019).
- Attention-deficit hyperactivity-disorder (ADHD) studies (Iaboni *et al* 1997, Dupuy *et al* 2014, Von Polier *et al* 2014, Beauchaine *et al* 2015).
- Study on autism spectrum disorder (Hubert *et al* 2009, Schupak *et al* 2016, Prince *et al* 2017).

(Tronstad, Amini, Bach, & Martinsen, 2022)

Elektrodermiline reaktsioon (EDR) / naha galvaaniline reakatsioon (GSR) / naha elektrijuhtivus



Levinuimad müraallikad:

- vahelduvvoolust tingitud müra (aitab elektriline varjestamine, filtreerimine)
- liigutamine (elektroodide kinnitamine sõrmede või käe külge aitab vähendada)
- liigutamine mõjutab ka otse naha elektrijuhtivust (sõltuvalt uurimisküsimusest võib see olla nii müra kui signaal)
- kõnelemine
- temperatuur

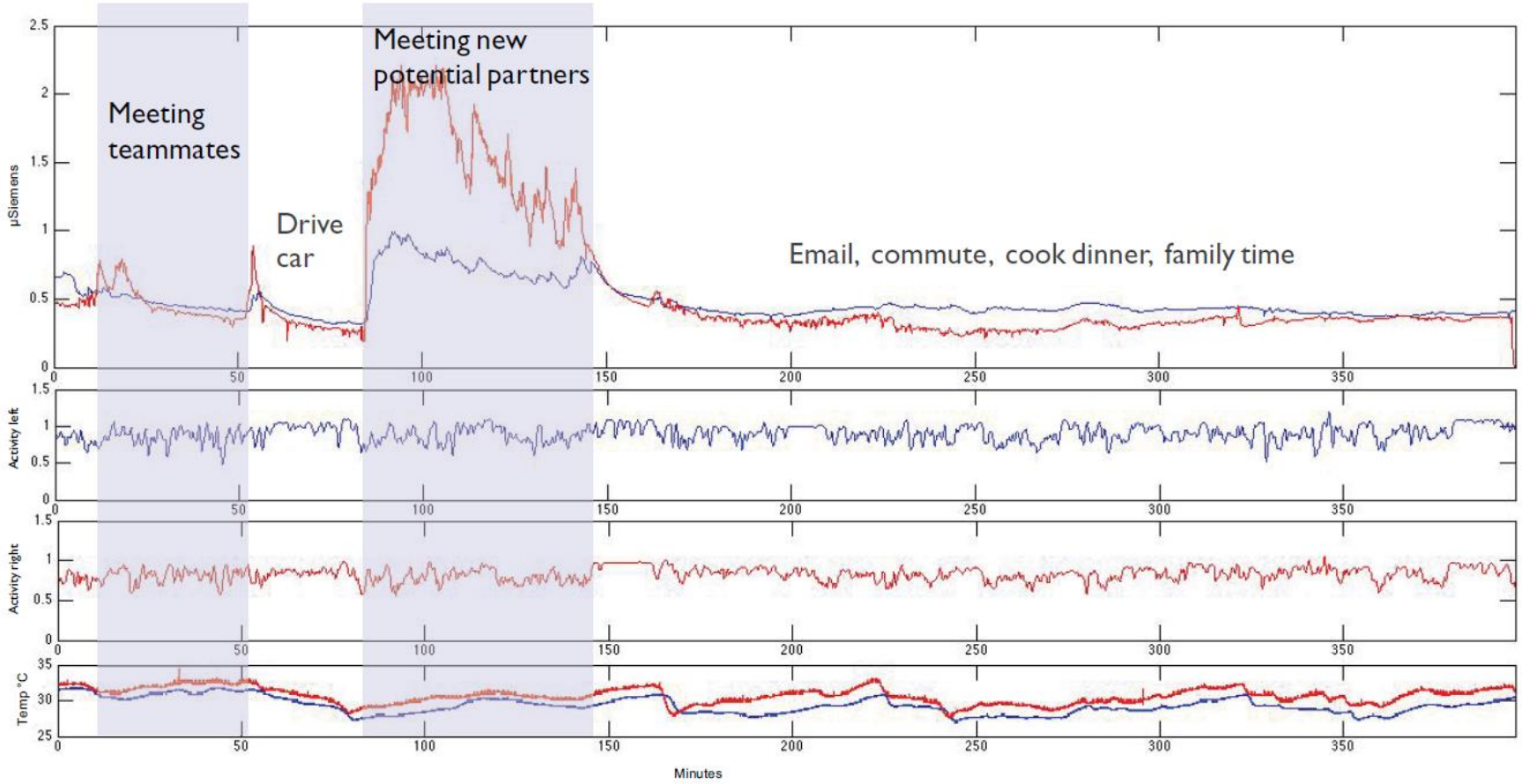
(Boucsein, 2012)

Rosalind W. Picard, ScD, FIEEE

MIT Media Lab

What Does Skin Conductance Tell Us About Brain Activity?

Recorded on Wednesday, May 29th, 2013 at the Athinoula A. Martinos Center for Biomedical Imaging in Charlestown, MA



(Picard, Fedor, & Ayzenberg, 2016)

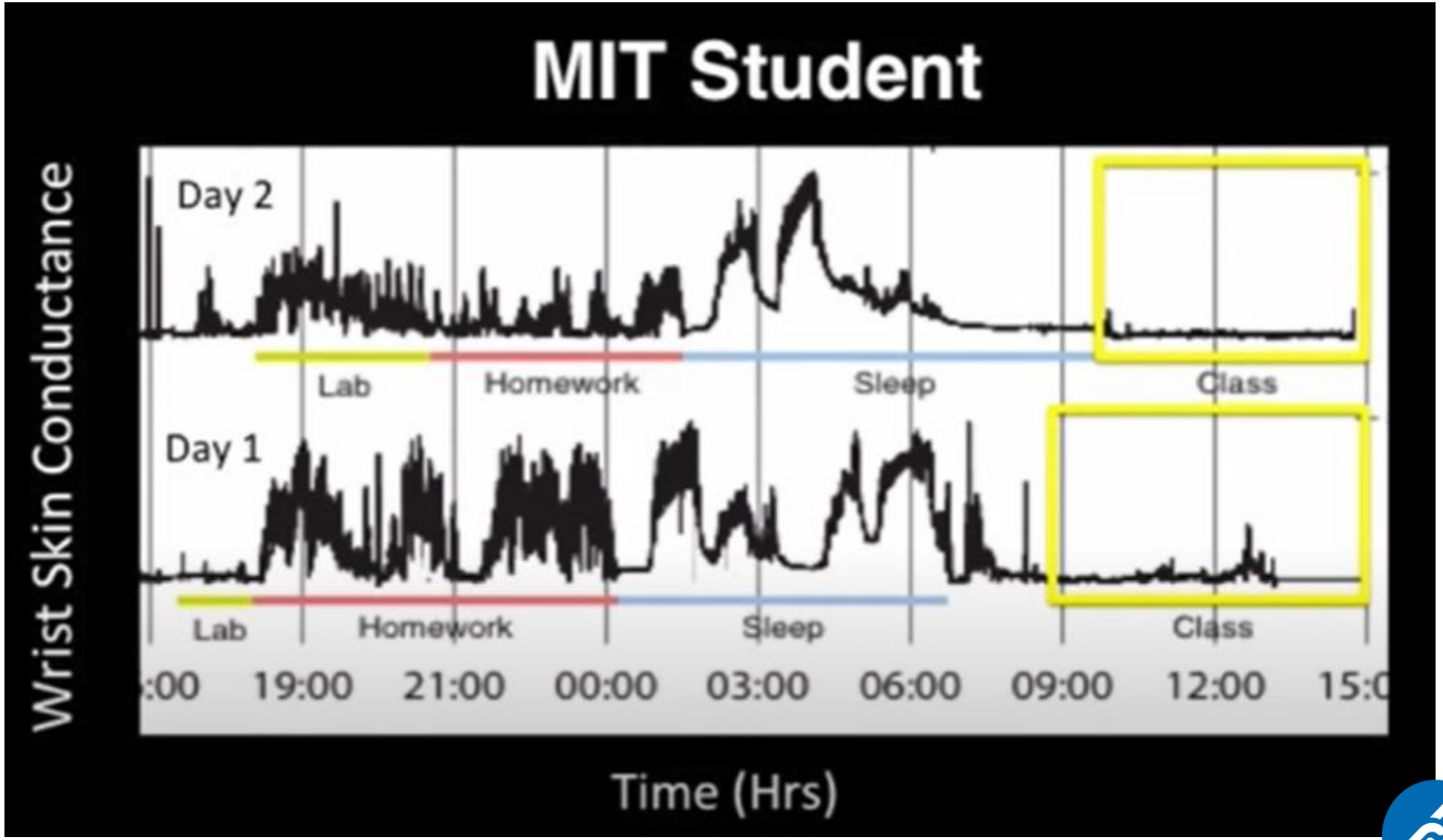
ELSEVIER

Epilepsy Research

Volume 153, July 2019, Pages 79-82

Multimodal wrist-worn devices for seizure detection and advancing research: Focus on the Empatica wristbands

Giulia Regalia [a, b] [1] ✉, Francesco Onorati [a, b, 1], Matteo Lai [a, b], Chiara Caborni [a, b], Rosalind W. Picard [a, b, c]


MIT Student
Wrist Skin Conductance
Day 2
Lab
Homework
Sleep
Class
Day 1
Lab
Homework
Sleep
Class
:00
19:00
21:00
00:00
03:00
06:00
09:00
12:00
15:0
Time (Hrs)

(Picard, 2013)

Sleep: Neurobiology, Medicine, and Society

by University of Michigan

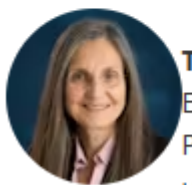
About this Course

The objective of this course is to give students the most up-to-date information on the biological, personal, and societal relevance of sleep. Personal relevance is emphasized by the fact that the single best predictor of daytime performance is the quality of the previous night's sleep. The brain actively generates sleep, and the first section of the course is an overview of the neurobiological basis of sleep

More

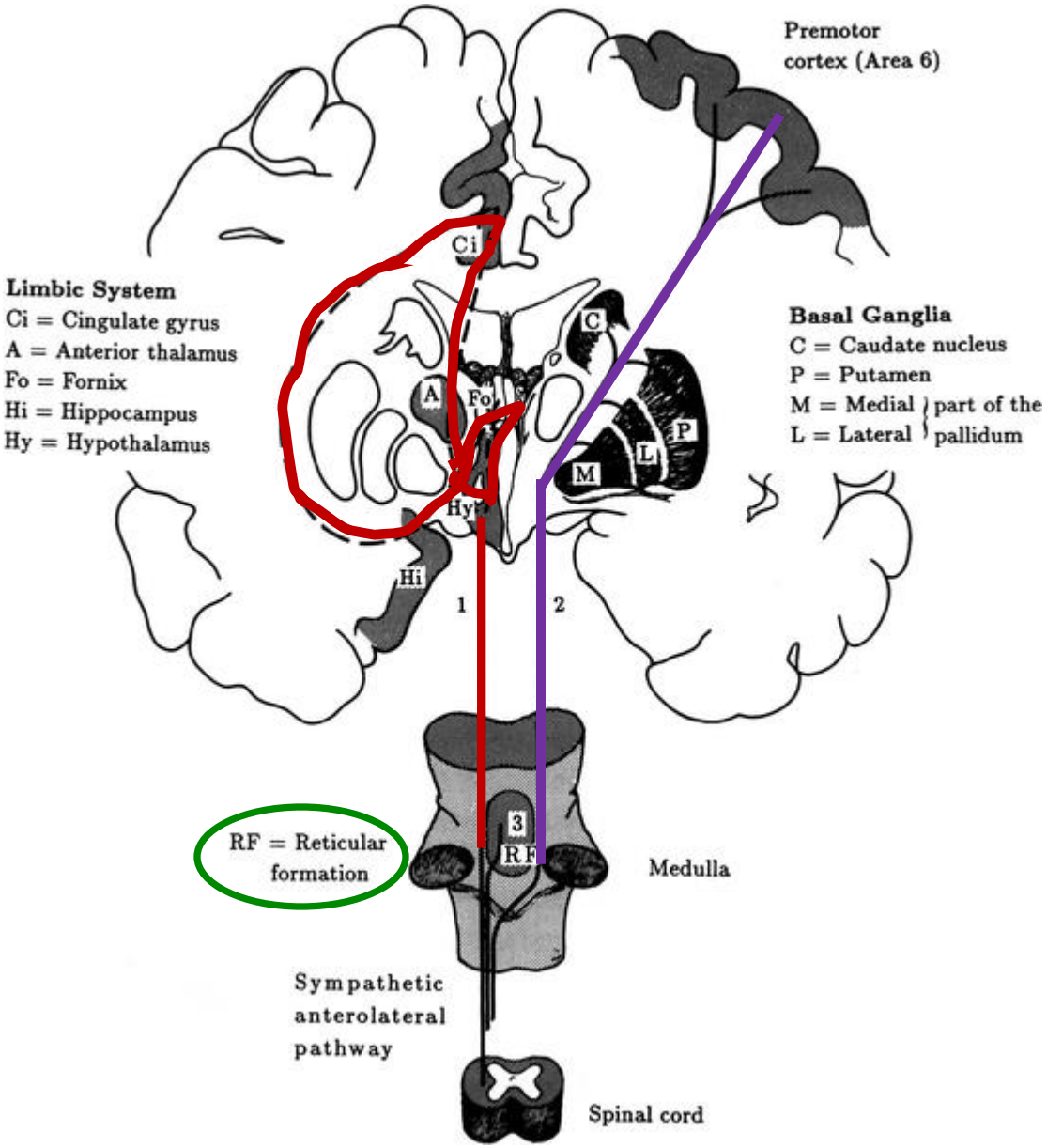
Taught by: **Ralph Lydic, Ph.D.**, Professor Emeritus, Molecular and Integrative Physiology, Professor Emeritus, Anesthesiology

University of Michigan Medical School

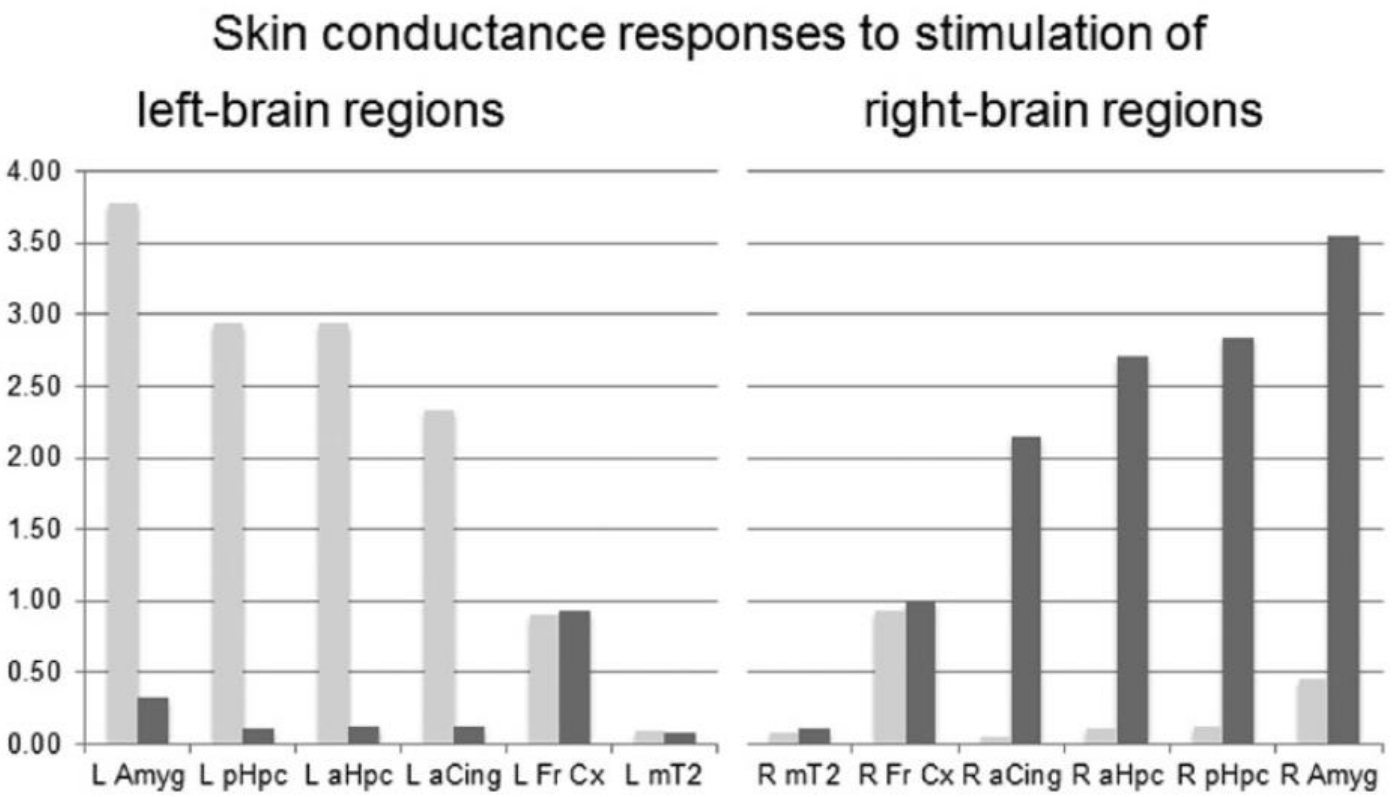


Taught by: **Helen Baghdoyan, Ph.D.**, Professor Emeritus, Anesthesiology, Professor Emeritus, Pharmacology, Professor of Psychiatry

University of Michigan Medical School



(Boucsein, 2012)

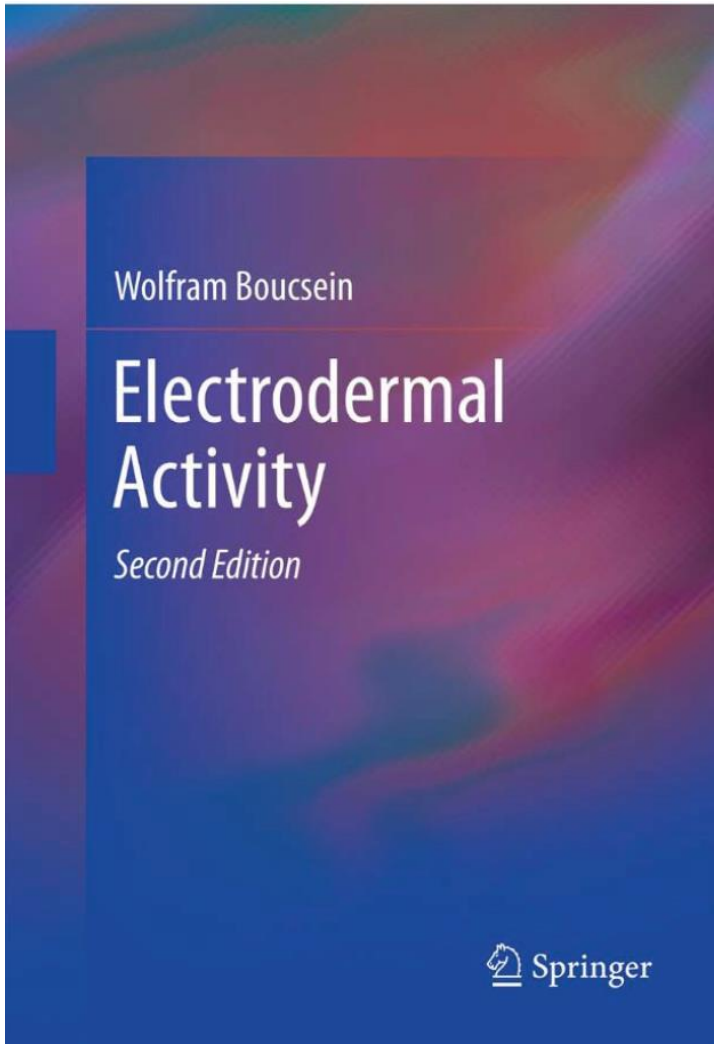


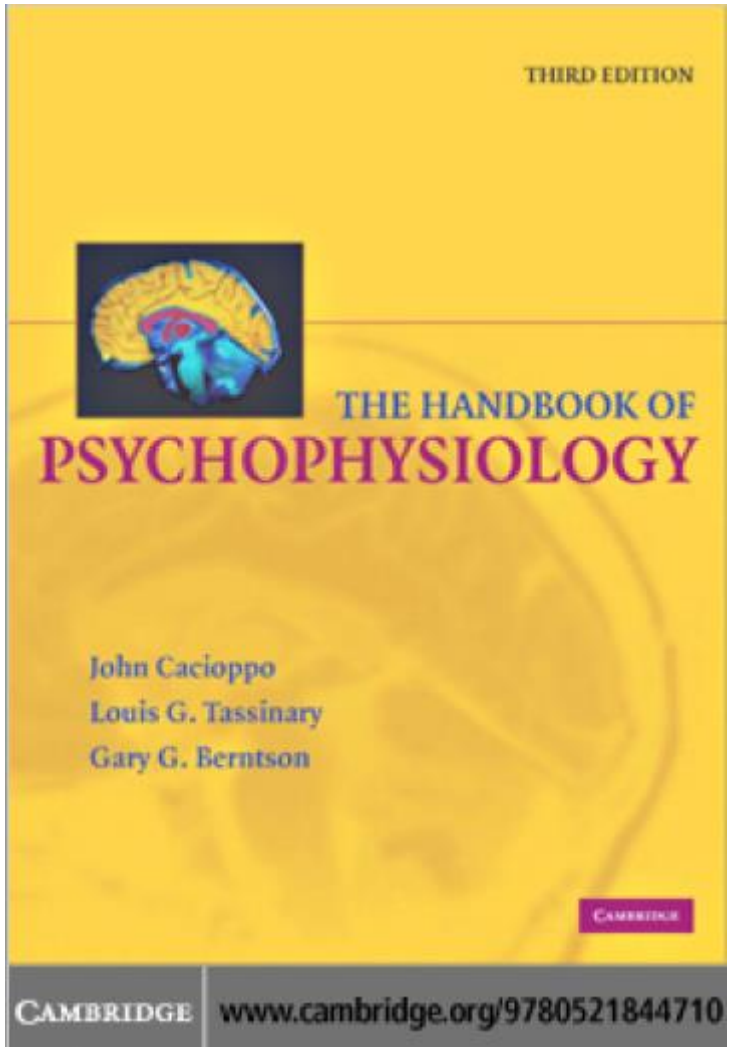
(Picard, Fedor, & Ayzenberg, 2016)

Kolm peamist tähelepanekut:

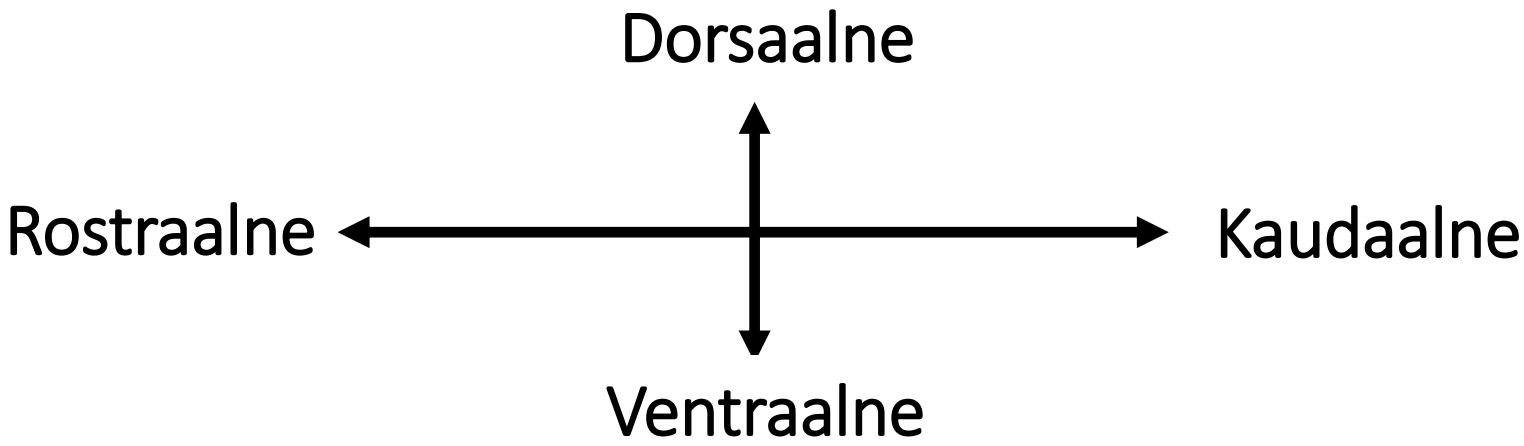
1) Limbiliste struktuuride stimuleerimine tekitas ipsilateraalse vastuse (samal keha poolel)
2) Kortikaalsete struktuuride stimuleerimine kutsus esile sümmeetrilise vastuse mõlemal keha poolel
3) Limbilise süsteemi alla kuuluvate piirkondade stimuleerimine andis suurema vastuse, kui kortikaalsete piirkondade stimuleerimine

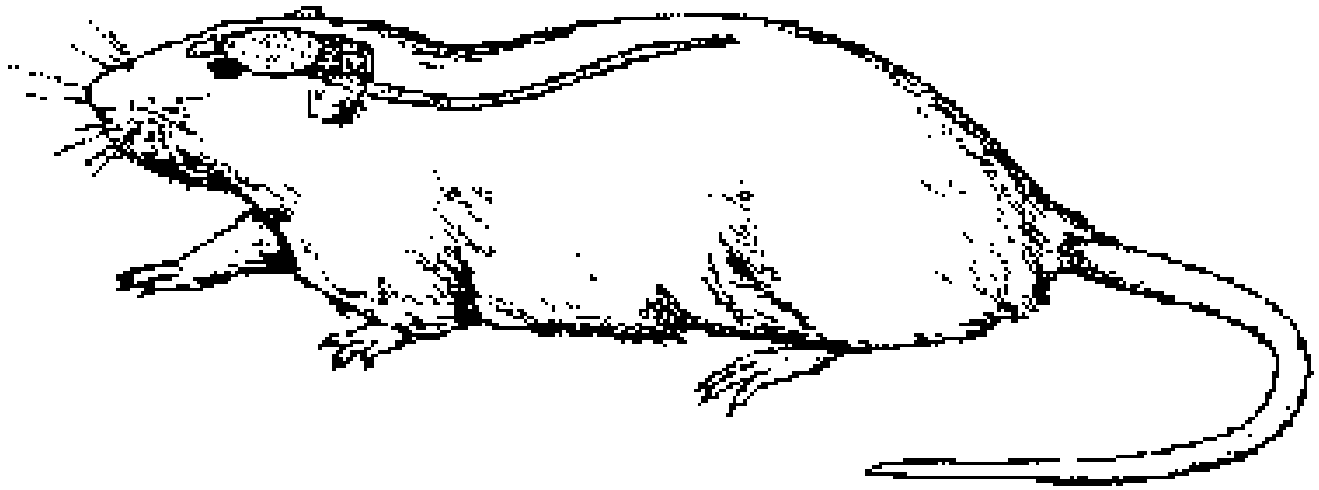
(Mangina and Beuzeron-Mangina, 1996)


Wolfram Boucsein
Electrodermal Activity
Second Edition
Springer


THIRD EDITION
THE HANDBOOK OF
PSYCHOPHYSIOLOGY
John Cacioppo
Louis G. Tassinary
Gary G. Berntson
CAMBRIDGE
www.cambridge.org/9780521844710

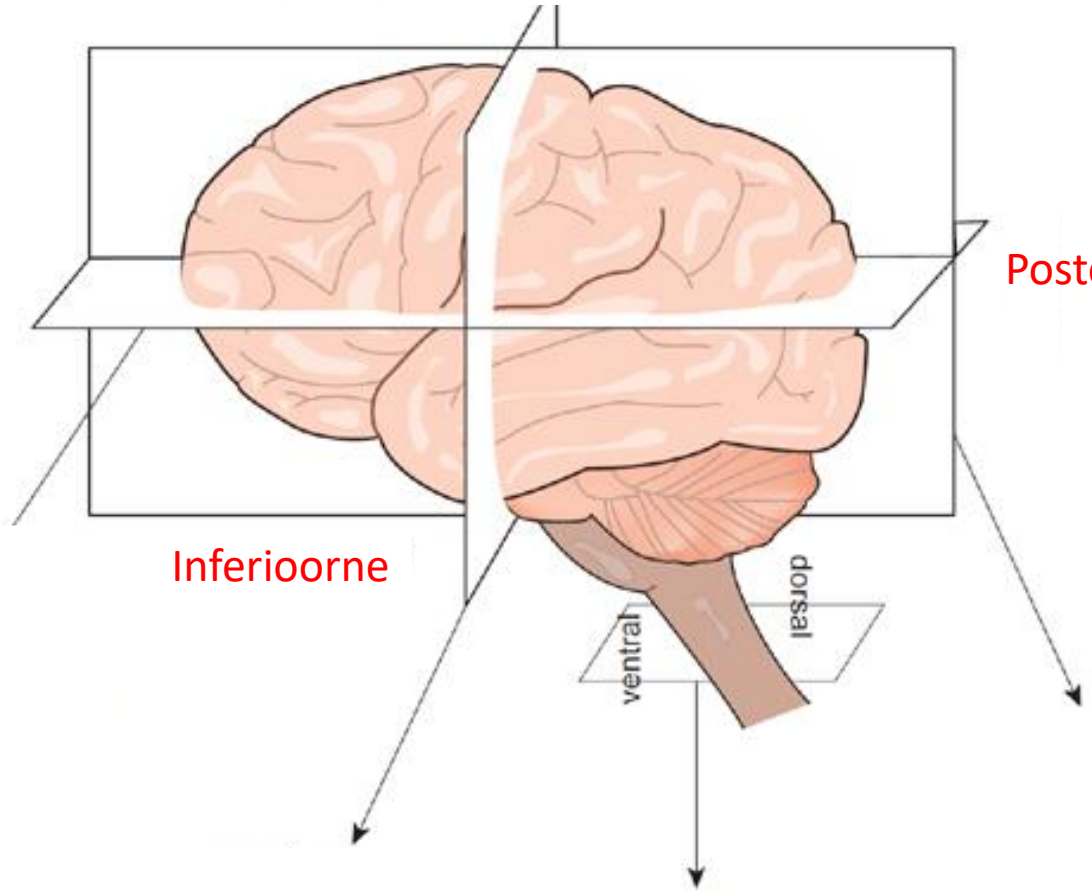
Anatoomilised asenditähistused





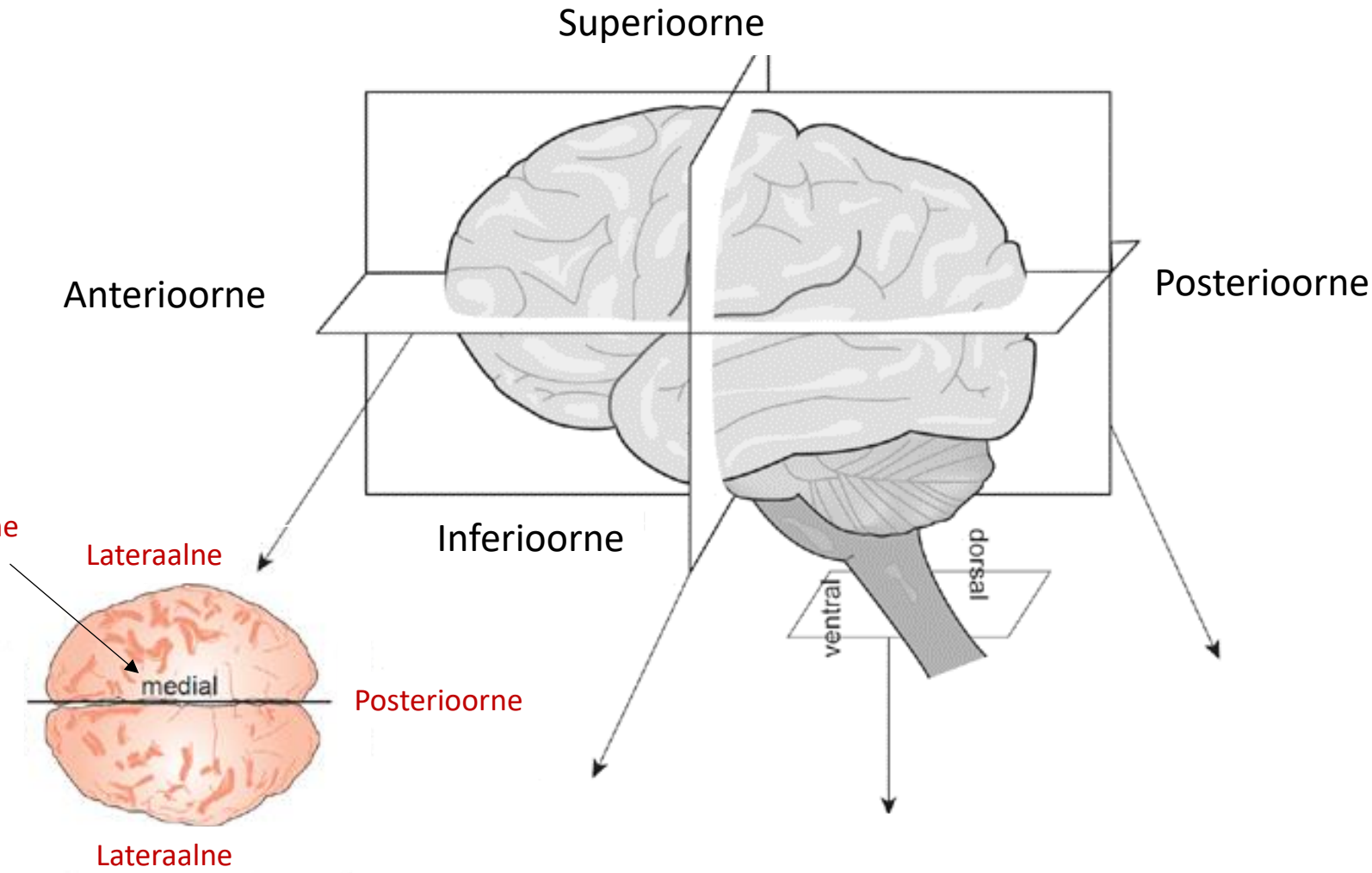
Superioorne

Anterioorne

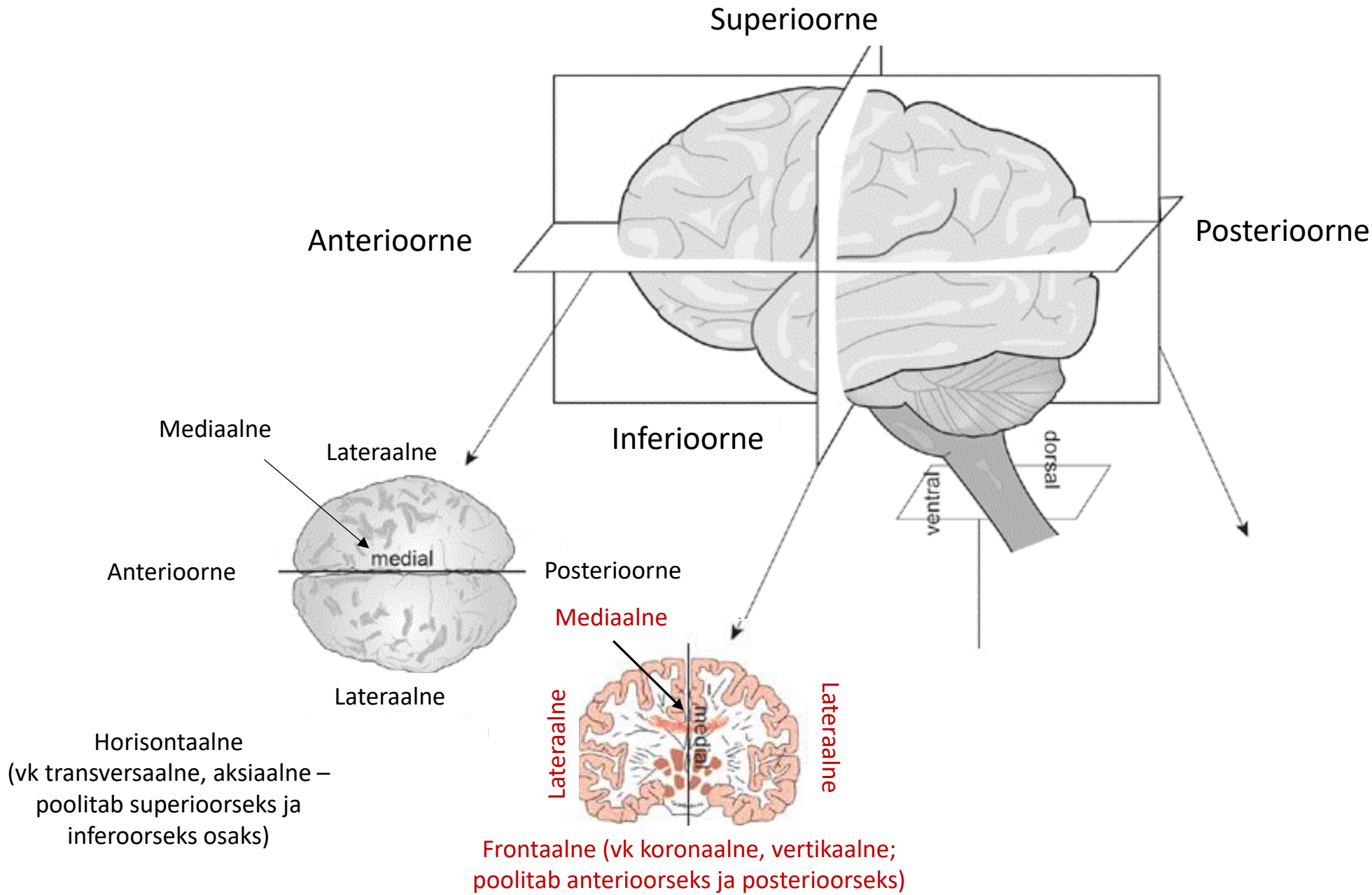


Posterioorne

Inferioorne

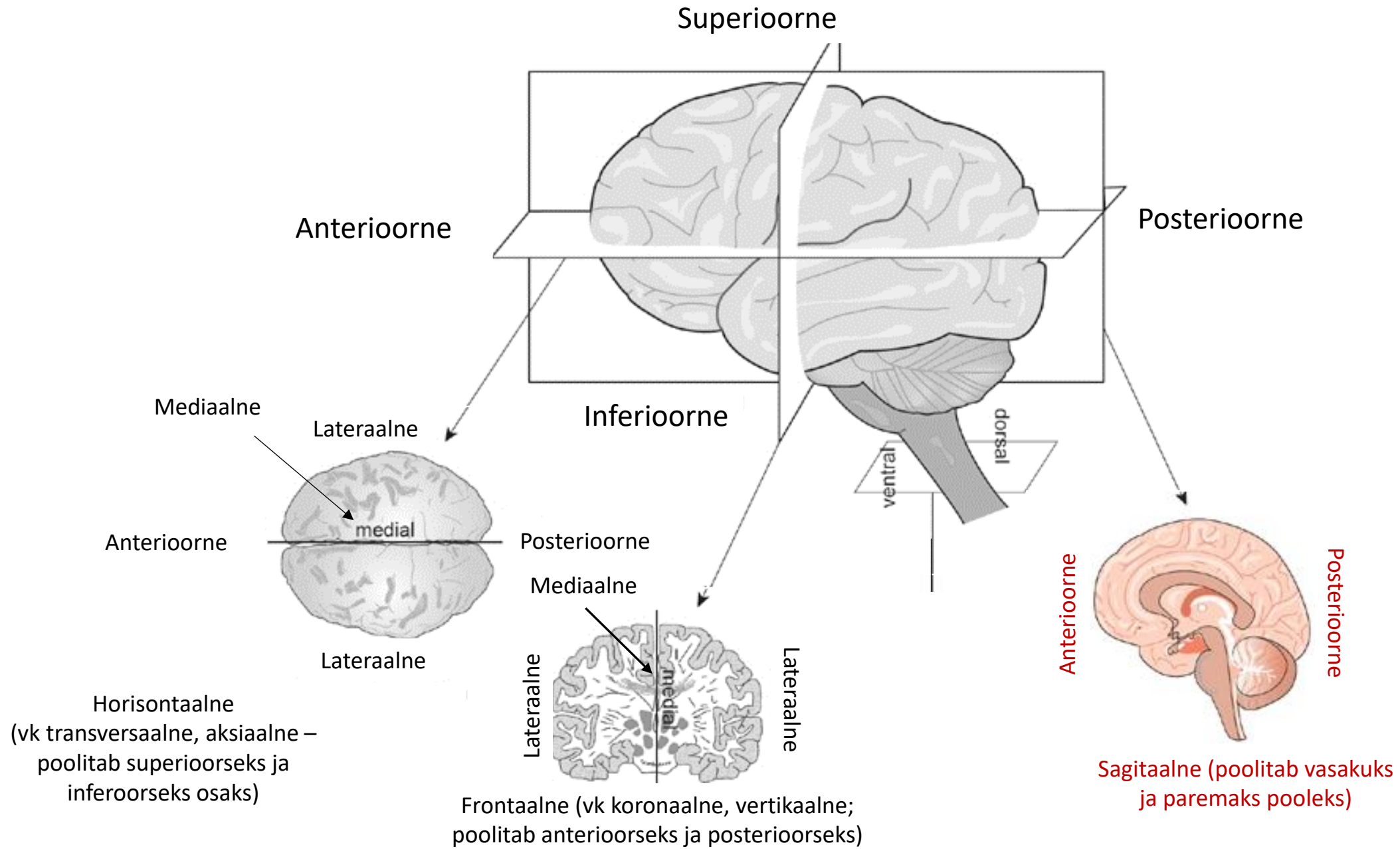


Horisontaalne
(vk transversaalne, aksiaalne – poolitab superioorseks ja inferoorseks osaks)



Horisontaalne
(vk transversaalne, aksiaalne – poolitab superioorseks ja inferoorseks osaks)

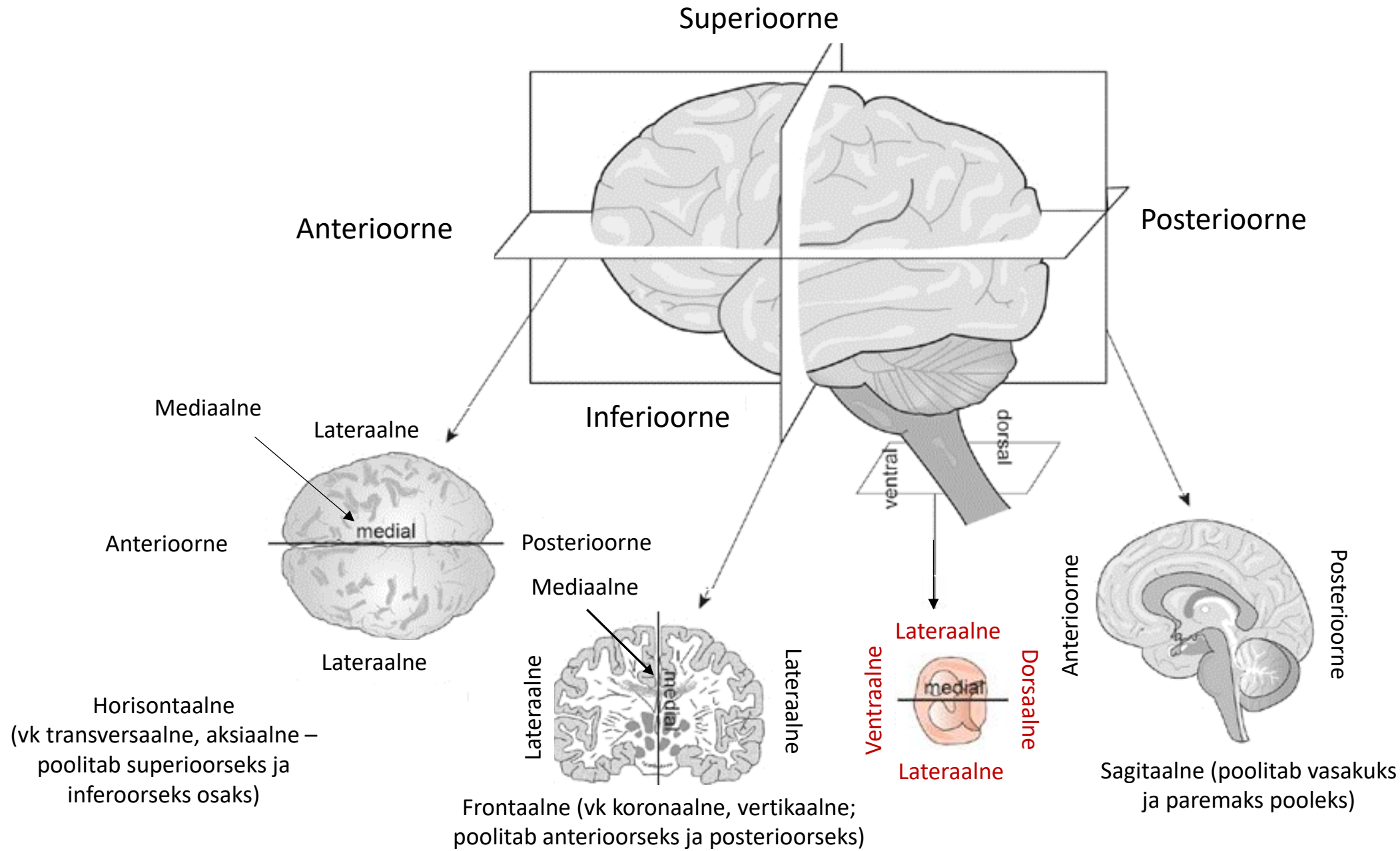
Frontaalne (vk koronaalne, vertikaalne; poolitab anterioorseks ja posterioorseks)



Horisontaalne
(vk transversaalne, aksiaalne – poolitab superioorseks ja inferoorseks osaks)

Frontaalne (vk koronaalne, vertikaalne; poolitab anterioorseks ja posterioorseks)

Sagitaalne (poolitab vasakuks ja paremaks pooleks)



Horisontaalne
(vk transversaalne, aksiaalne – poolitab superioorseks ja inferoorseks osaks)

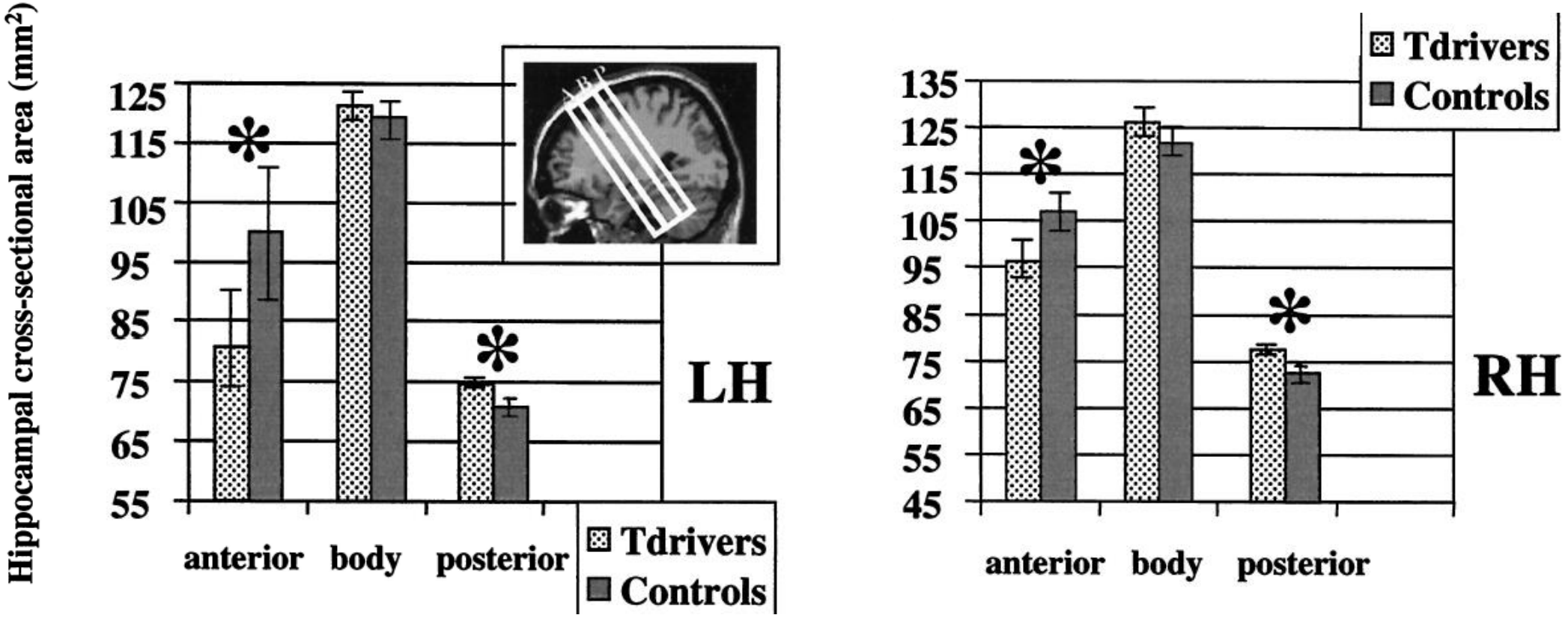
Frontaalne (vk koronaalne, vertikaalne; poolitab anterioorseks ja posterioorseks)

Sagitaalne (poolitab vasakuks ja paremaks pooleks)

Kompuutertomograafia (*computer tomography*)

Kompuutertomograafia kombineerib paljude nurkade alt tehtud röntgenpildid üheks ruumiliseks pildiks

Strukturaalsed erinevused



(Maguire et al., 2000)

Fundamental Neuroscience for Neuroimaging

by Johns Hopkins University

About this Course

Neuroimaging methods are used with increasing frequency in clinical practice and basic research. Designed for students and professionals, this course will introduce the basic principles of neuroimaging methods as applied to human subjects research and introduce the neuroscience concepts and terminology necessary for a basic understanding of neuroimaging applications. Topics include the history of neuroimaging, an

More

Taught by: **Arnold Bakker**, Assistant Professor

Psychiatry and Behavioral Sciences

Principles of fMRI 1

by Johns Hopkins University

About this Course

Functional Magnetic Resonance Imaging (fMRI) is the most widely used technique for investigating the living, functioning human brain as people perform tasks and experience mental states. It is a convergence point for multidisciplinary work from many disciplines. Psychologists, statisticians, physicists, computer scientists, neuroscientists, medical researchers, behavioral scientists, engineers, public health researchers, biologists, and

More

Taught by: **Martin Lindquist, PhD, MSc**, Professor, Biostatistics

Bloomberg School of Public Health | Johns Hopkins University

Taught by: **Tor Wager, PhD**, Diana L. Taylor Distinguished Professor

Department of Psychological and Brain Sciences

Synapses, Neurons and Brains

by Hebrew University of Jerusalem

About this Course

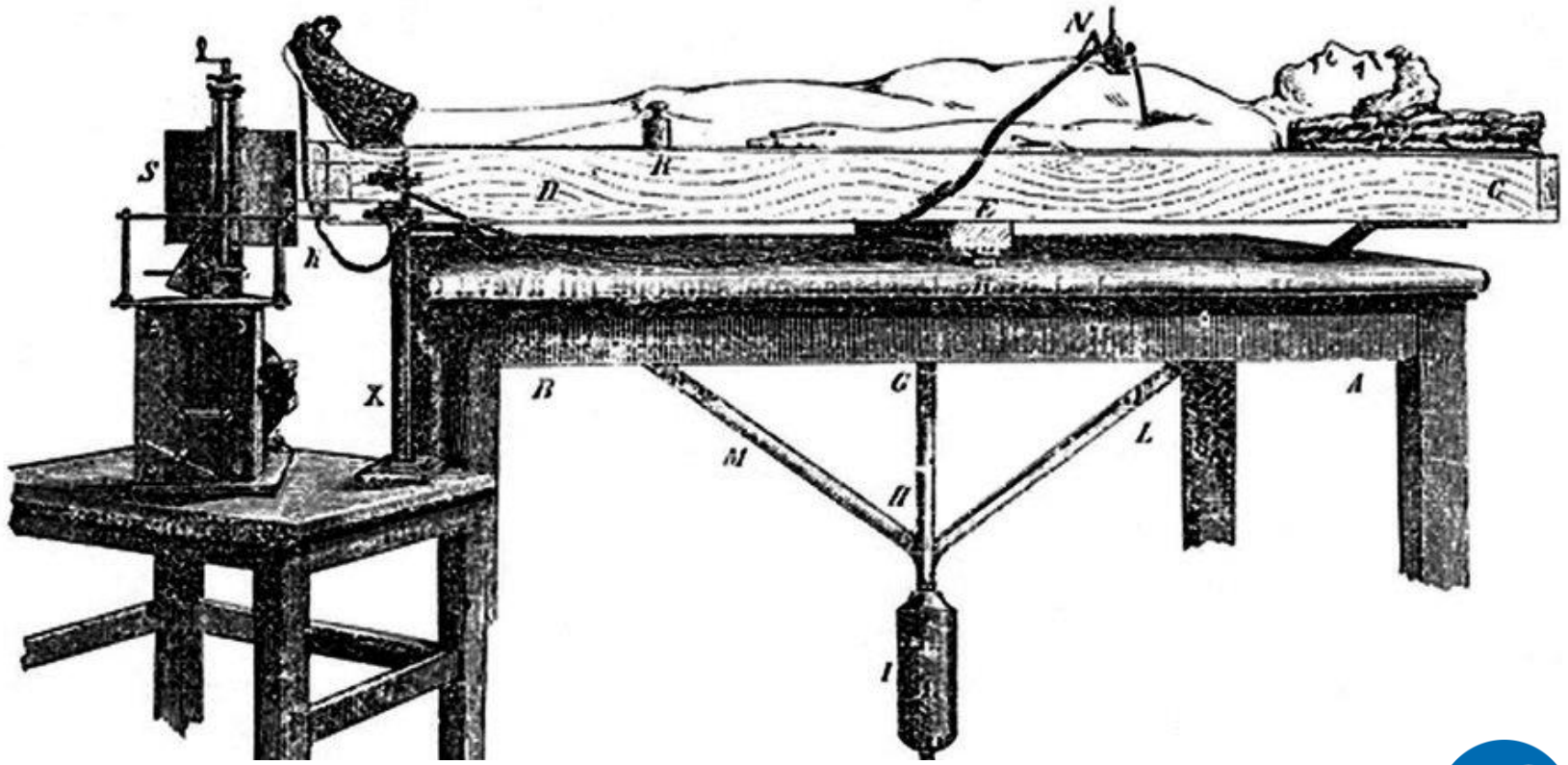
These are very unique times for brain research. The aperitif for the course will thus highlight the present “brain-excitements” worldwide. You will then become intimately acquainted with the operational principles of neuronal “life-ware” (synapses, neurons and the networks that they form) and consequently, on how neurons behave as computational microchips and how they plastically and constantly change - a process that underlies

More

Taught by: **Idan Segev**, Professor

Computational Neuroscience

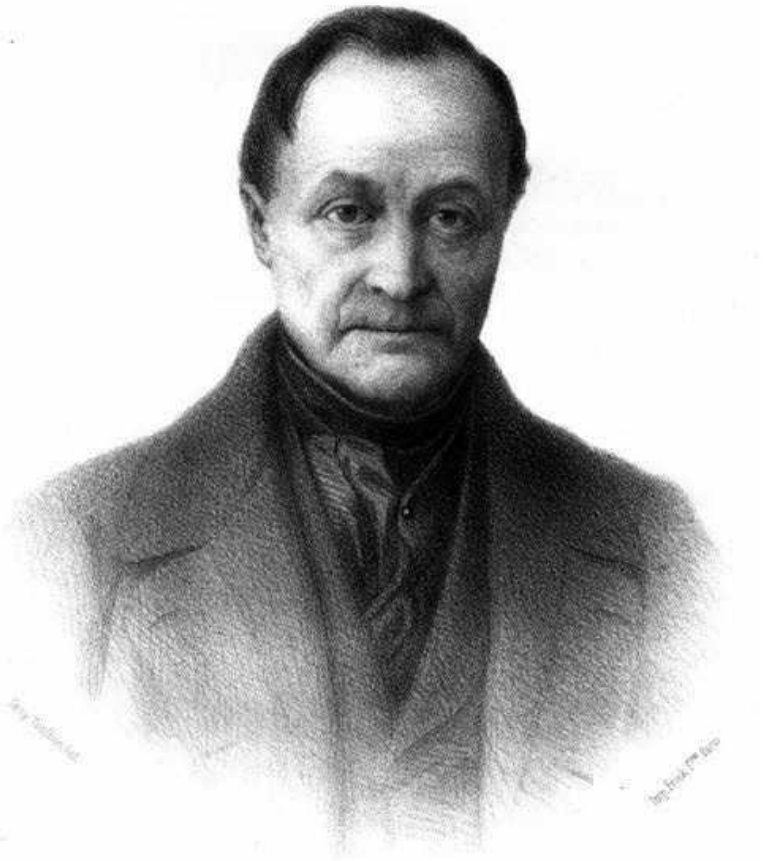
Angelo Mosso (1846 –1910)



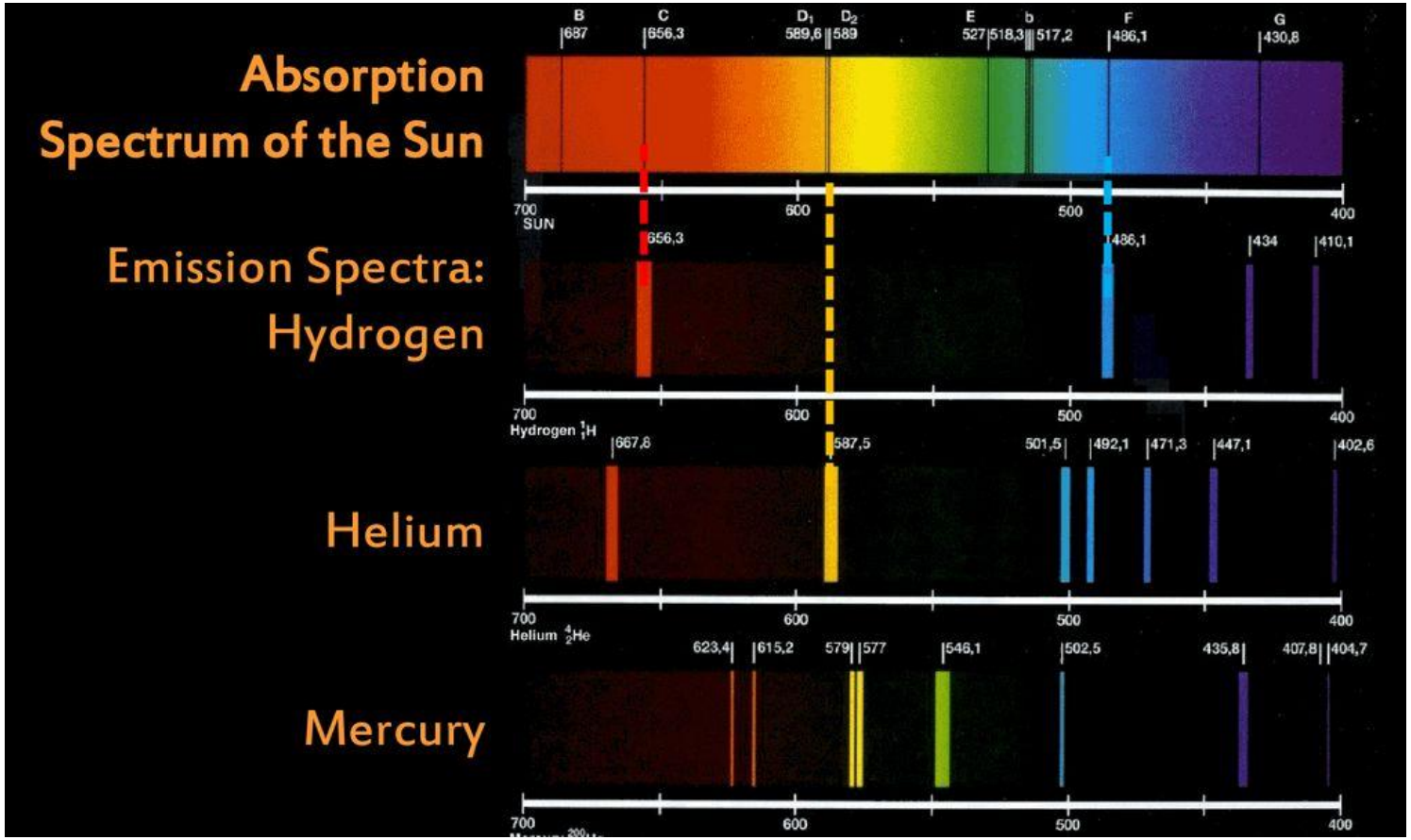
1882

(Mee, 2012)

Auguste Comte (1798-1857)



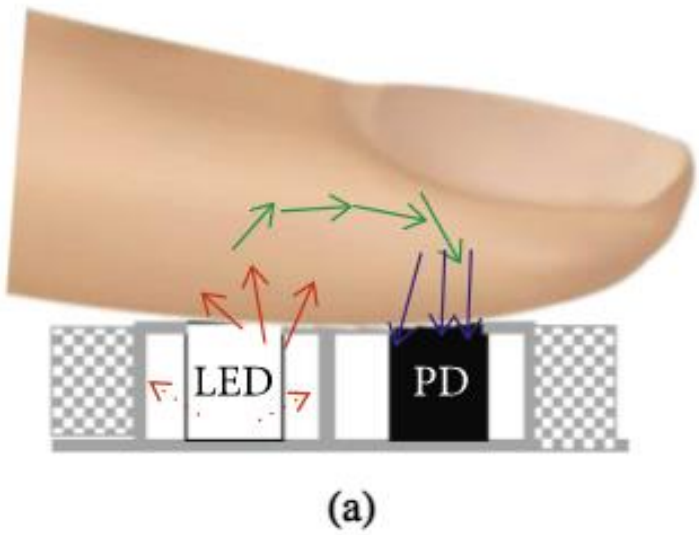
Auguste Comte (1798-1857)



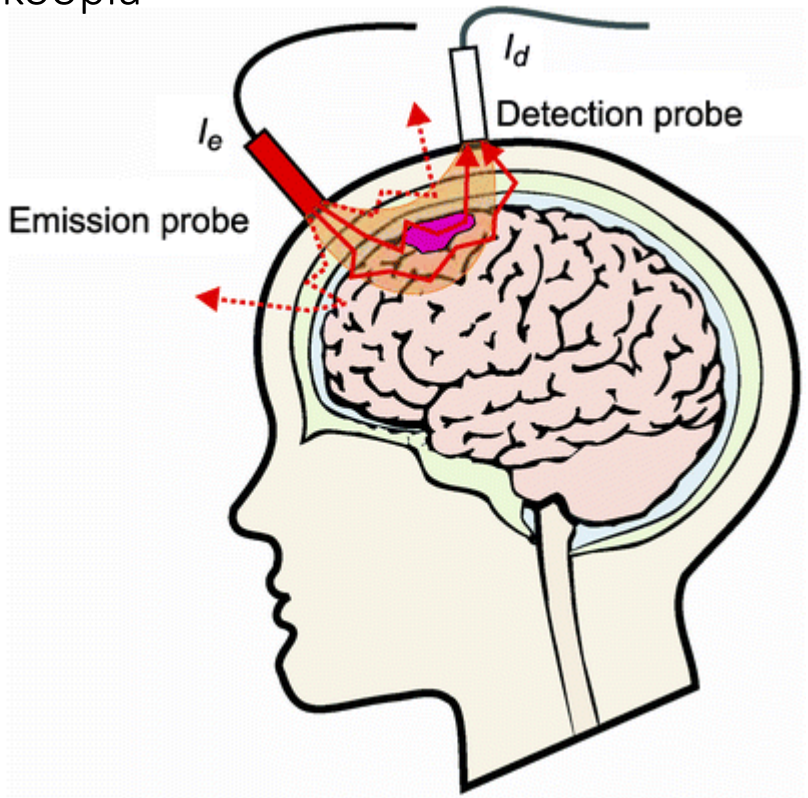
(Mee, 2012)

fNIRS ehk fotopletüsmograaf steroididel

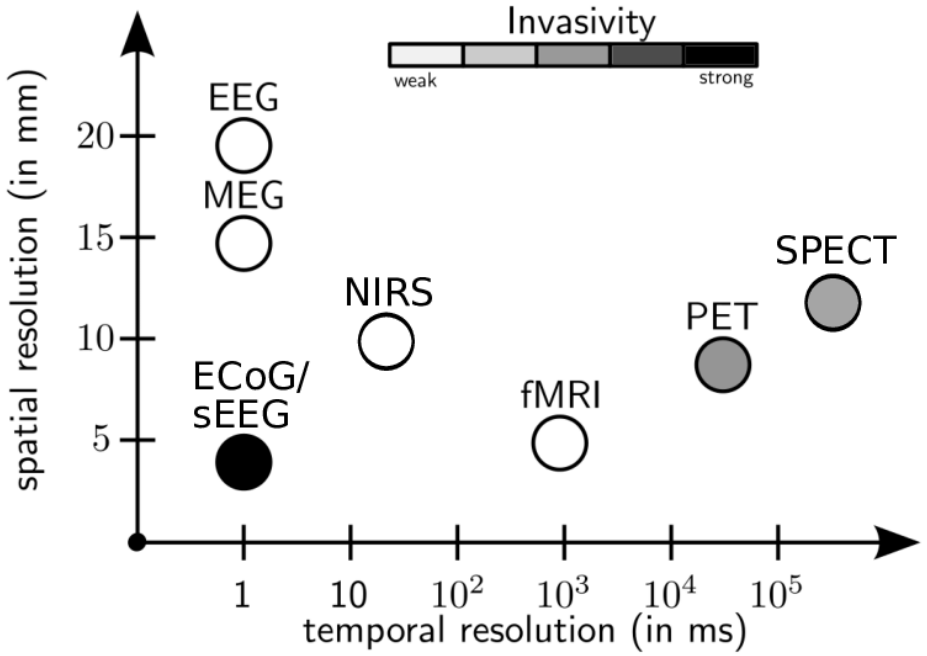
fNIRS – funktsionaalne lähiinfrapuna spektroskoopia



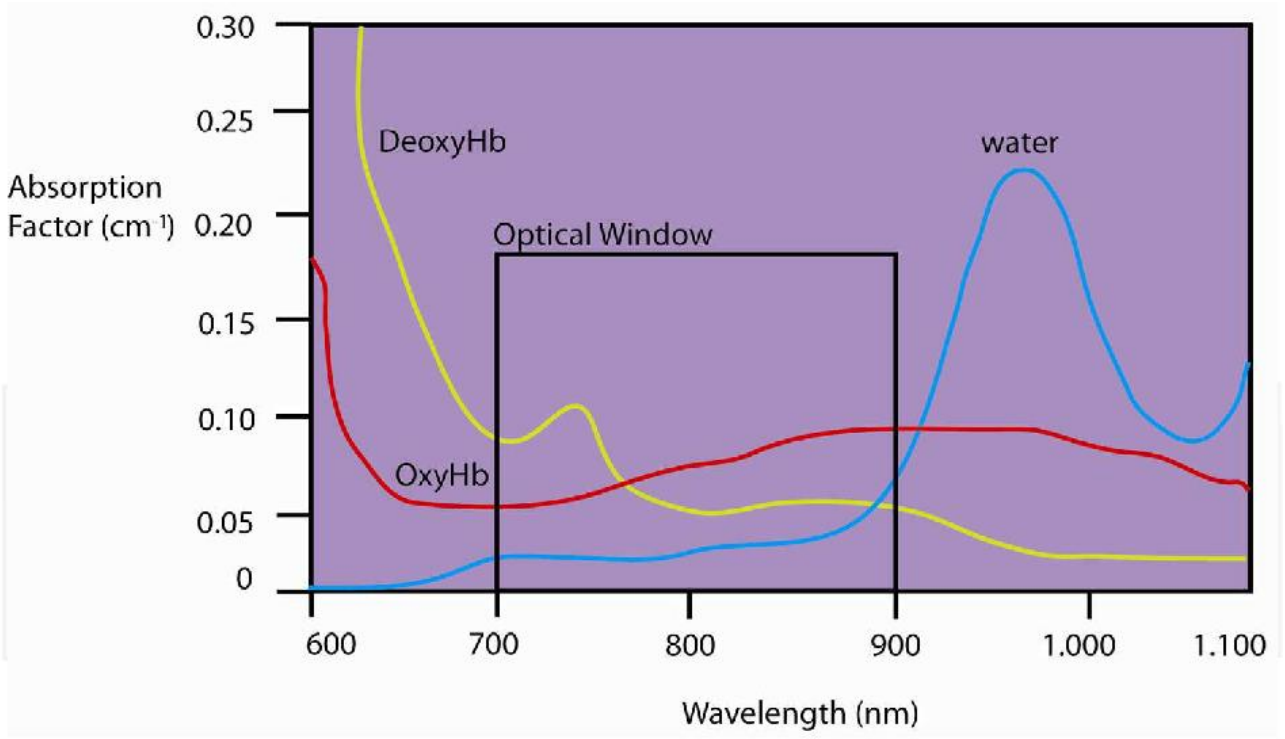
(Baek, Shin, & Cho, 2018)



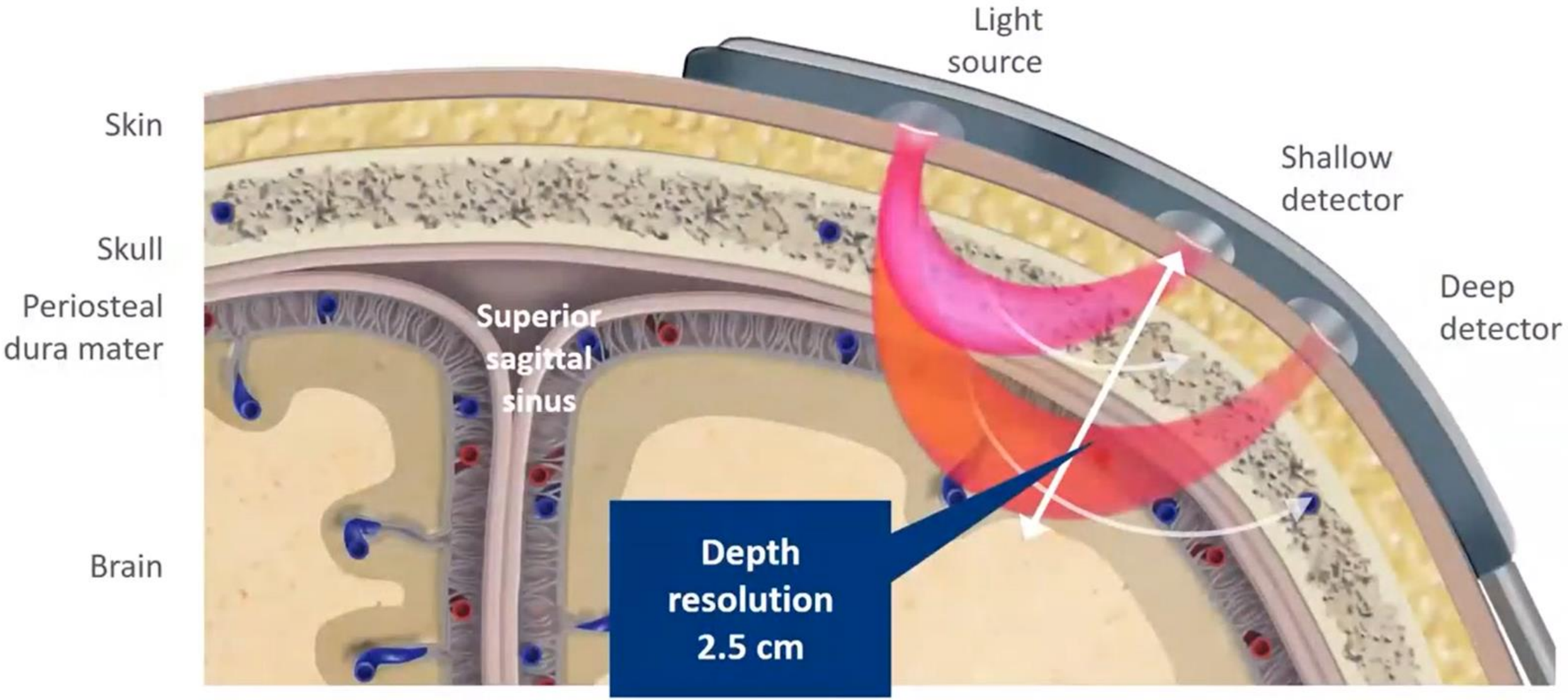
(Okada, 2013)



(Hitziger, 2015)

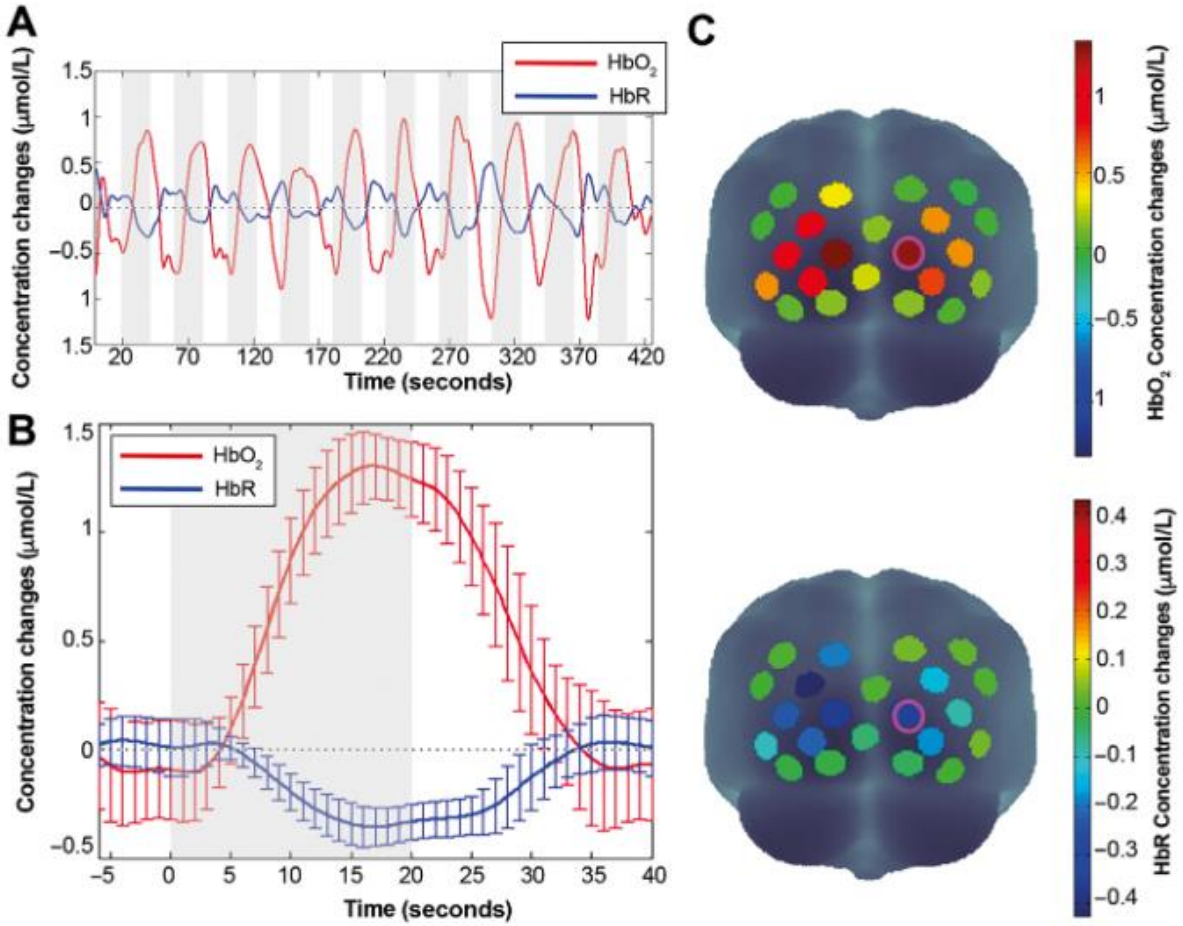


(León-Carrión, & León-Domínguez, 2012)



04 Marin T, Moore J. Understanding Near-Infrared Spectroscopy *J. Adv Neonatal Care* 2011 Dec;11(6):382-8

(Marin, & Moore, 2011)



(Pinti, Tachtsidis, Hamilton, Aichelburg, & Burgess, 2020)

fNIRS ehk fotopletüsmograaf steroididel

	fNIRS	fMRI	EEG
Ajaline lahutusvõime	keskmine	madal	kõrge
Ruumiline lahutusvõime	keskmine	kõrge	madal
Mobiilsus	kõrge mobiilsusega	väga madal	kõrge mobiilsus
Elektroonikaseadmetest tingitud artefaktid	ei	jah	jah
Esimene mõõtmine	90-ndatel	90-ndatel	1920-ndatel

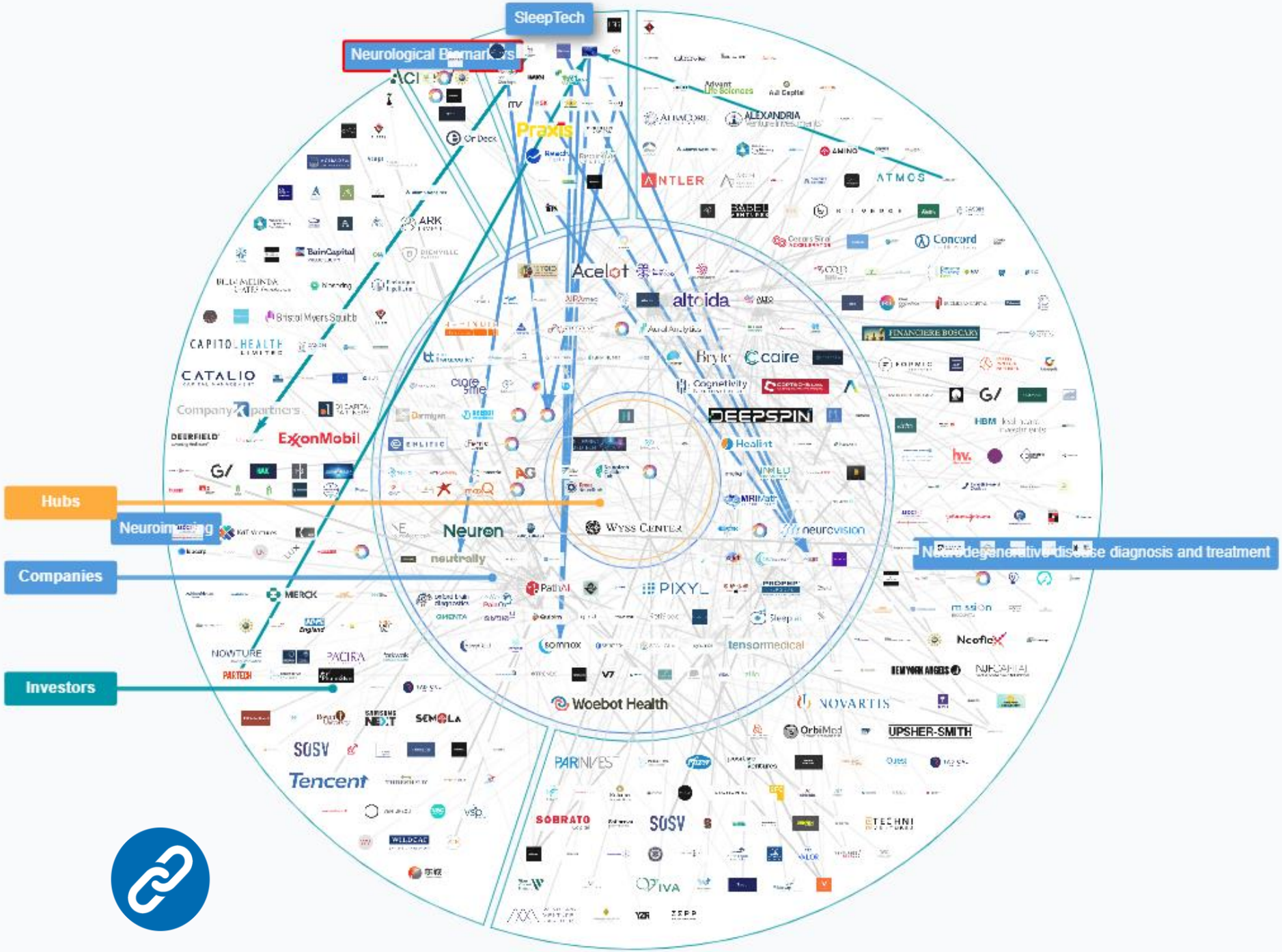
Erasmus+ programmiga Euroopasse praktikale

Infotund: Erasmus+ stipendium välispraktikaks

Uus toimumise aeg! Järgmine infotund toimub 11. detsembril 2024 | kell 15.00–16.00 Zoom vahendusel.

“Praktikaid saab teha programmi- või partnerriigis mistahes avaliku- või erasektori asutuses, sh kõrgkoolides, mis on tööturul aktiivsed või haridus-, koolitus-, teadus-, noorte- või innovatsioonivaldkonnas.“

Registeeri oma osalemine siin →


SleepTech
Neurological Biomarkers
Hubs
Companies
Investors
Neuroimaging
Neurodegenerative disease diagnosis and treatment
Praxis
Acelot
altoida
Cognetivity
DEEPSPIN
Healint
Neuron
Wyss Center
neurovision
neutrally
PIXYL
somnox
tensormedical
Woebot Health
NOVARTIS
UPSHER-SMITH
Tencent
SOSV
SOBRATO
PARINVES
IVA
ANTLER
ATMOS
Concord
ALEXANDRIA
Bristol Myers Squibb
ExxonMobil
MERCK
Ncoflex

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Aitäh!