

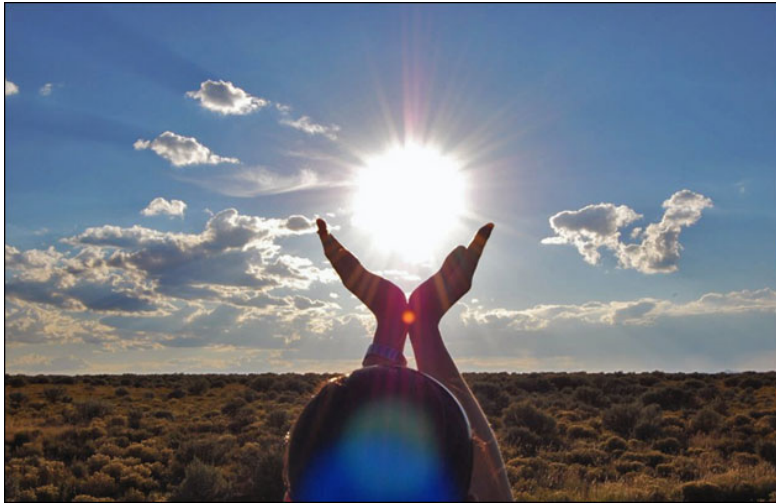
Nasjonalt studieveilederseminar, 22.09.15

Hjernen 2.0

Gaute T. Einevoll

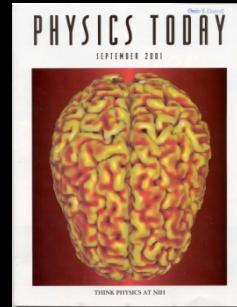
Norges miljø- og biovitenskapelige universitet, Ås;
Universitetet i Oslo

INSPIRASJON



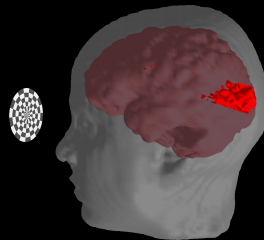
Avbildning av hjerneaktivitet på systemnivå

- *Hjernestruktur:*

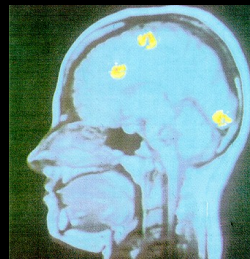


MRI → "vev"

- *Hjerneaktivitet:*



fMRI → "blod"



PET → "mat"



**MEG/
EEG** → "elektrisitet"

- Tankelesing



- Telekinese



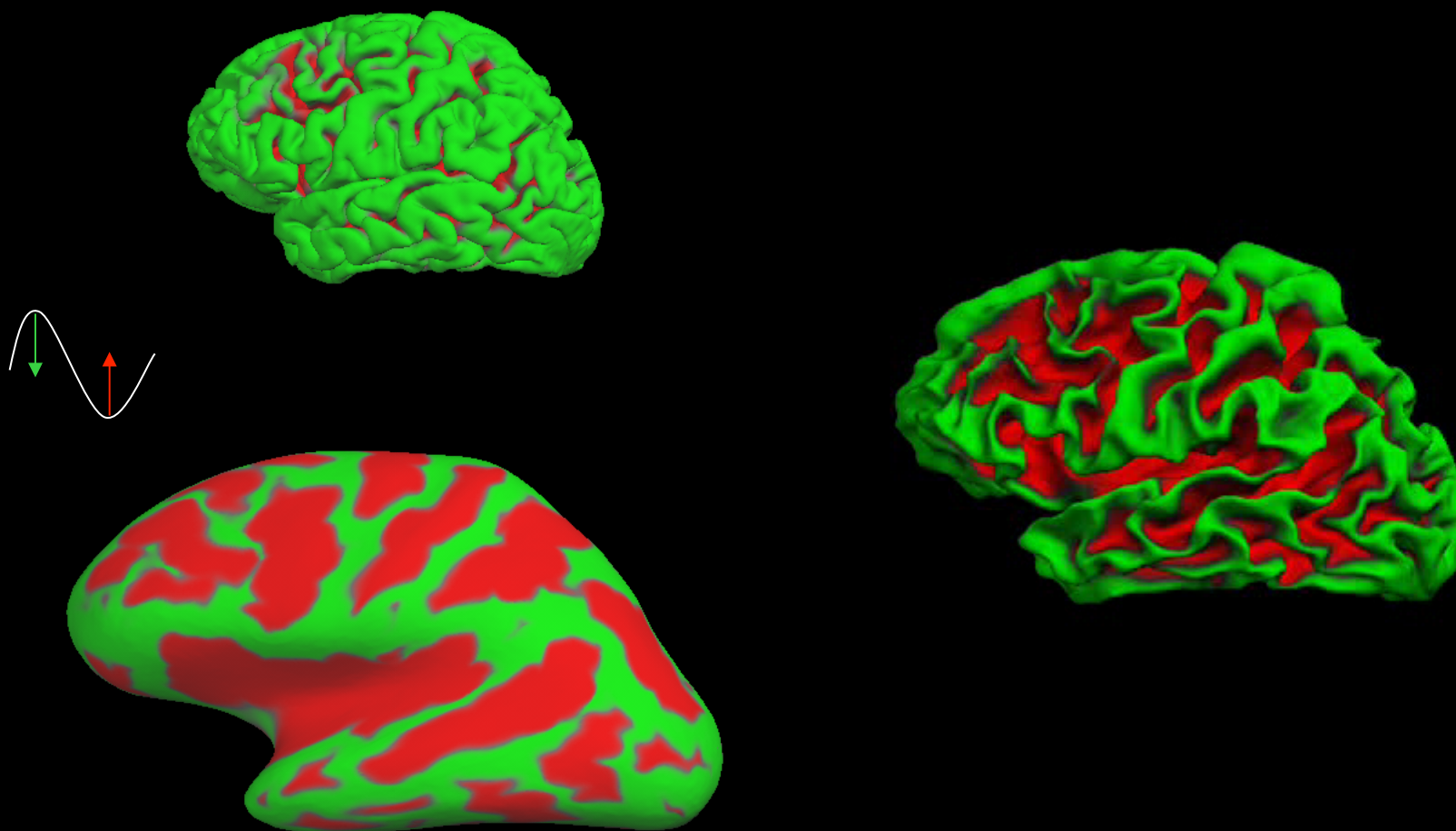
- Hjerneproteser



- Tankeoverføring

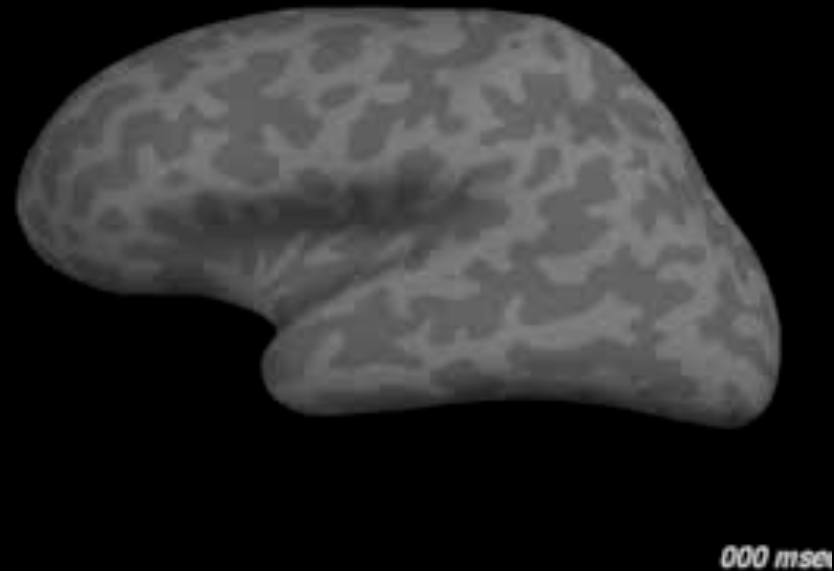
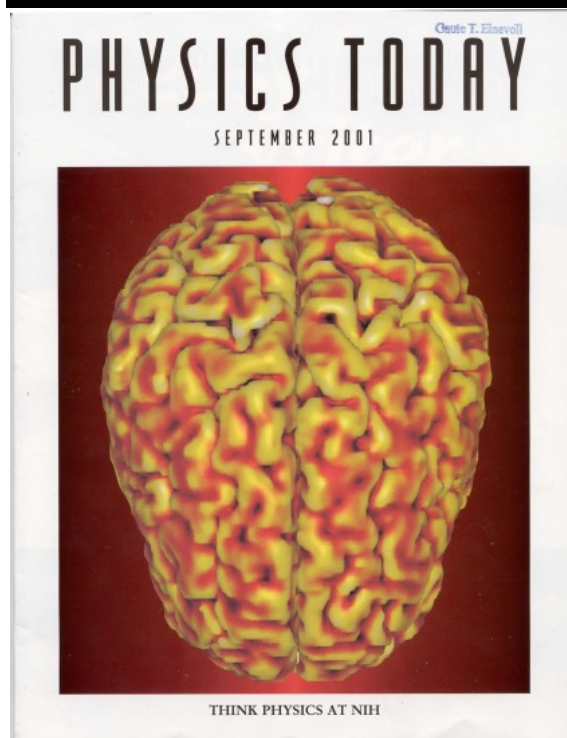
- Hjerneavlytting
- Telekinese
- Hjerneproteser
- Tankeoverføring

Overflateekspansjon



Kombinert bruk av MEG og MRI

- Respons når en ser ukjente ord



Analyse og animasjon av
Anders Dale, UC San Diego

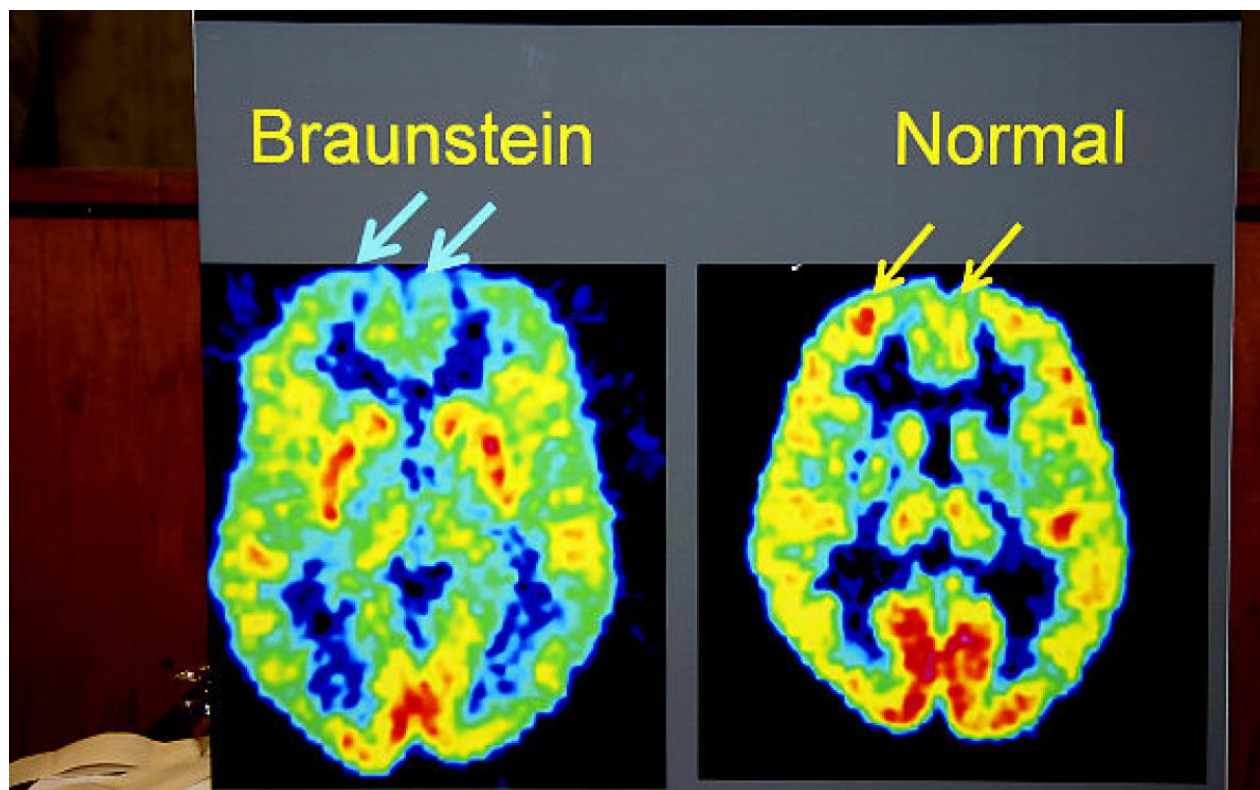
Løgndetektor?

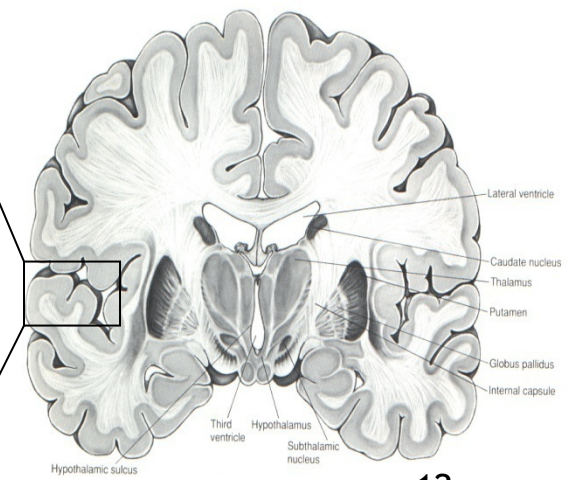
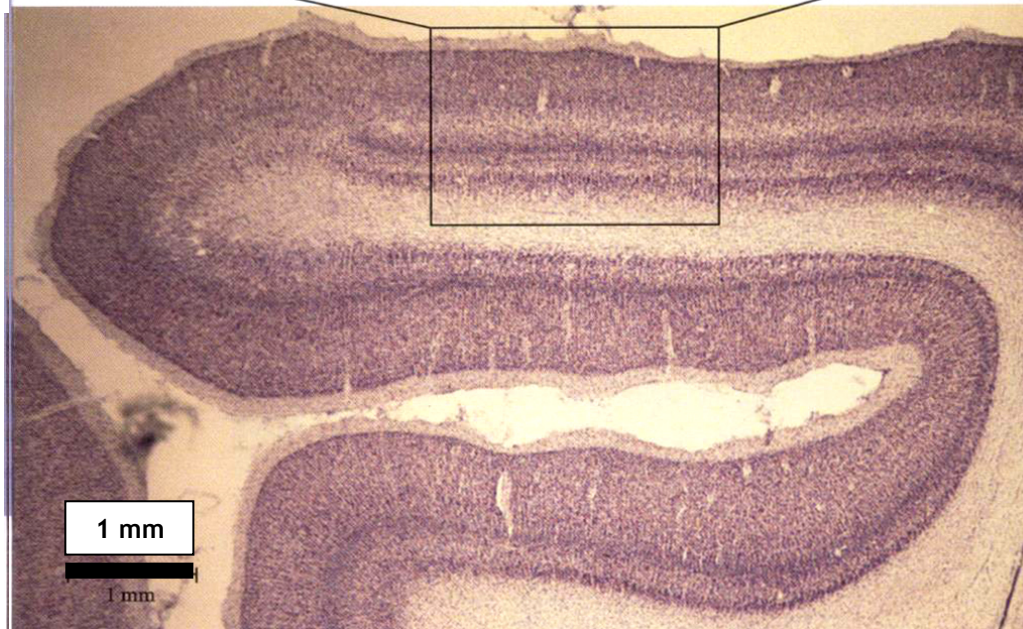
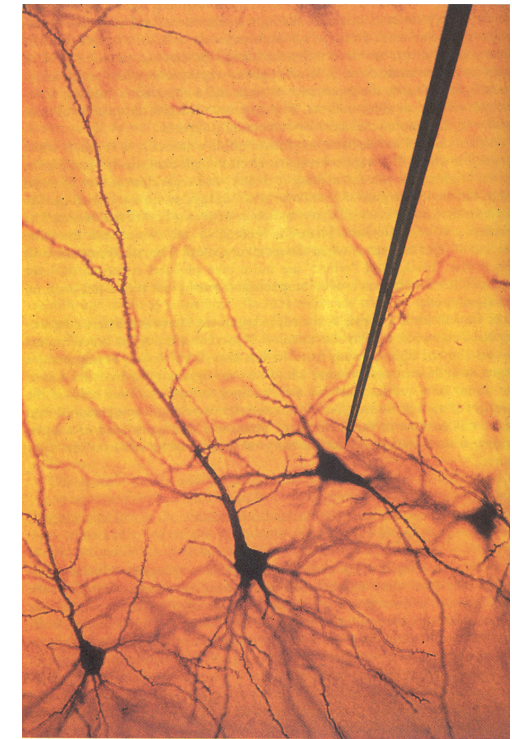
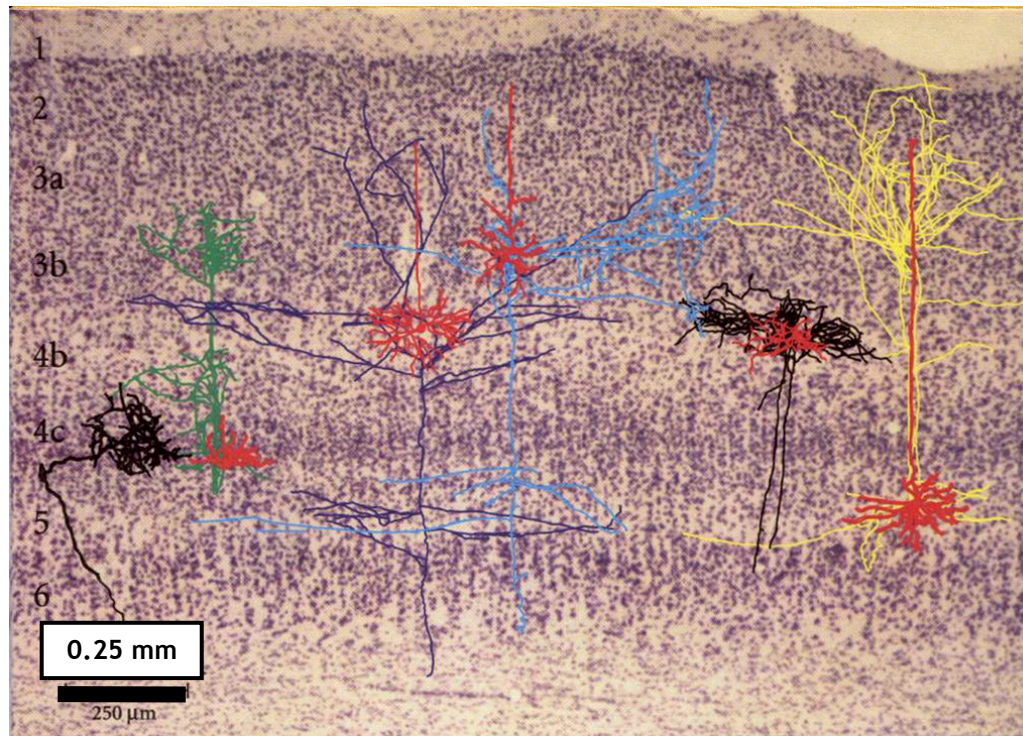




Hjernen min har skylda ...?

- Peter Braunstein (f. 1964): Dømt i New York i 2007 for kidnapping, seksuell vold, tyveri, ...



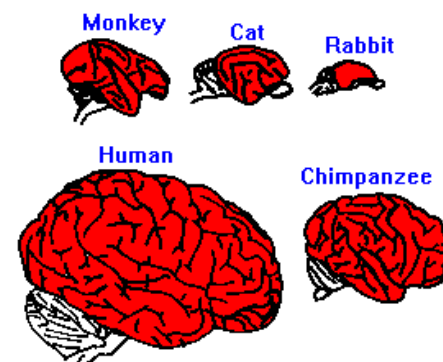
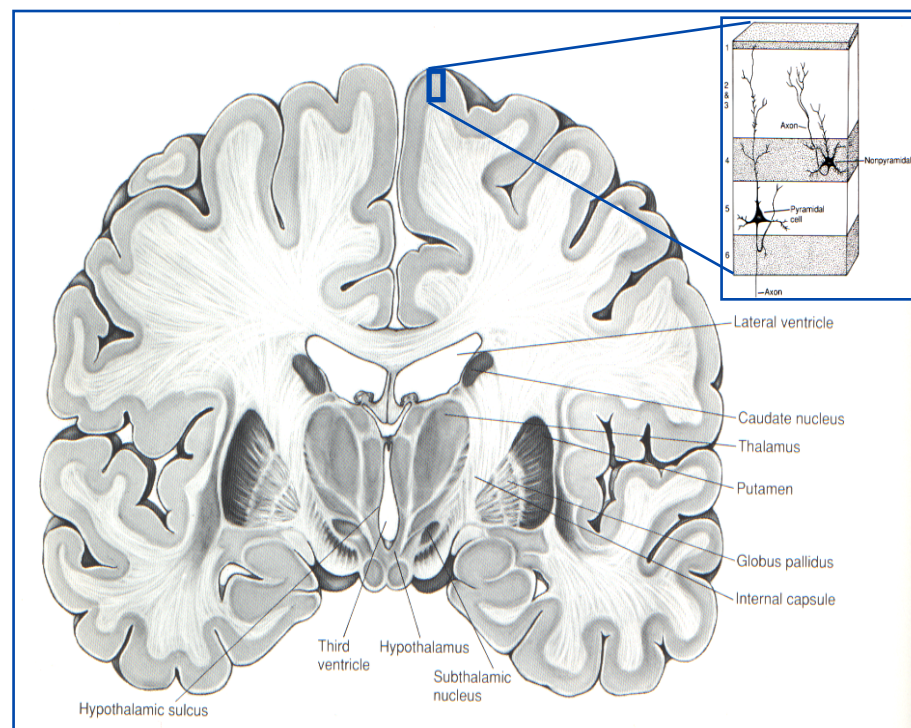


Hjernens byggesteiner

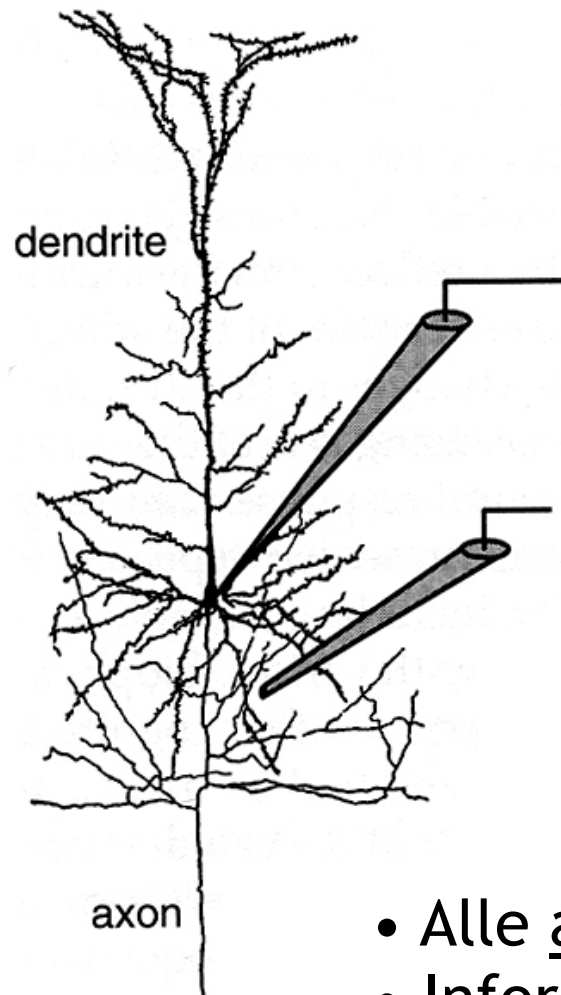
Mental aktivitet skyldes nettverk av nerveceller

- $\sim 10^{11}$ nerveceller (nevroner)
- $\sim 10^{14}$ nevronkoblinger (synapser)
- hjernebark (mennesker):
tykkelse $\sim 2-4$ mm
areal ~ 2000 cm²

Mindre, men kvalitativ
lik, hjernebark i andre
pattedyr



Elektroden



- Alle a
- Inform

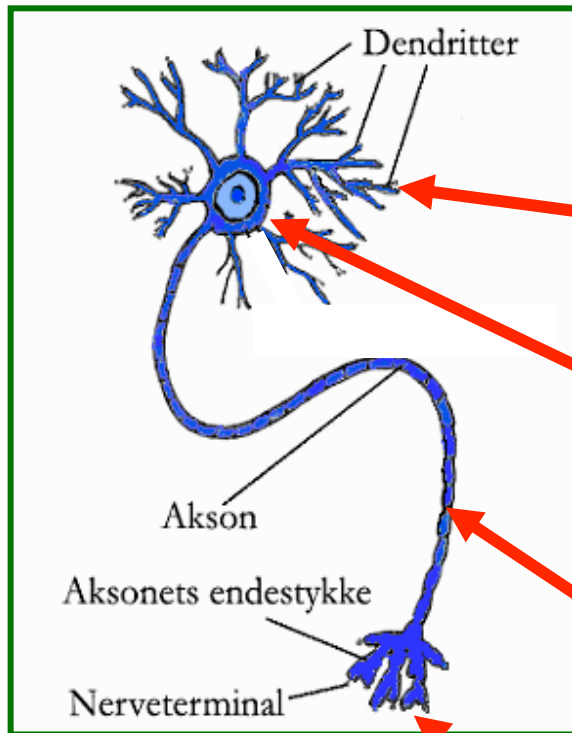


iling
net

iling rett
onet

ene

Fysikk i nerveceller

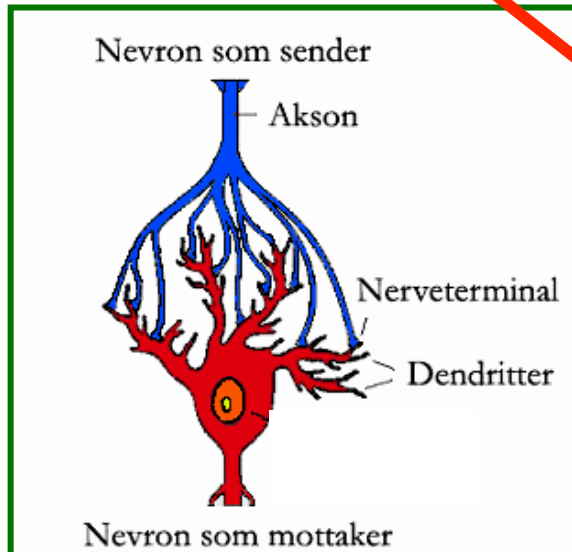


DENDRITTER: Innkommende signal spres elektrisk til cellekropp (soma)

CELLEKROPP (SOMA): Fyrer et *aksjonspotensial* hvis membran-spenning passerer en terskel

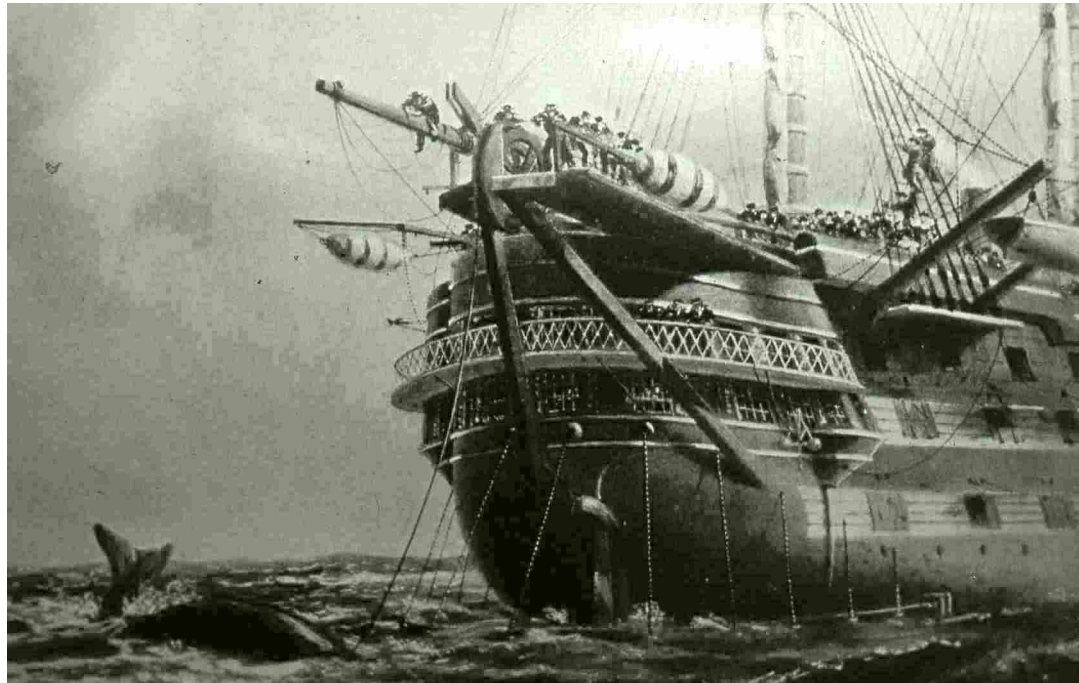
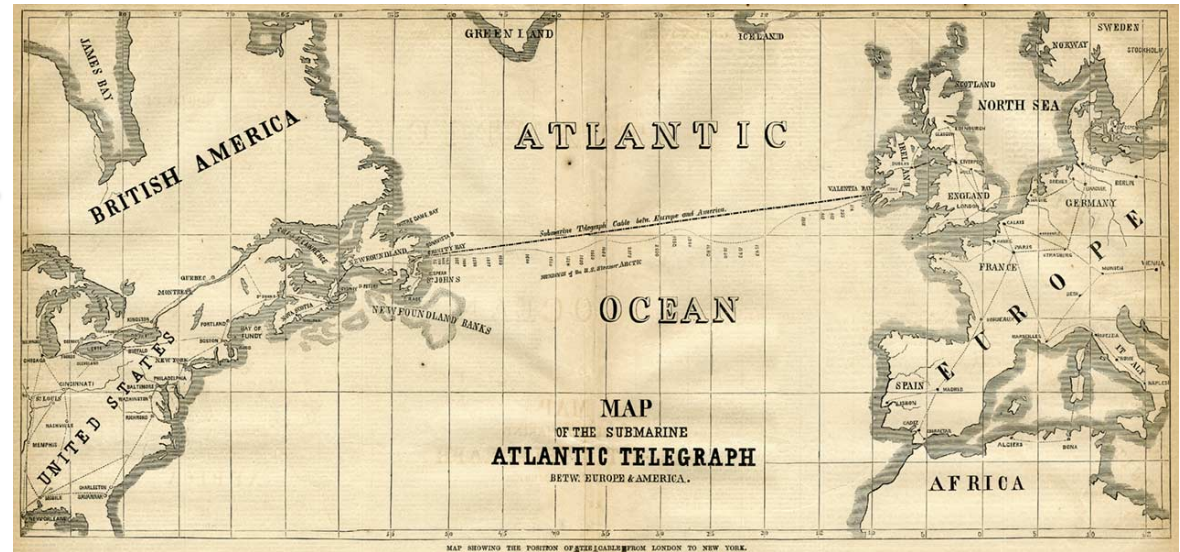
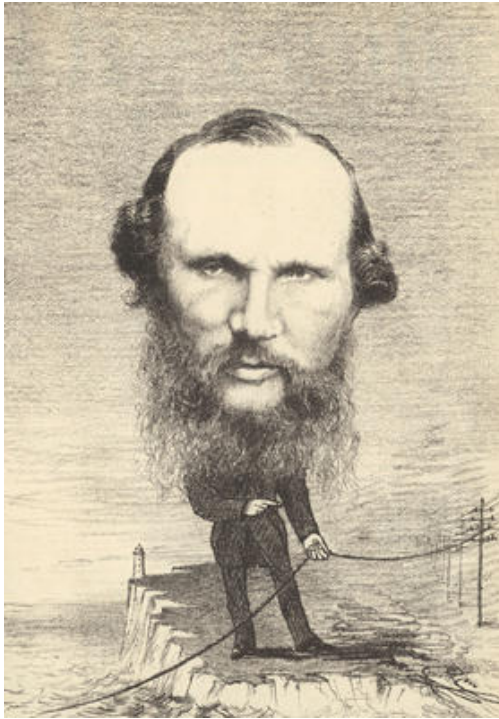
AKSON: Aksjonspotensialer beveger seg uten dempning til synapse (nerveterminal)

SYNAPSE: Diffusjon av signal-molekyler (over synaptisk kløft) endrer membranpotensial på mottakernevronet



**MATEMATISKE BESKRIVELSER
FINNES FOR ALLE DELPROSESSER**

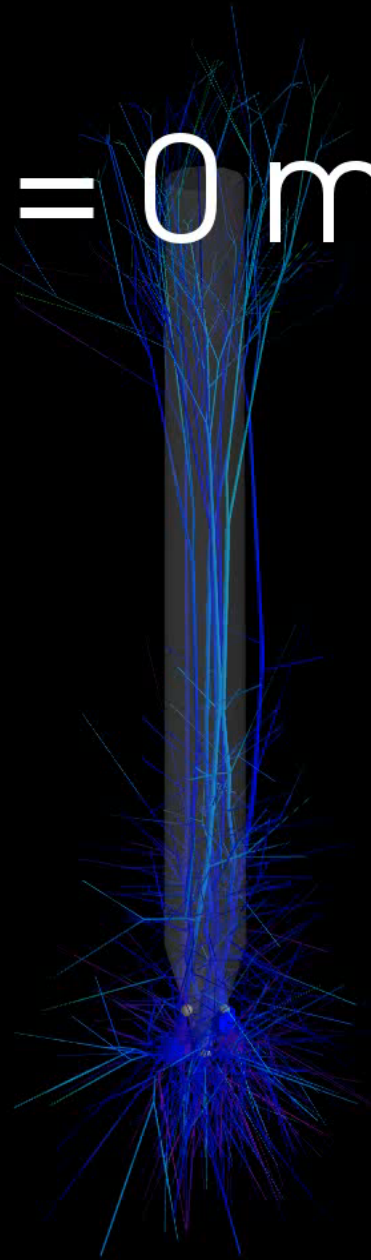
Lord Kelvins transatlantisk kabel & kabelligningen



V_m

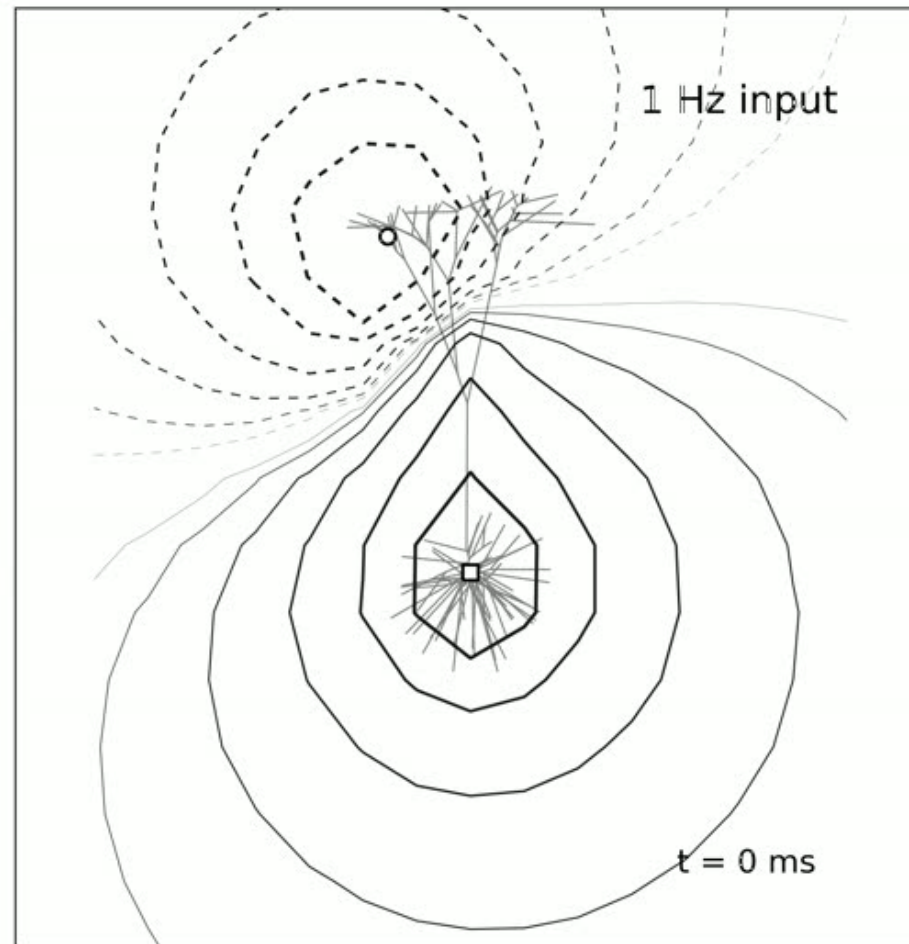


$t = 0$ ms



Animasjon
laget av
Espen
Hagen på
NMBU

Nerveceller sender ut elektriske signaler

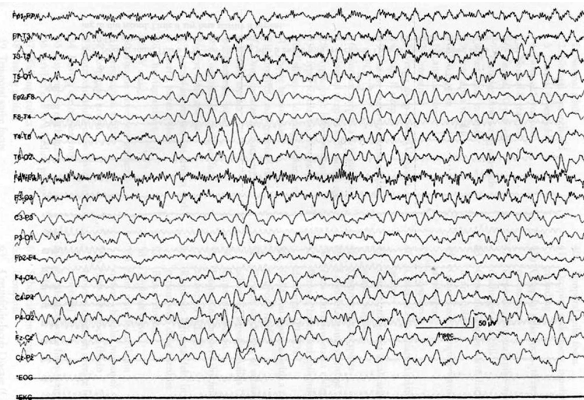


Animasjon
laget av
Henrik
Lindén på
NMBU
18

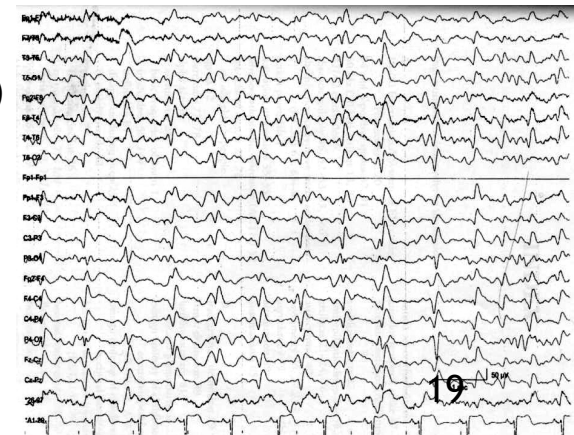
EEG



frisk baby
på 7
måneder



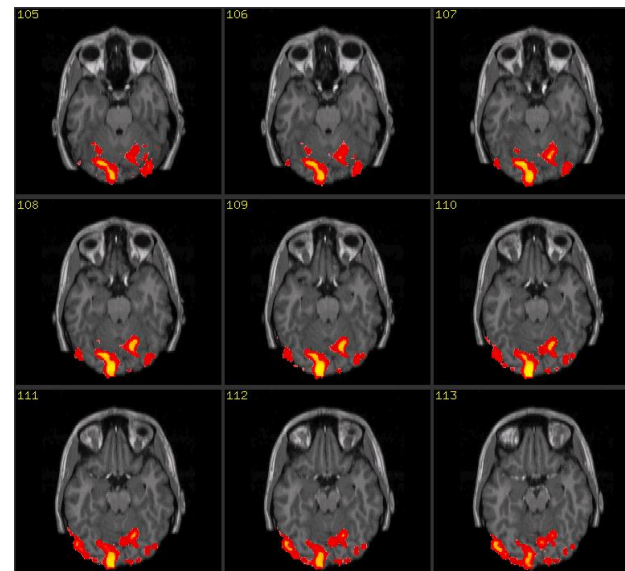
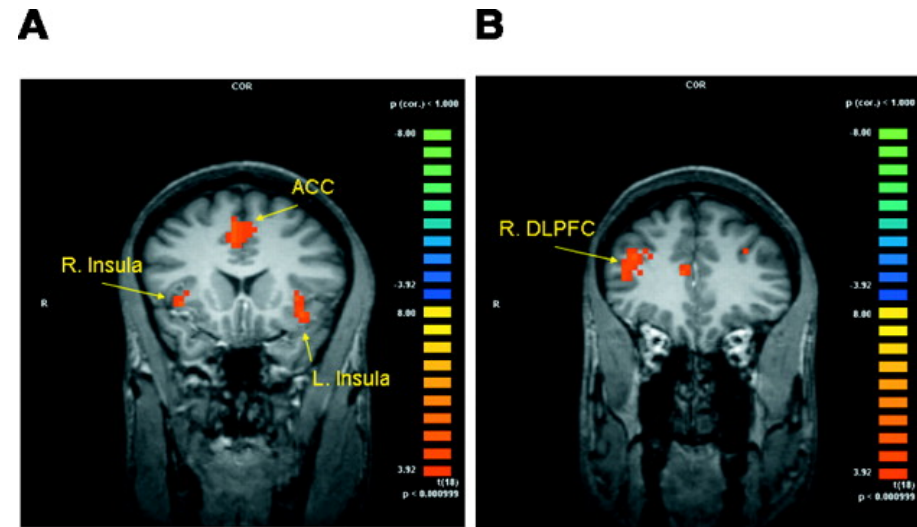
dame (71 år)
med
Creutzfeldt-
Jacobs
sykdom



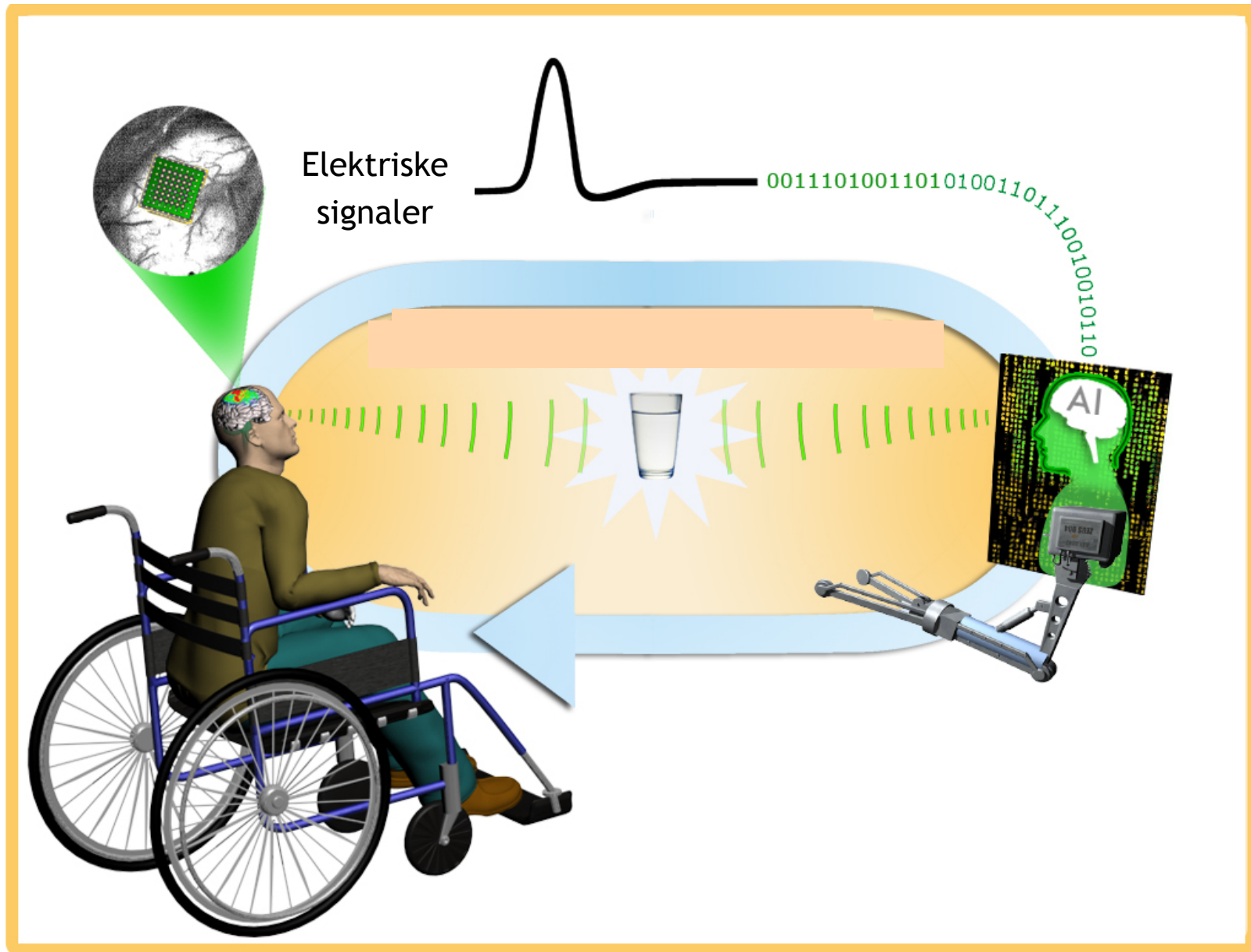
Nevromarkedsføring

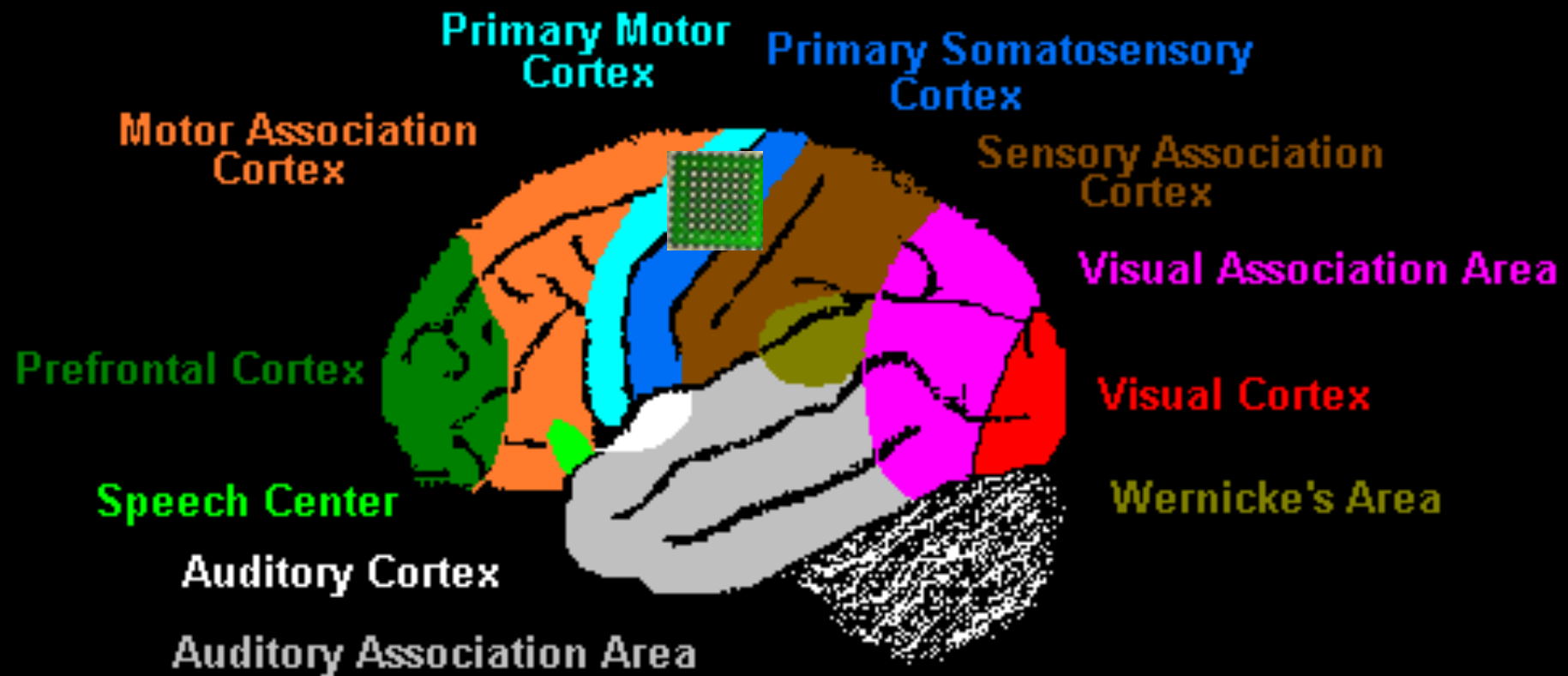
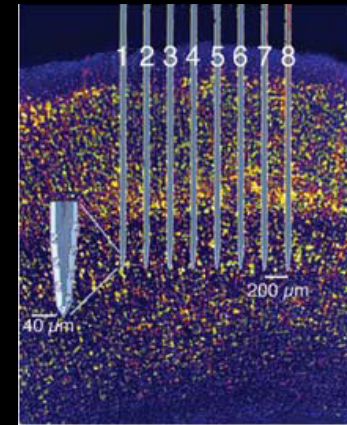


- Hva skjer i hjernen når fornuften konkurrerer med følelsene?
- Pepsi vs. Coca Cola:

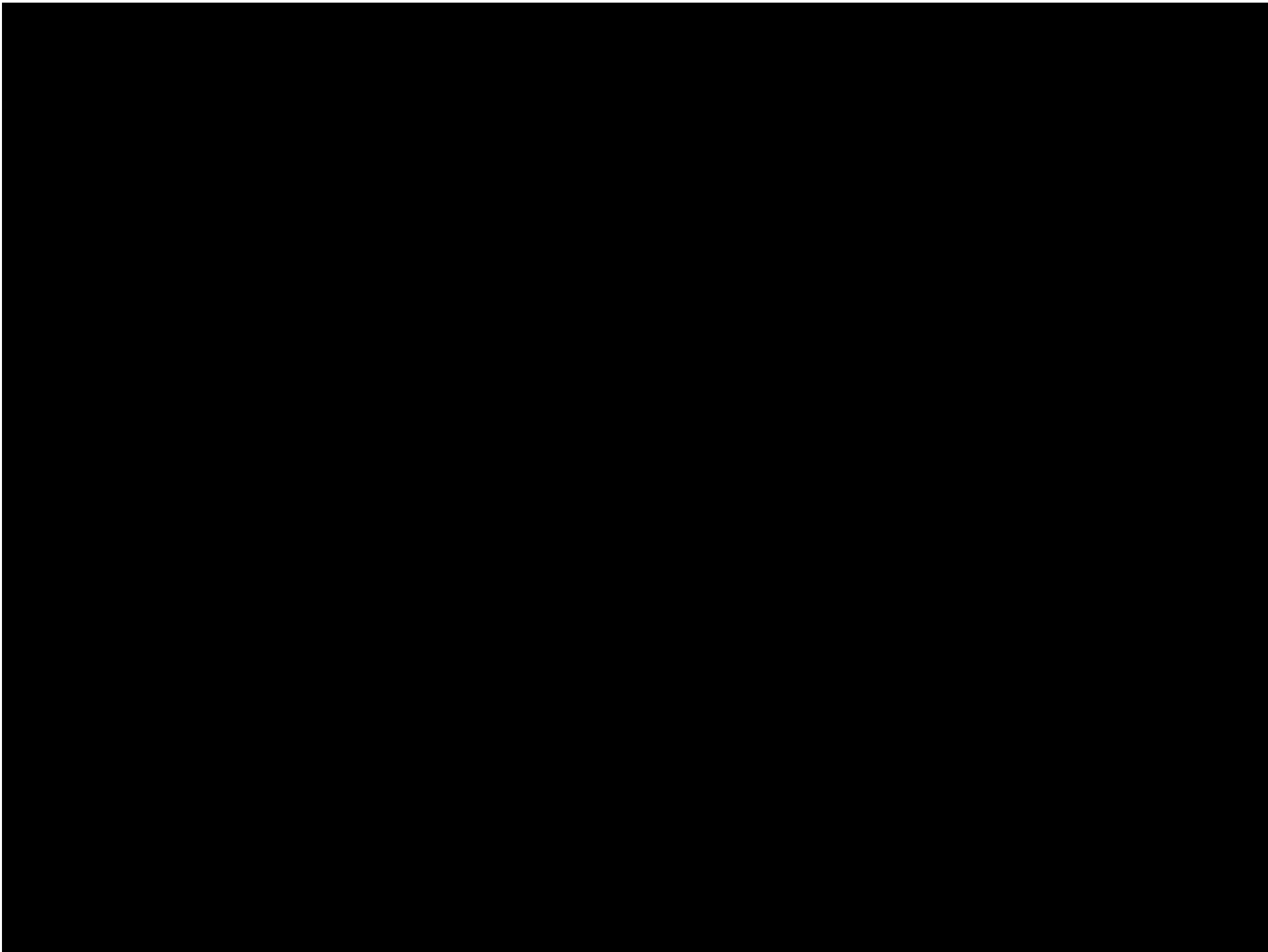


- Hjerneavlytting
- **Telekinese**
- Hjerneproteser
- Tankeoverføring





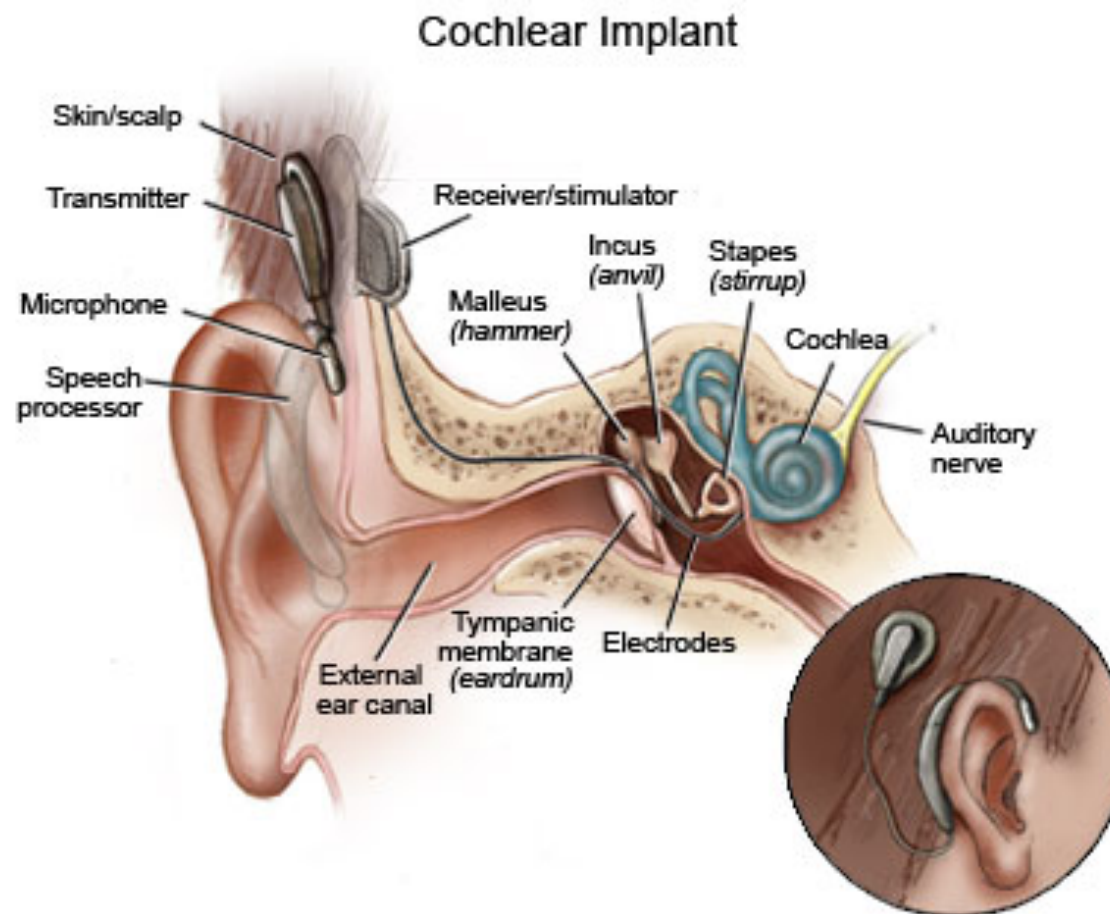




- Hjerneavlytting
- Telekinese
- Hjerneproteser
- Tankeoverføring

Cochlea implantat

- 300-400.000 med implantat verden over



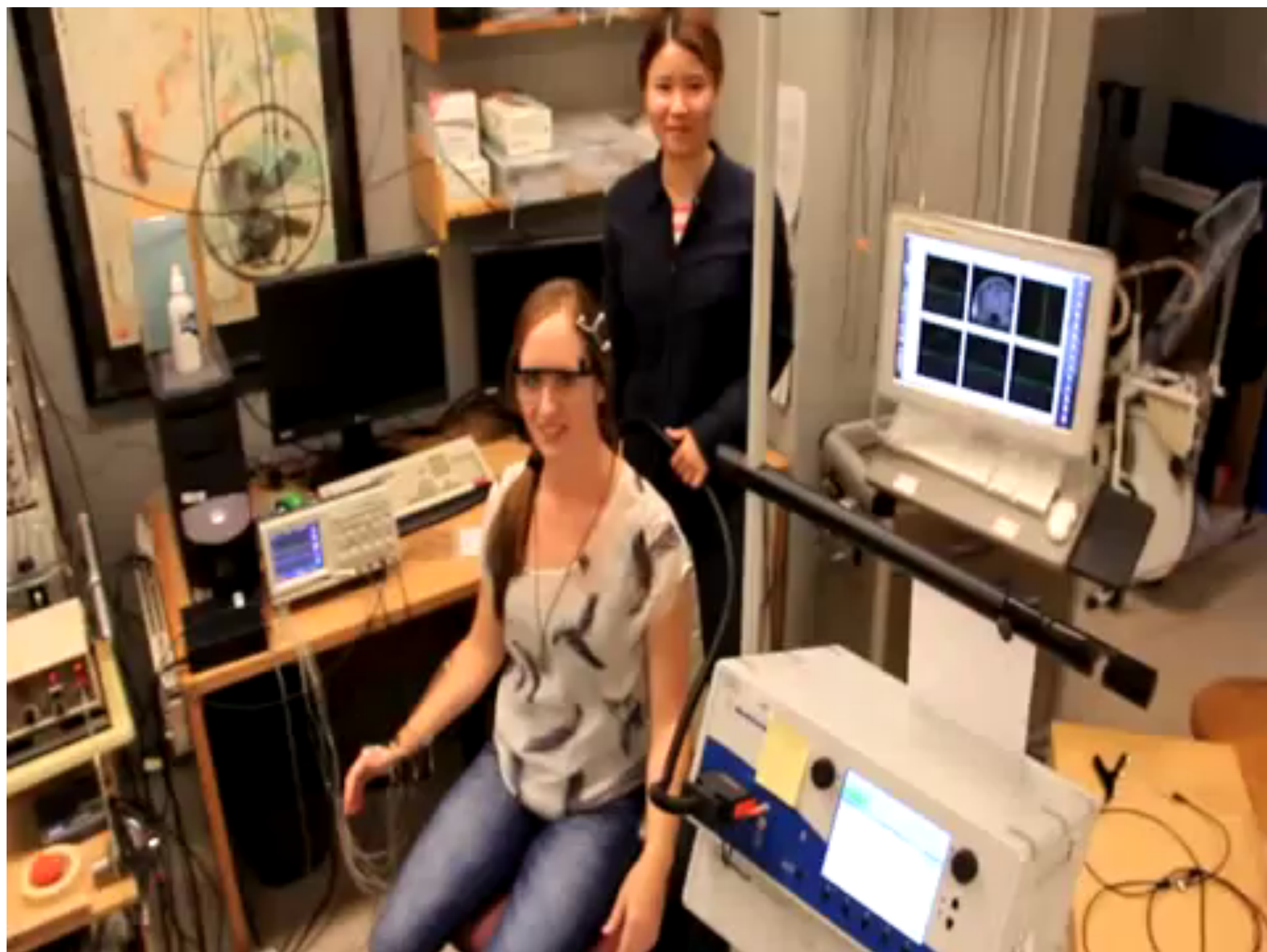
Alternativ til piller: Hjernestimulering med elektriske strømmer/magnetisk felt



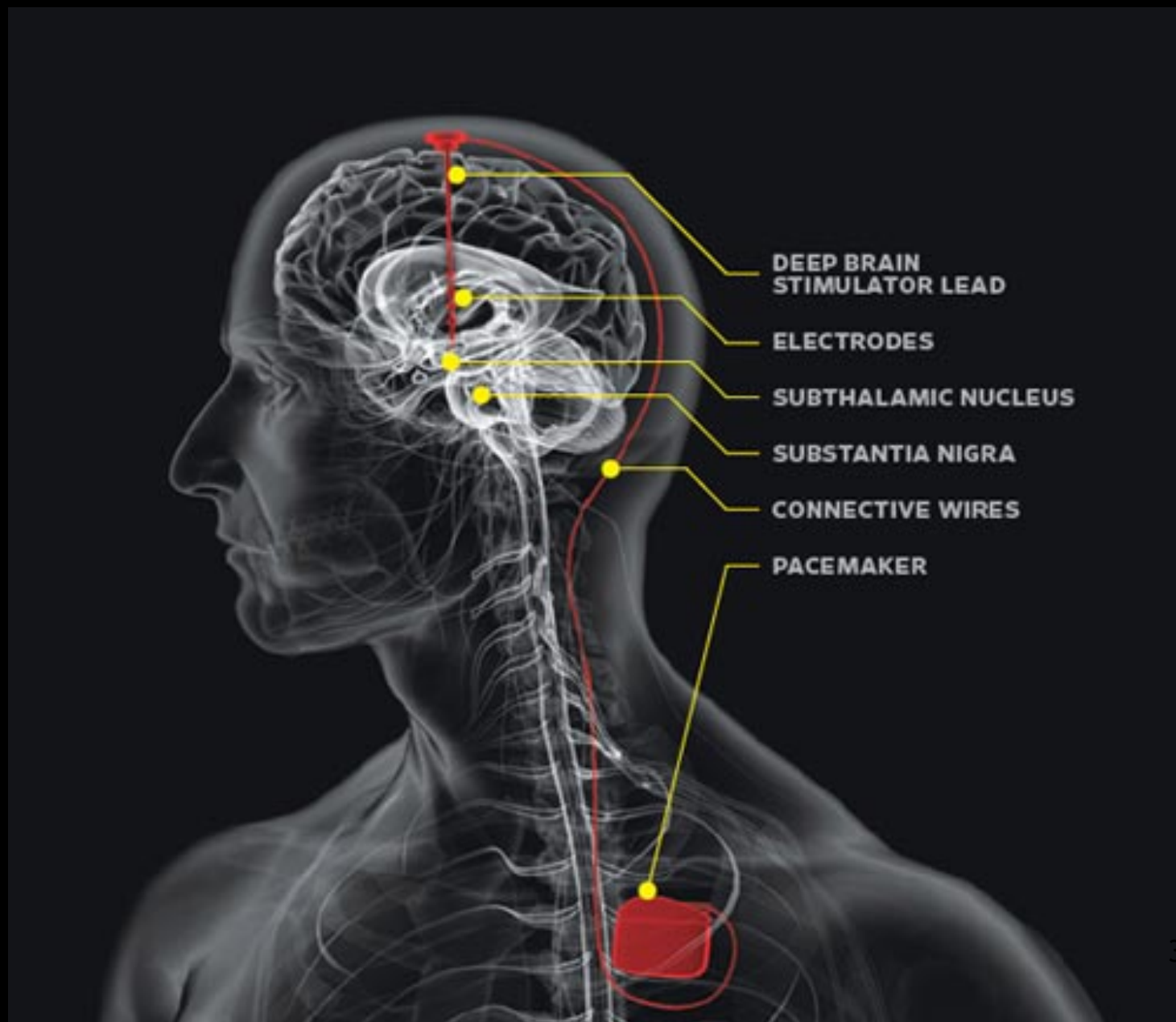
TMS: transkraniell magnetisk stimulering



*Dr. Dave's Best
"Instant Einstein"*



"Deep brain stimulation"





- Hjerneavlytting
- Telekinese
- Hjerneproteser
- **Tankeoverføring**

Brain-to-Brain Interface in Rats



Encoder Setup



Decoder Setup

Kan vi regne ut hvordan vi tenker?



HBP

The Human Brain Project

www.humanbrainproject.eu

Initial HBP Consortium

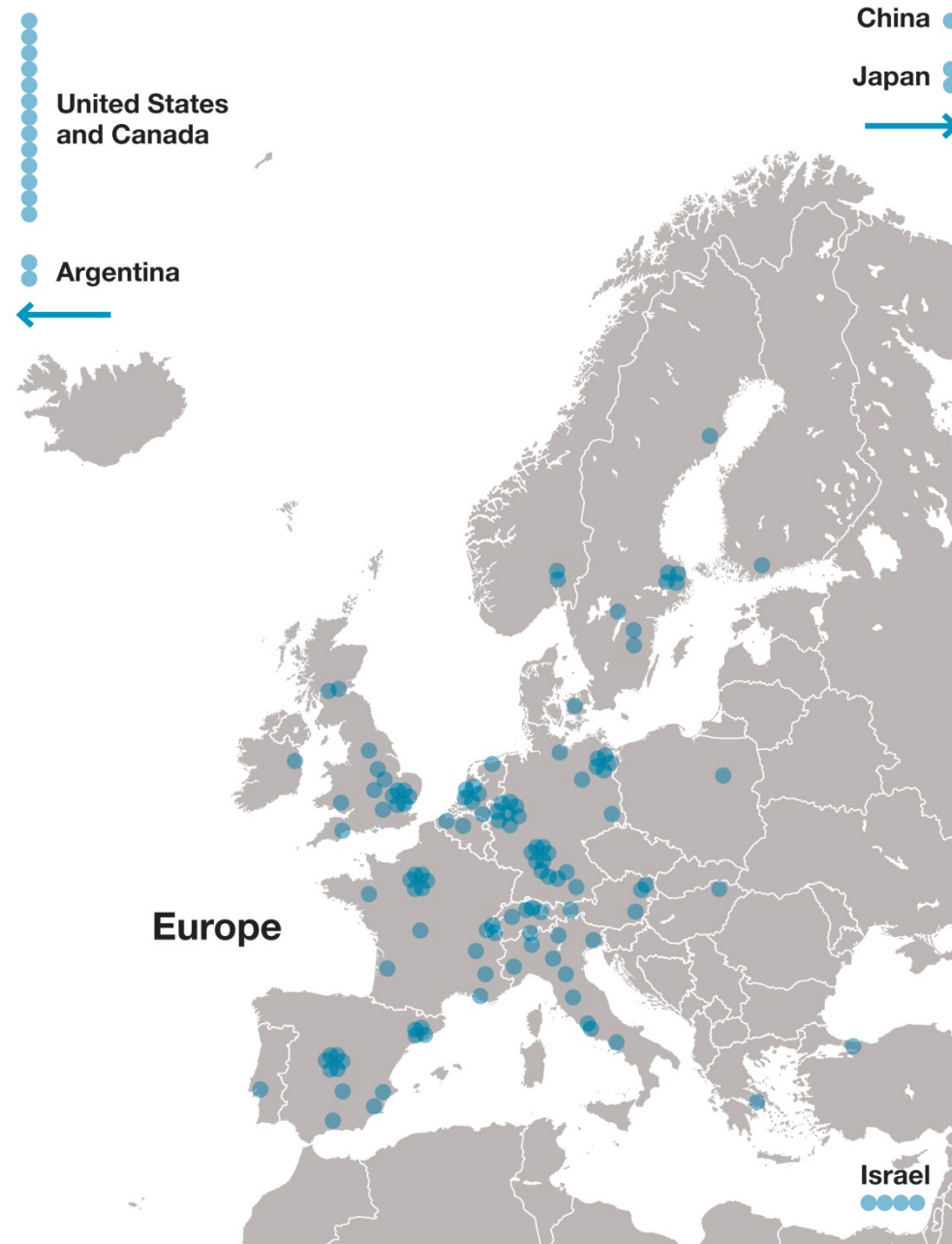
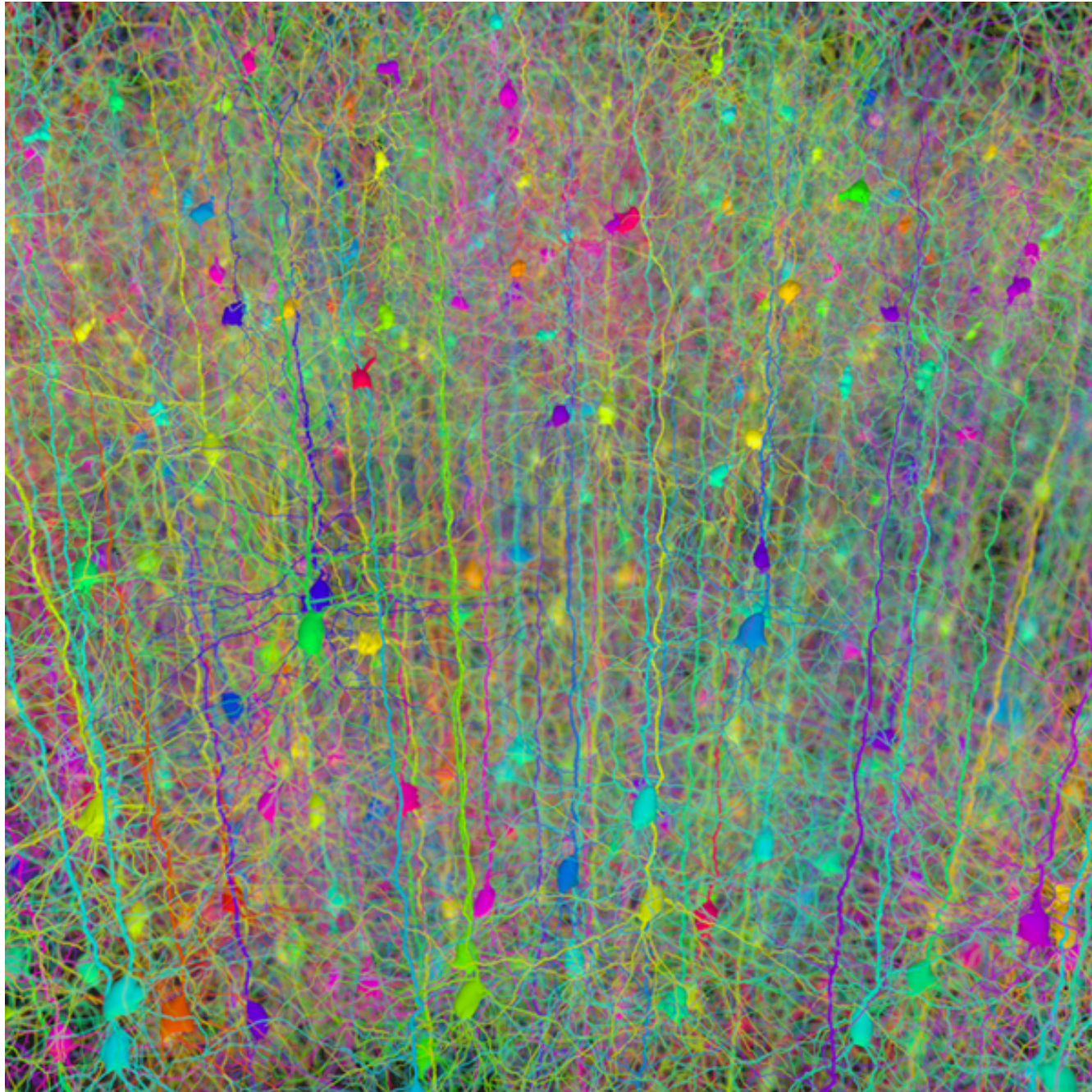
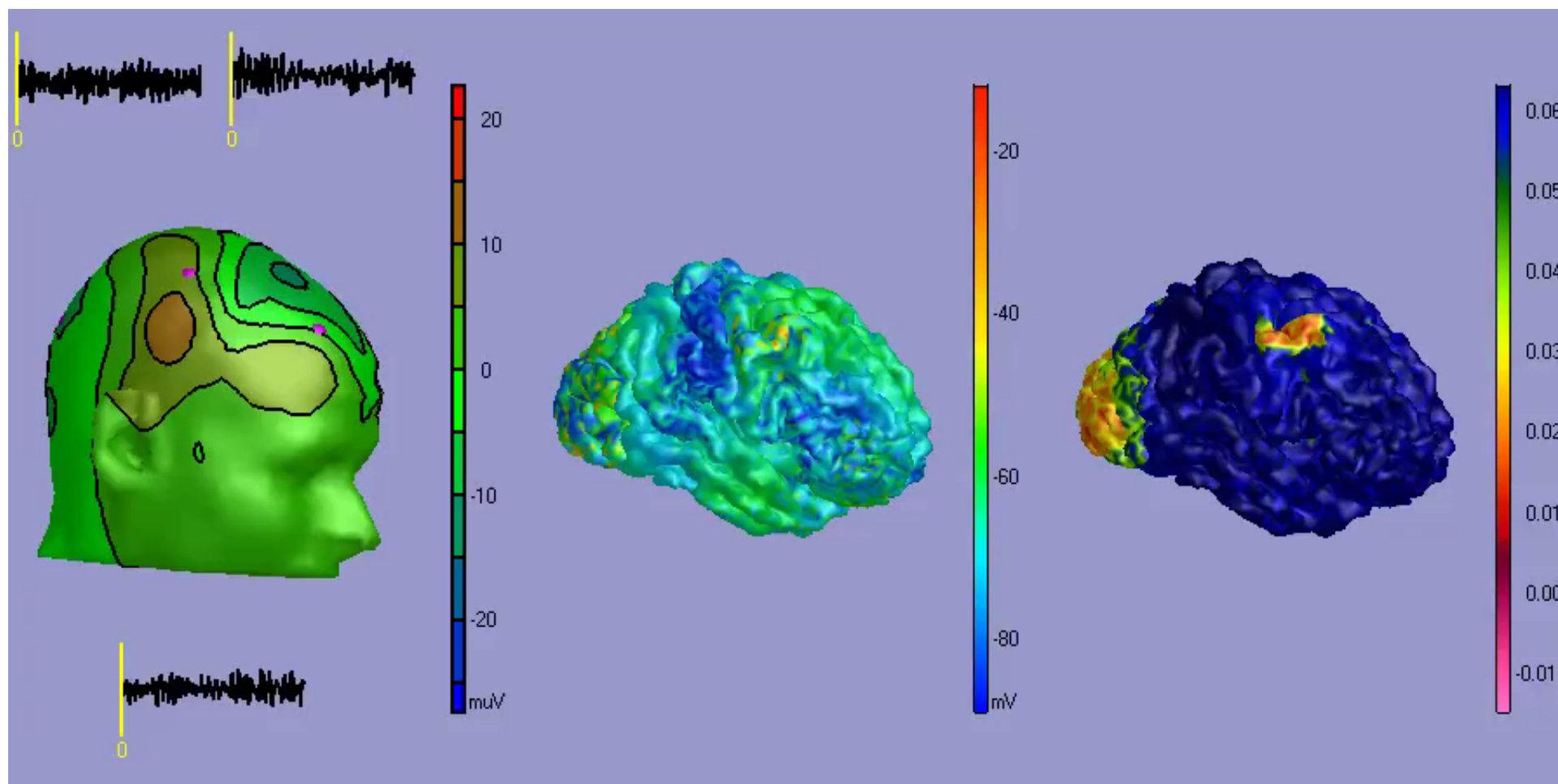


Figure 40: Research institutions identified to participate in the HBP, if approved as a FET Flagship Project









2003: Menneskers genom (DNA) avdekket





Meet the Maker:
Backyard Brains

