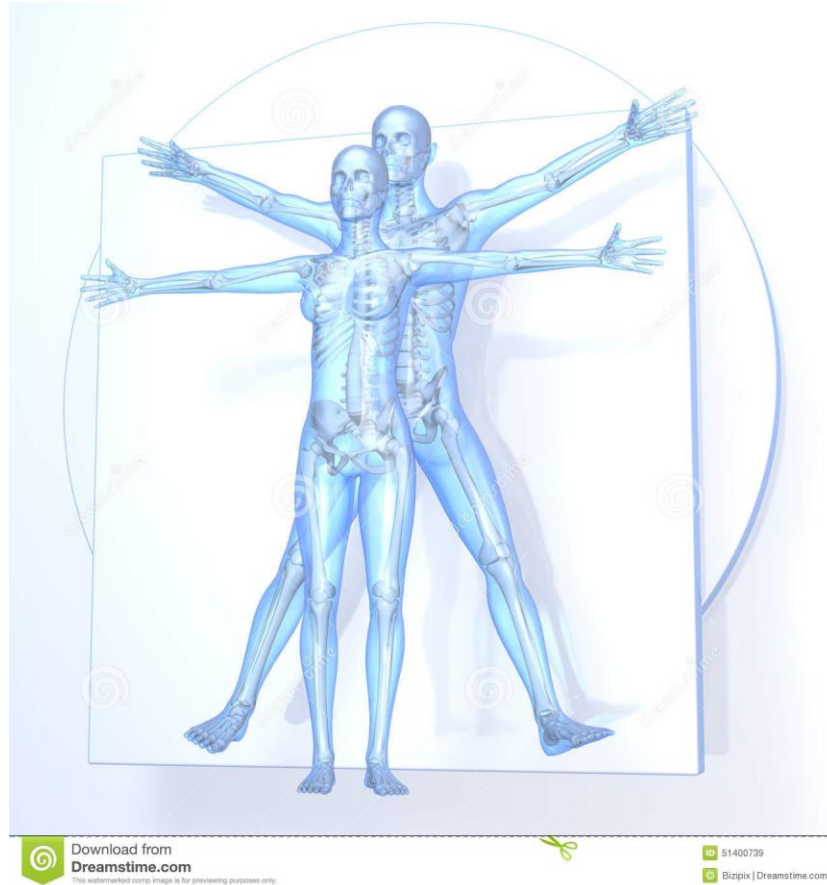


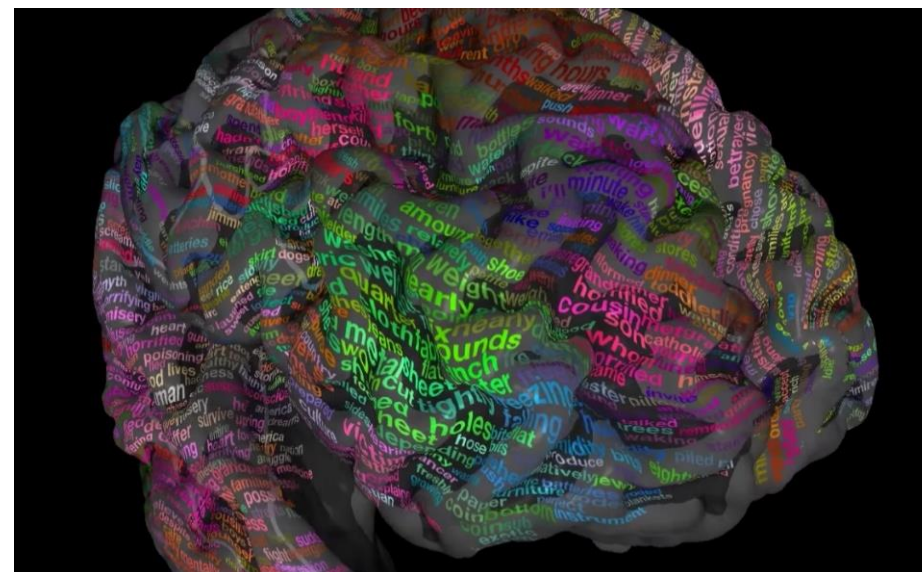
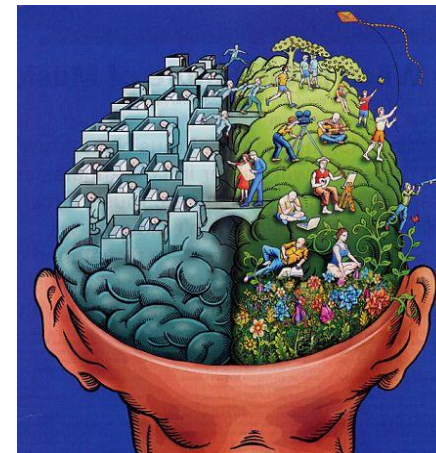
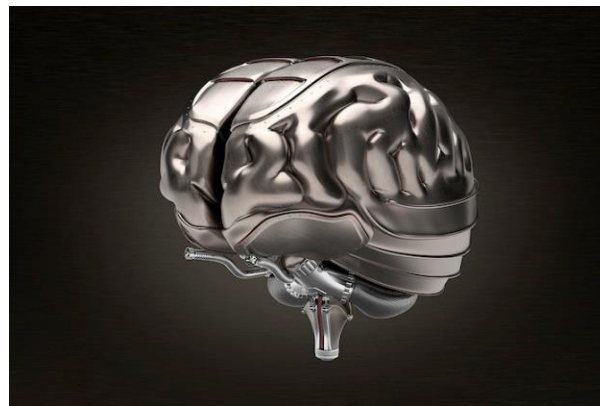
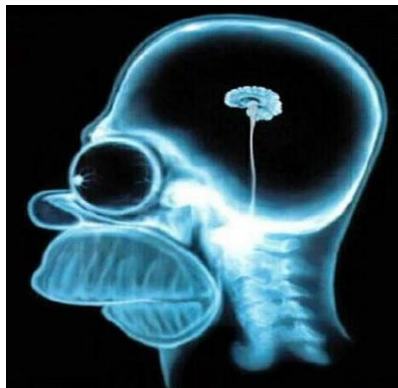


Komplexitet

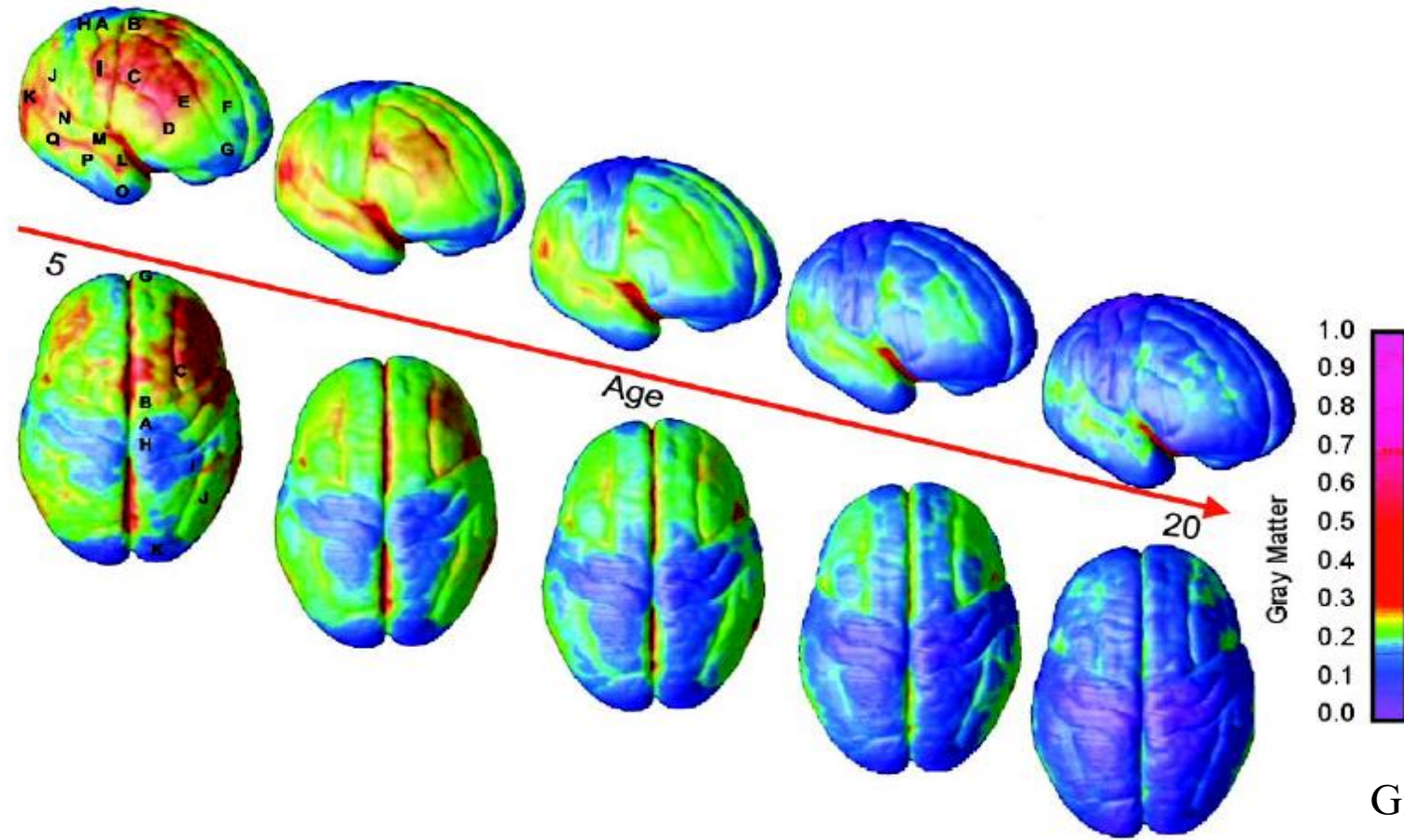




Myter



Plasticitet



Giedd et al. 2004

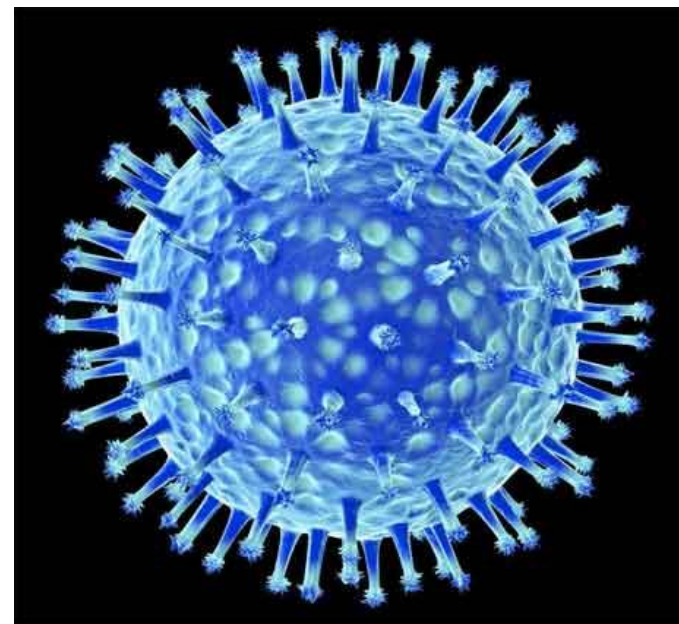
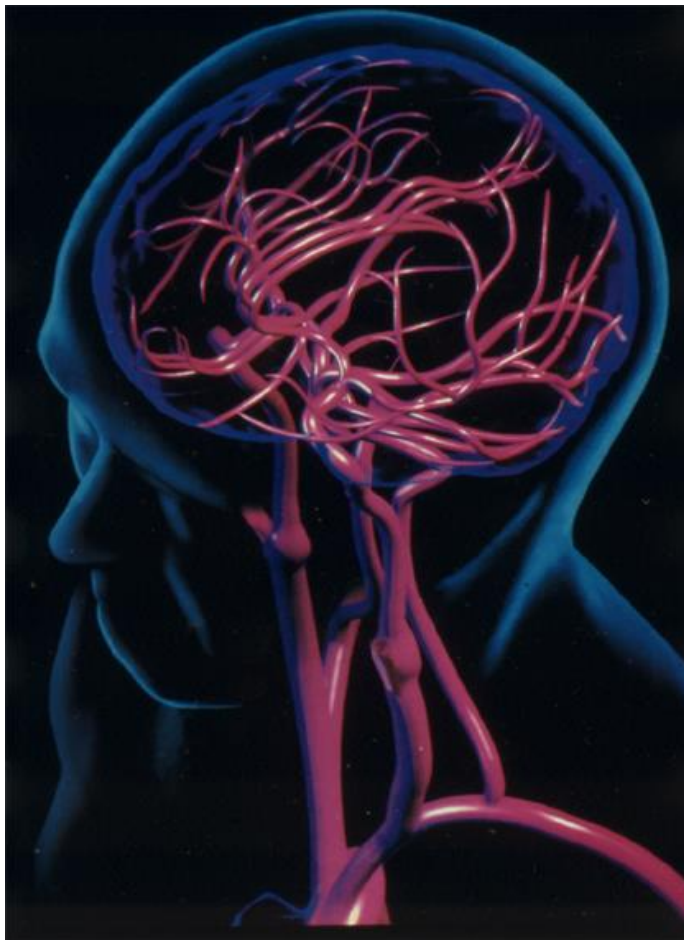
Fig. 3. Right lateral and top views of the dynamic sequence of GM maturation over the cortical surface. The side bar shows a color representation in units of GM volume. The initial frames depict regions of interest in the cortex as described for Fig. 1. This sequence is available in Movies 1–4 in the supporting information.

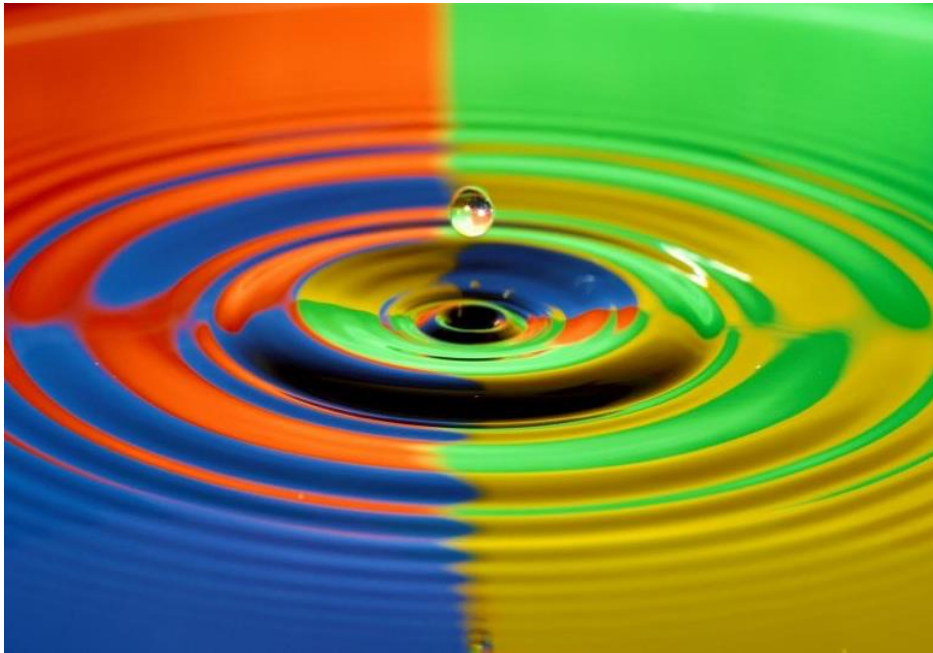


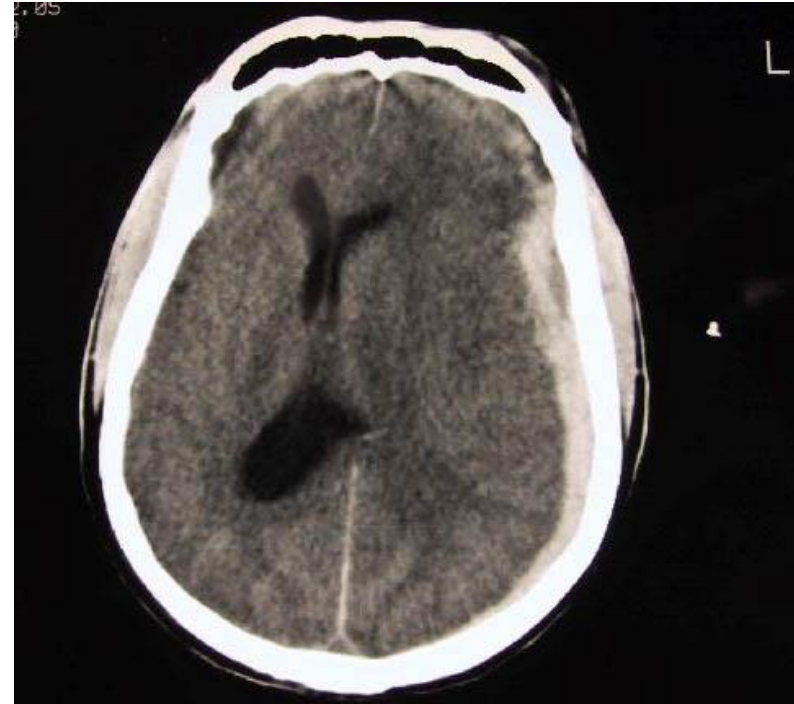
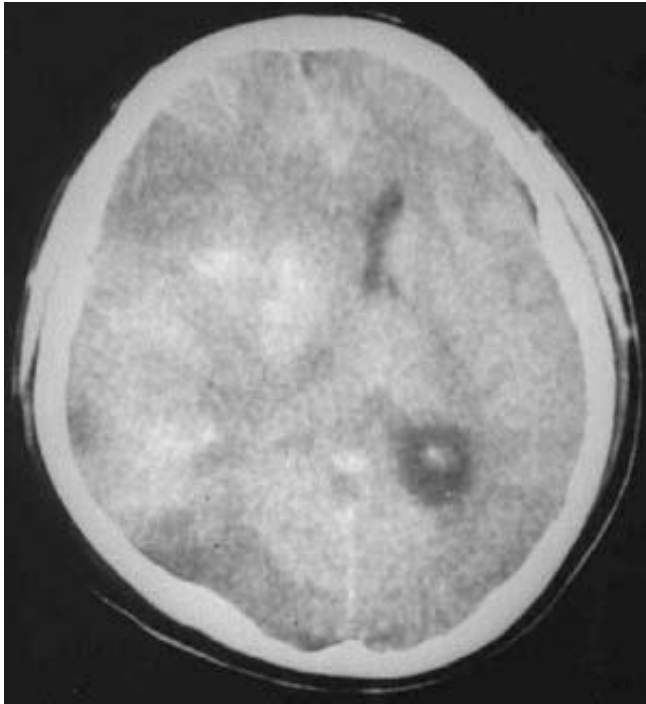
Medvetandet



Den akuta skadan

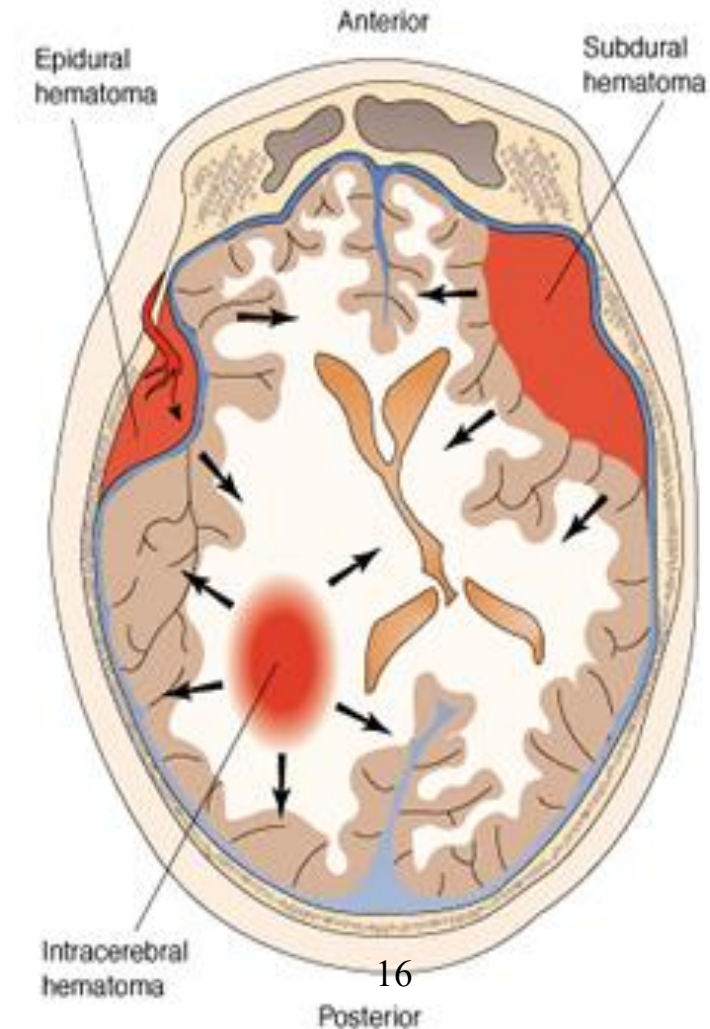






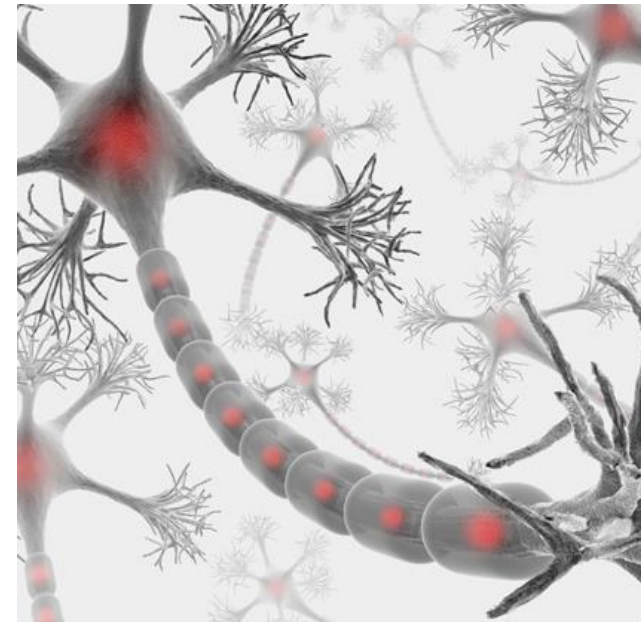
Traumatisk hjärnskada

- Blödningar: Subduralt, epiduralt, intracerebralt
- Traumatisk subarachnoidalblödning
- Contusion
- Diffus axonskada
- Hjärnödem
- Anoxi/hypoxi
- Inflammation



Diffus Axon Skada (DAI)

- Spridda skador i vit substans (axon, små kärl)
- Acceleration-deceleration våld
 1. Störd axonal transport
 2. Axonal svullnad
 3. Avbrott i kontakt med nervceller
 4. Wallerian degeneration
 5. Glial celler (the glymphatic system)?



Skallskada

1. Diffusa och fokala skador
2. Komplext samband mellan skada och klinisk

Medvetandegrad/vakenhet

Kognition

Beteende

Perception

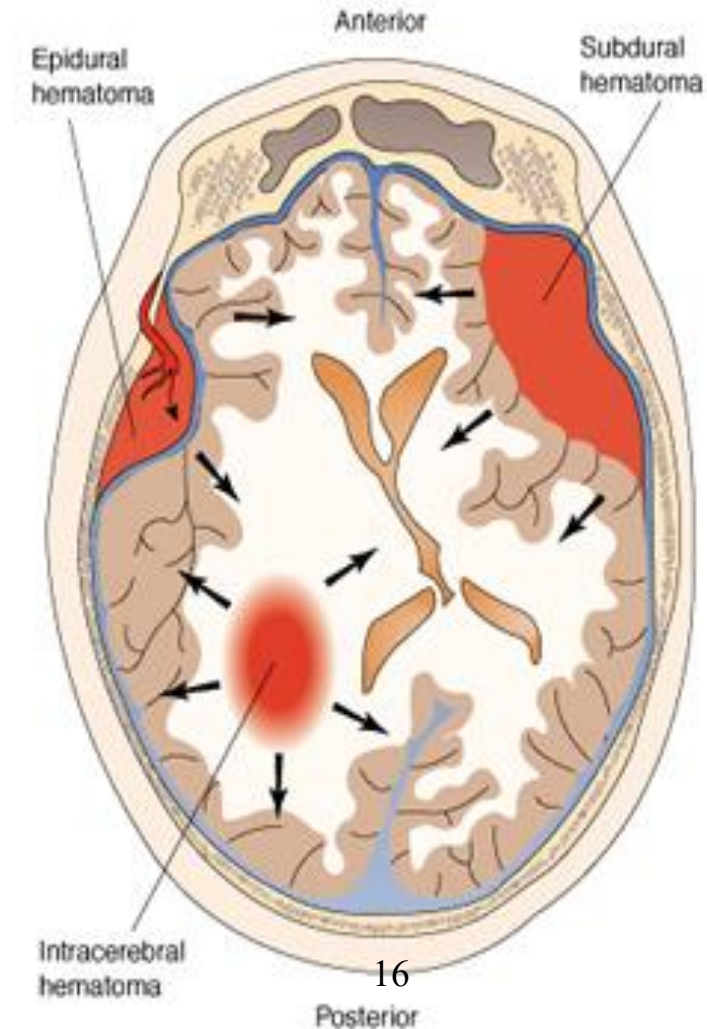
Känslor/emotioner

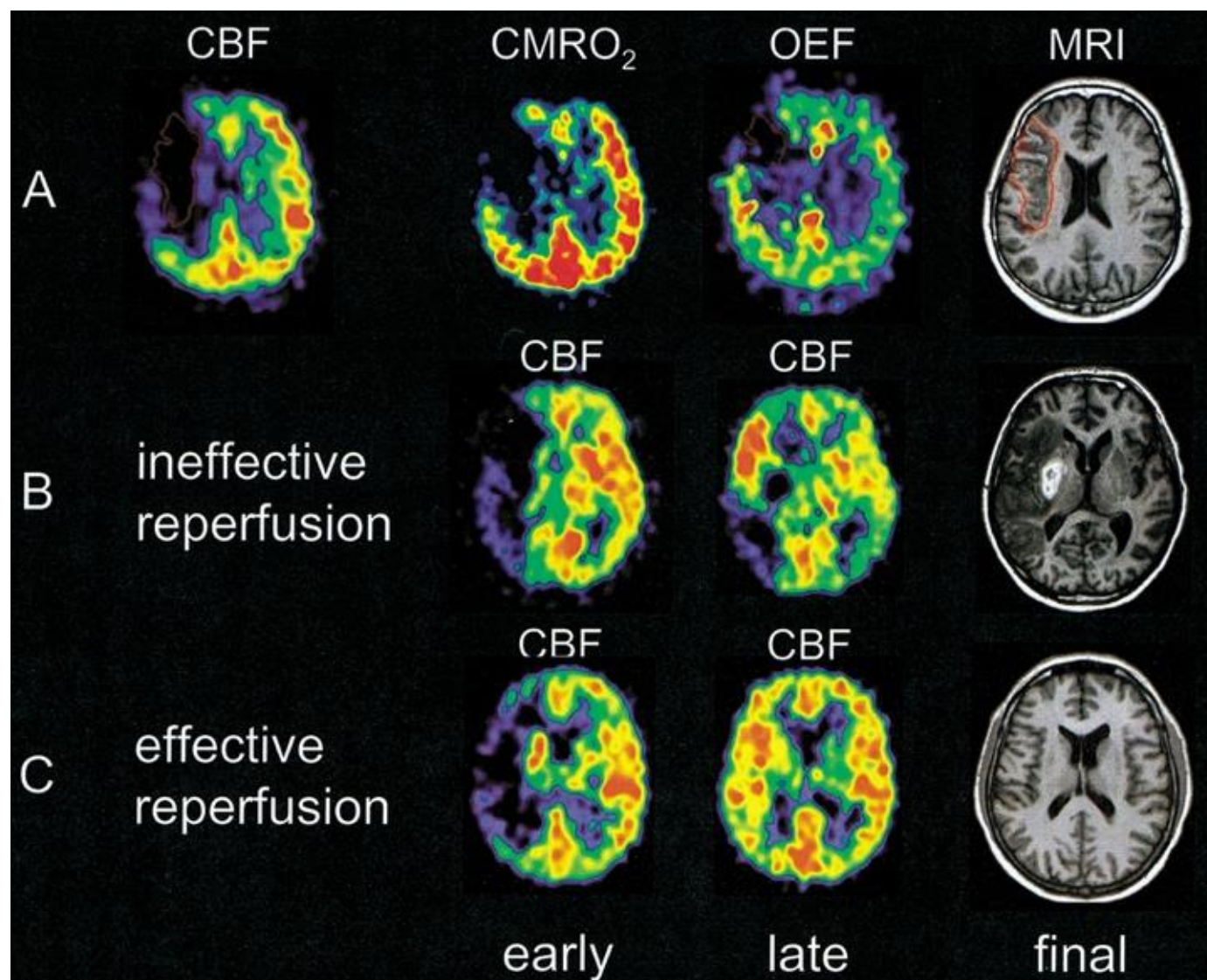
Personlighet

Motorik

Kommunikation

Autonoma funktioner





Stroke/slaganfall

1. Fokala skador
2. Samband mellan skada och symptom

Motorik/tonus rubbningar

Perception

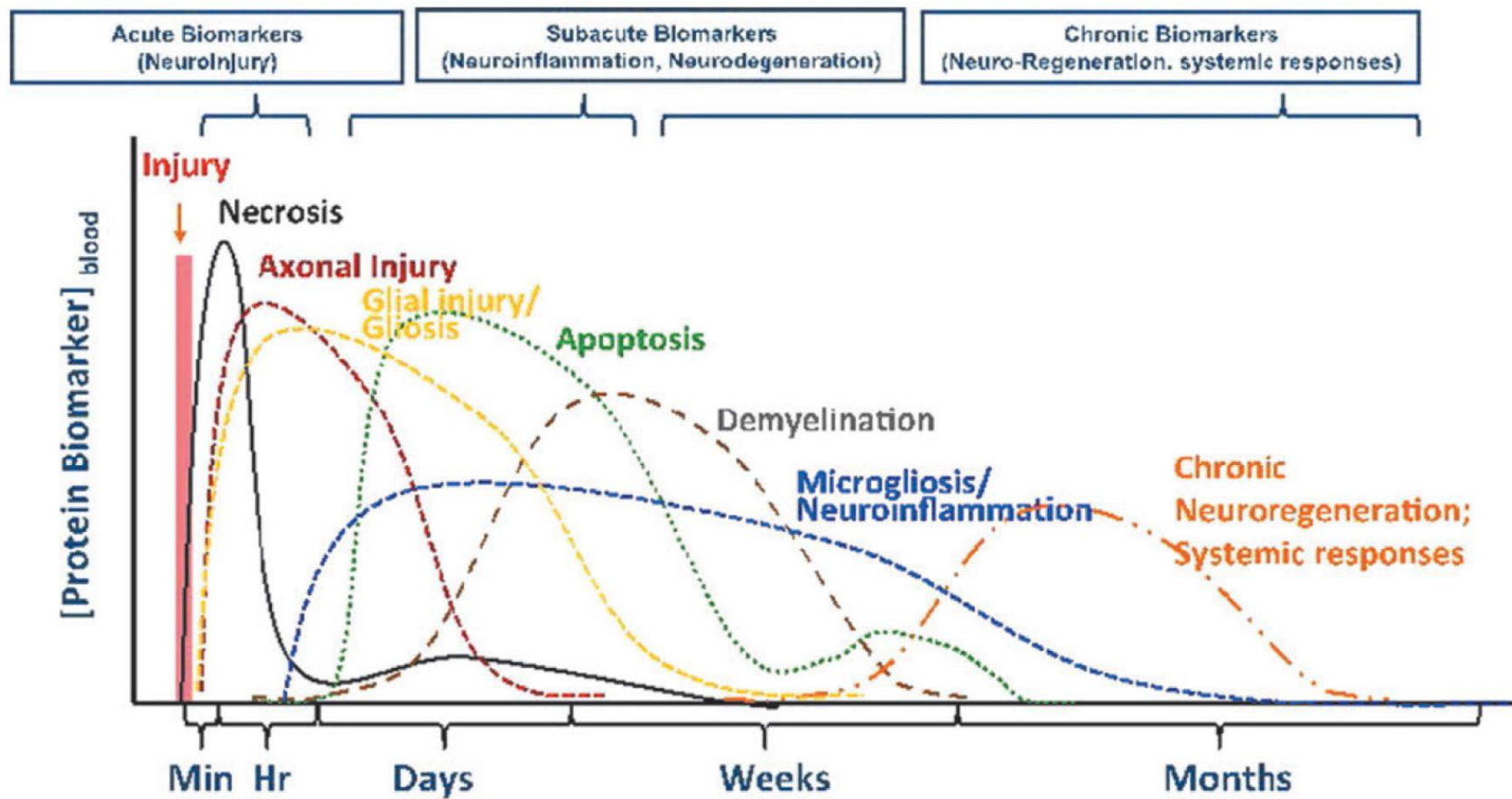
Kommunikation

Känslor/emotion

Beteende

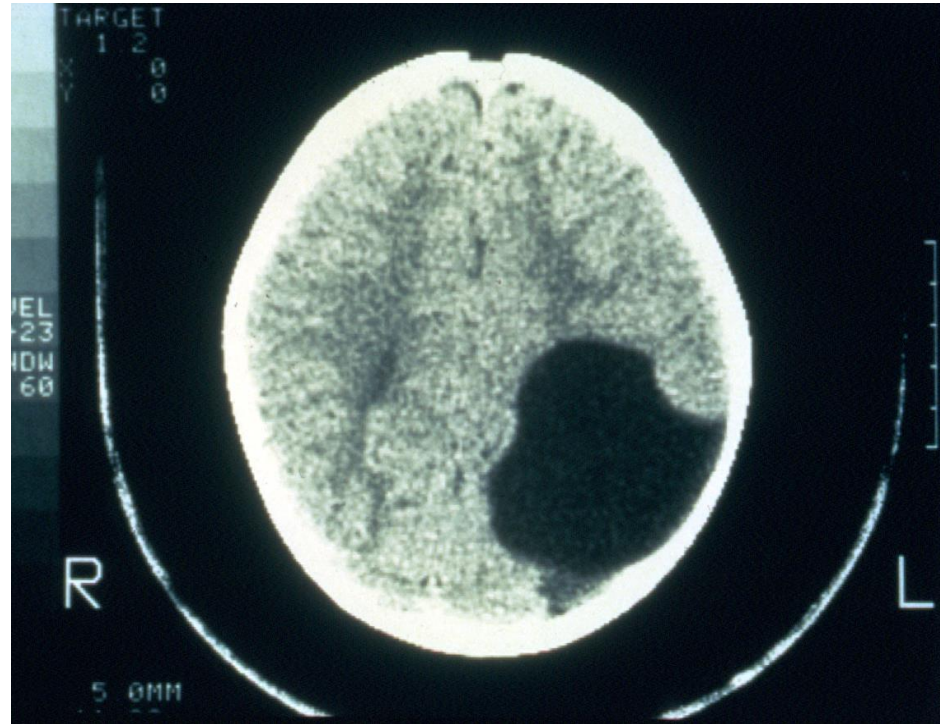


Source:
Schefer, Wilhelm, Hart (Eds.), Clinical Neuro-Ophthalmology -
A Practical Guide, Springer, Berlin/Heidelberg/New York, 2007.

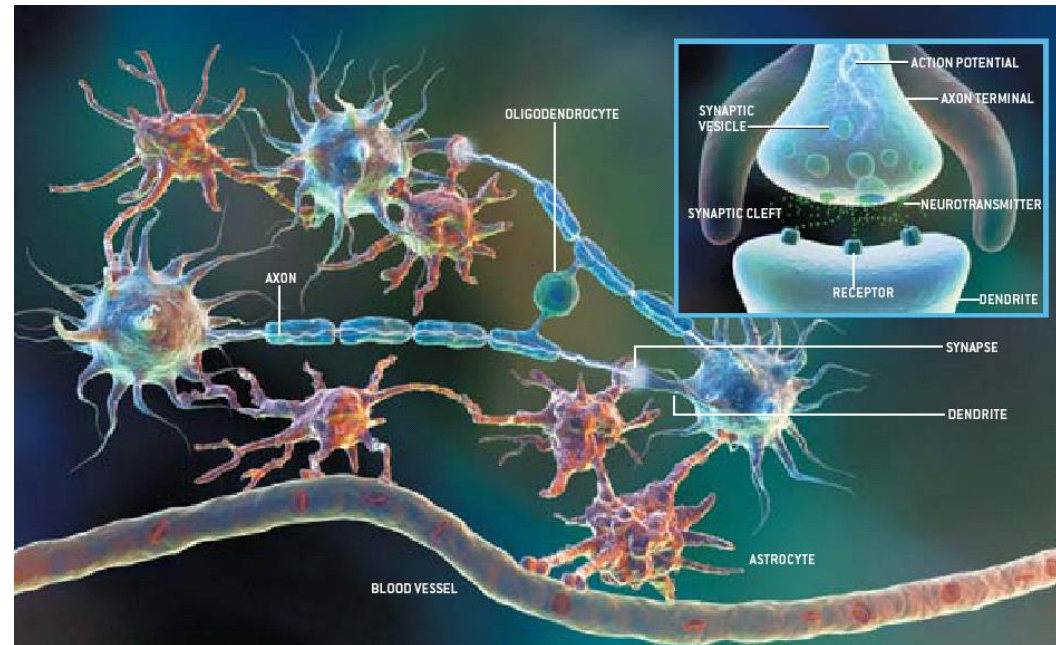


Kompensatorisk plasticitet

- polio
- demens
- parkinson
- hjärnskador

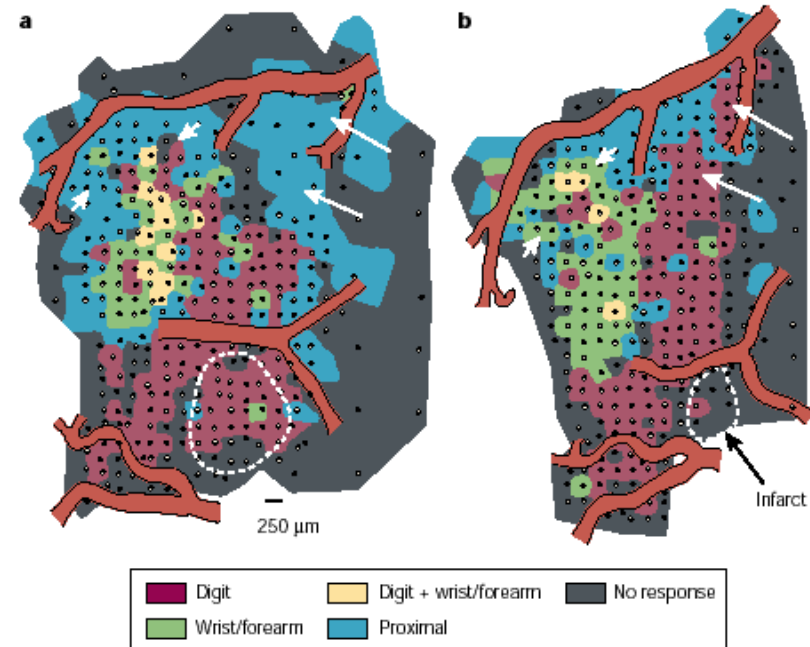


Kompensatorisk plasticitet cellnivå



Kompensatorisk plasticitet

Lokal nivå



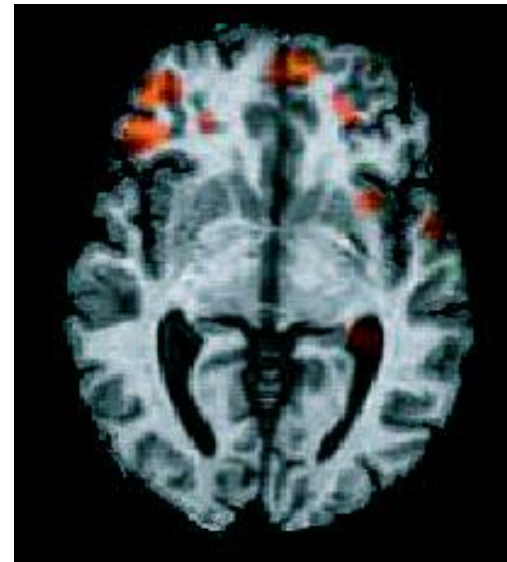
Kompensatorisk plasticitet

Systemnivå

Kontroll

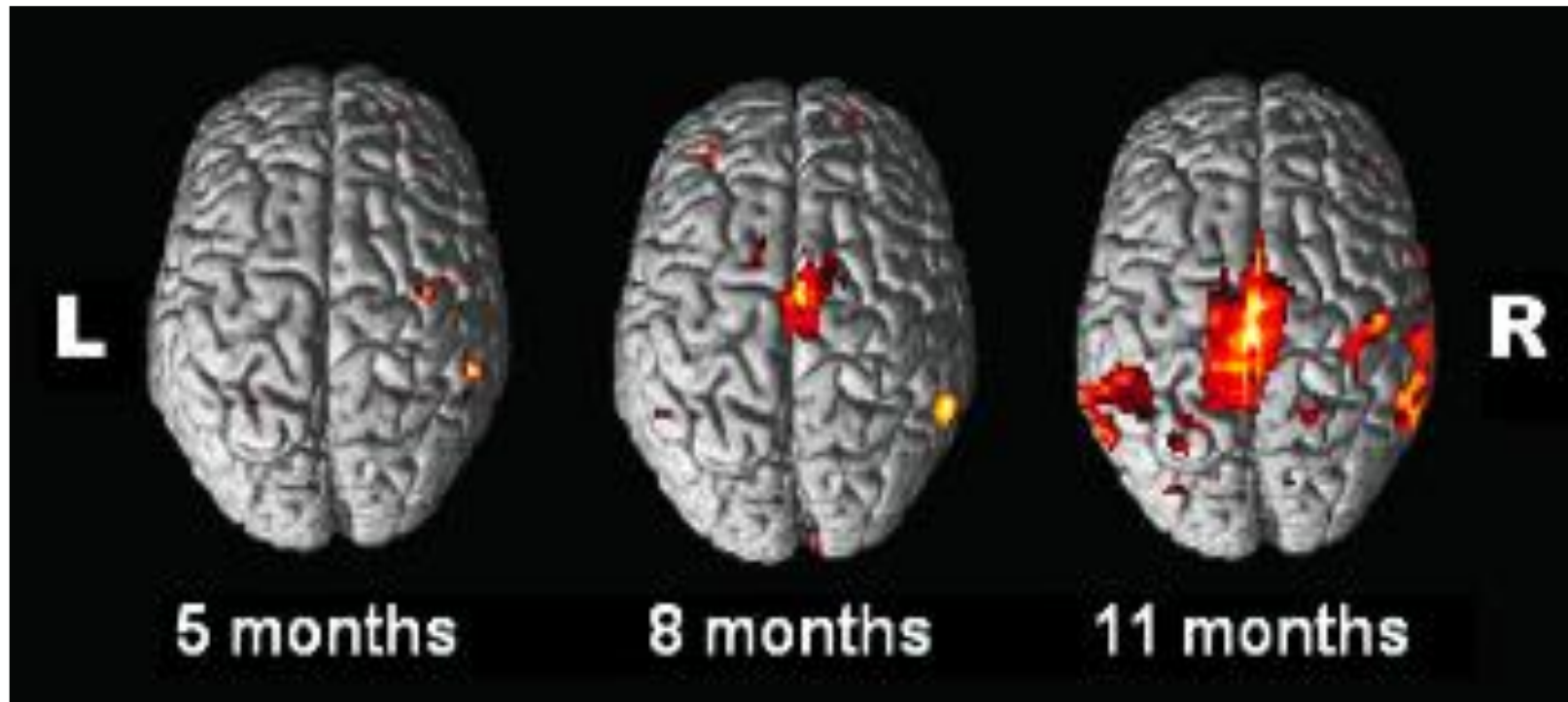


Hjärnskadad

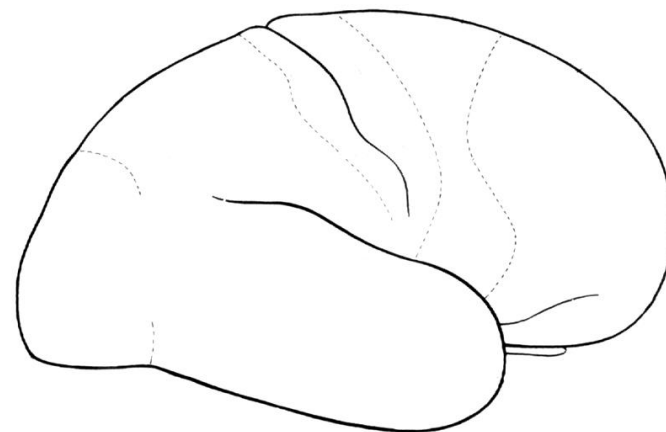
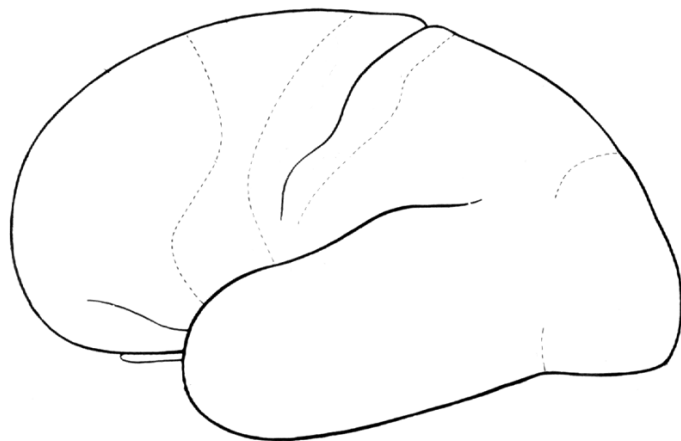


Kompensatorisk plasticitet

Systemnivå



Specifika symptom



Specifika symptom

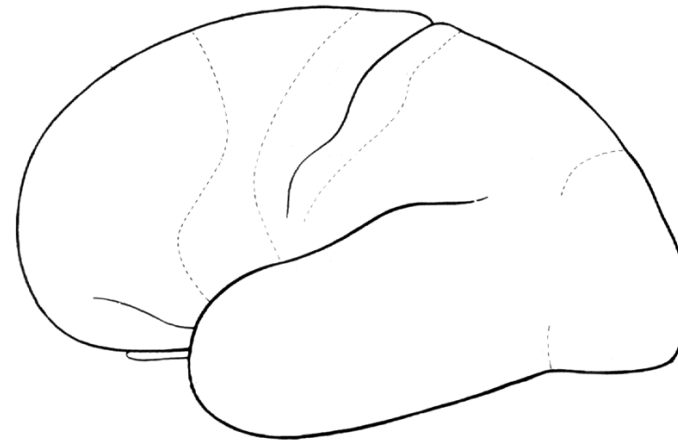
Rehab

Eliminera/minska

Kompensera

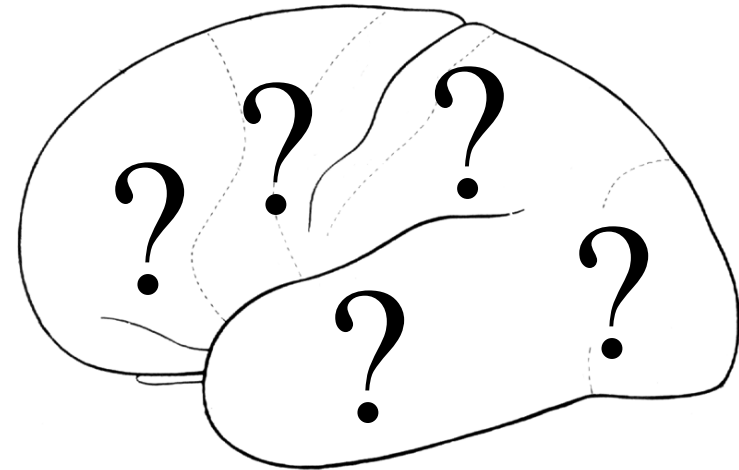
Aktivitetsanpassa/träna

- Allmäntillstånd
- Vakenhet
- Kontakt
- Uppmärksamhet
- Kommunikation
- Motivation
- Aktiv/passiv träning
- Kompensera
- Intensiv träning
- Optimalt eller maximalt?



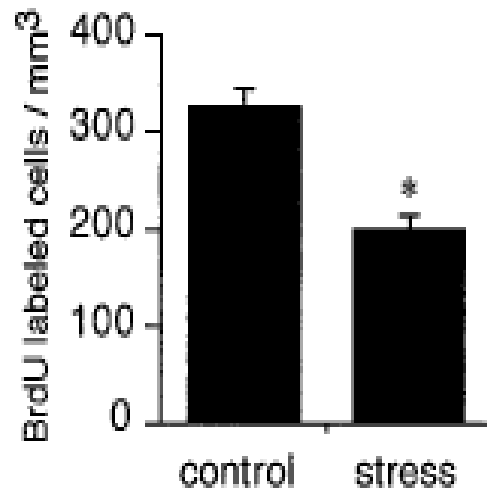
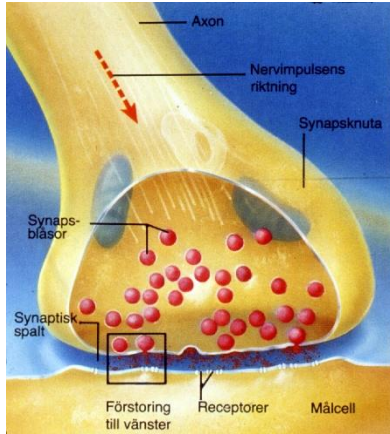
Ospecifika symptom

Iritabilitet
Koncentrationssvårigheter
Minnesproblem
Stresskänslighet
Mental trötthet/uttröttbarhet



stress

Stress och plasticitet



Synaptisk

- Neurotransmission
- LTP
- LTD
- Synaptisk styrka

Strukturell

- Dendrit struktur
- Axon
- Receptor densitet
- Apoptos

System

- Tillväxtfaktorer
- Stamcellsnybildning
- "Dark microglia"

(Kim et al 2002, McEwen 2007, Vyas et al 2016)

Fatigue

“the awareness of a decreased capacity for physical and/or mental activity due to an imbalance in the availability, utilization, and/or restoration of [physiological or psychological] resources needed to perform activity” (Aaronson 1999)

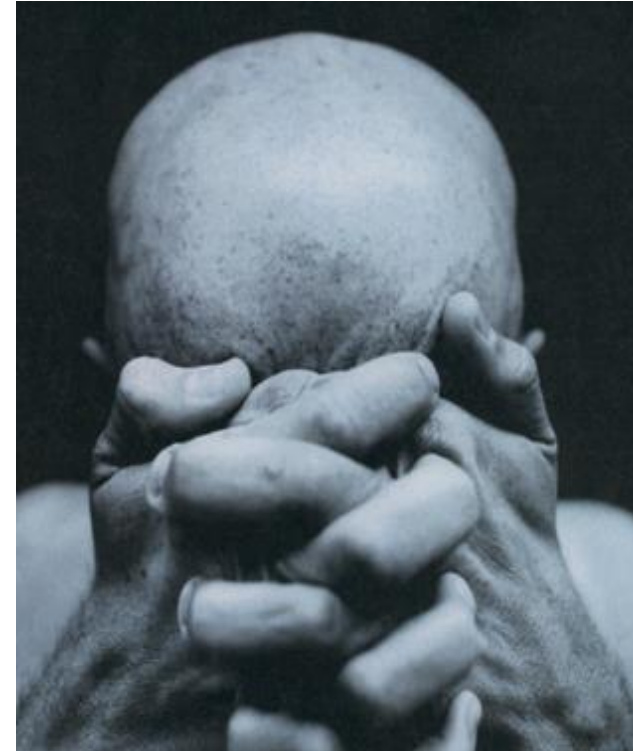
“A deep sensation of fatigue, lack of energy and a feeling of exhaustion”(Kirkevold 2011)

“Difficulties in initiating and maintaining cognitive functions”(Clark 2016)

“The failure to initiate and/or sustain attentional tasks and physical activities requiring selfmotivation’ (Chaudhuri 2004)

“It is a subjective awareness of a negative balance between available energy and the mental and physical requirements of activities” (Cantor 2014)

“A feeling of lack of energy, weariness, and aversion to effort” (Mead 2007)



Fatigue

“En djup känsla av trötthet, brist på energi och känsla av utmattning”
(Kirkevold 2011)

“Svårigheter att initiera och vidmakthålla kognitiva funktioner”
(Clark 2016)

”Subjektiv upplevelse av obalans mellan tillgång och krav på energi för aktiviteter”

Brist på energi
Ökat sömnbehov
Uttröttbarhet
Vilopauser
Oförutsägbart/oförklarligt
Stresskänslighet



Underskattat problem

Välkänt vid MS, Parkinson's sjukdom, ALS, Myasteni, postpolio

Mycket underskattat vid hjärnskada

Skallskador:	50 – 70%
Stroke:	30 – 70%
SAH	56 %
Anoxi/hypoxi	
Encefaliter	



Stora konsekvenser

- Livskvalitet
- Depression/ångest
- Påverkar rehabiliteringen
- Funktionshinder
- Arbetsförmågan
- Konflikter

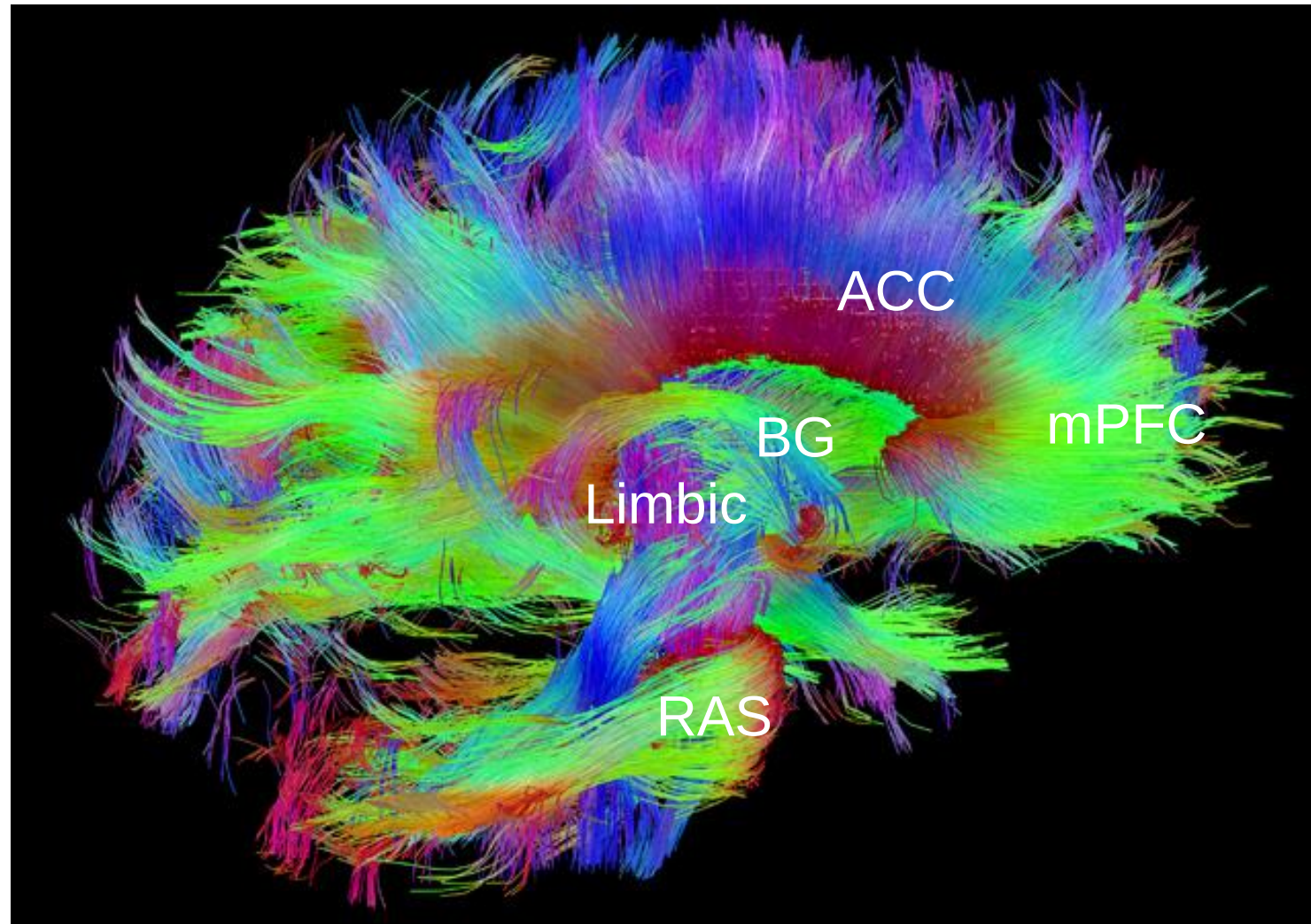
Återgång i arbete

- Koncentrationssvårigheter
- Mental trötthet
- Smärta
- Huvudvärk
- Sömnstörning

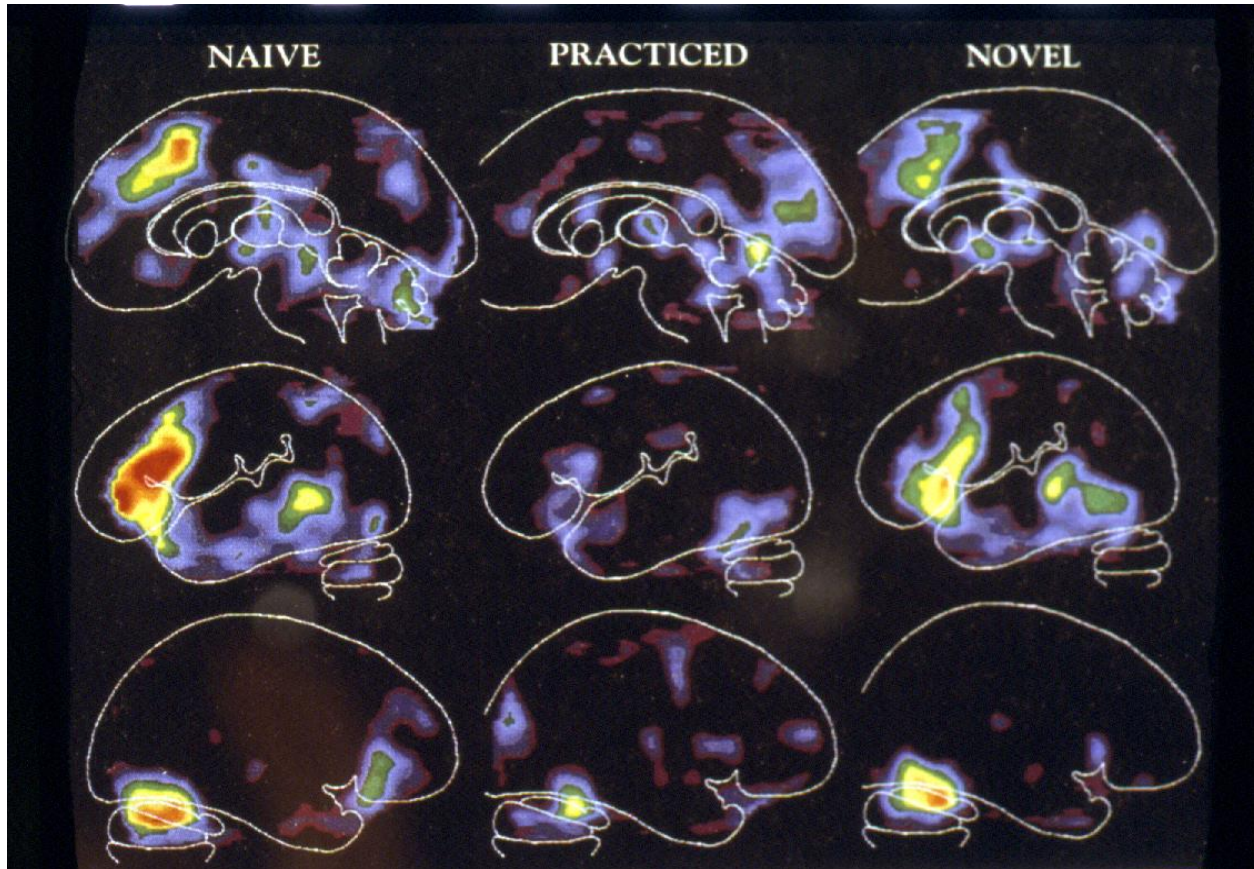


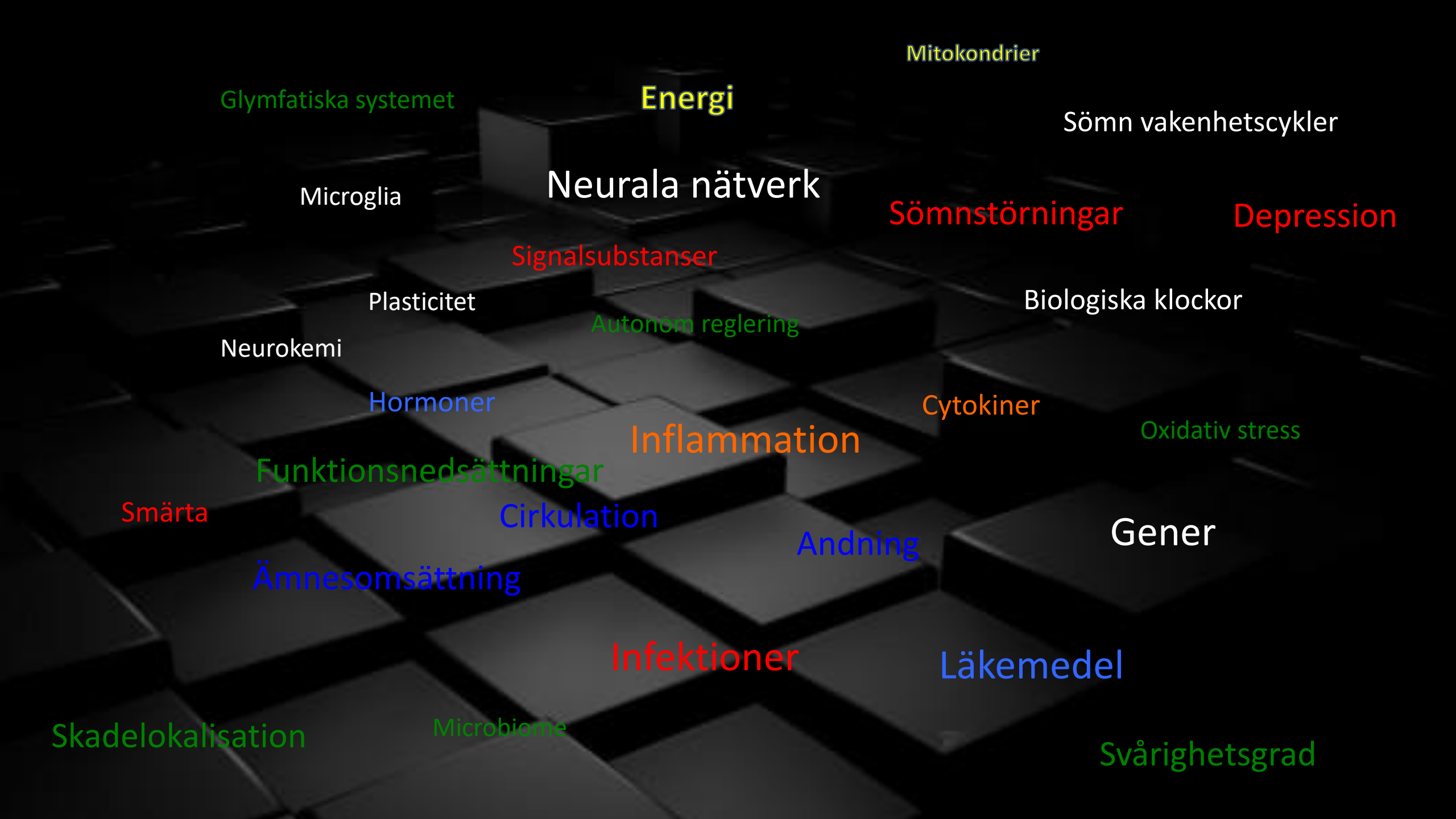
(Kirkevold 2011, Ponsford 2016, Colantonio 2016, Schiehcer 2016)

Skadelokalisation



Rådande förklaringsmodell





Mitokondrier

Glymfatiska systemet

Energi

Sömn vakenhetscykler

Microglia

Neurala nätverk

Sömnstörningar

Depression

Signalsubstanser

Plasticitet

Autonom reglering

Biologiska klockor

Neurokemi

Hormoner

Cytokiner

Inflammation

Oxidativ stress

Funktionsnedsättningar

Smärta

Cirkulation

Andning

Gener

Ämnesomsättning

Infektioner

Läkemedel

Skadelokalisation

Microbiome

Svårighetsgrad

Klinisk hantering

Fatigue
(Hjärntrötthet)

Skattningsskalor

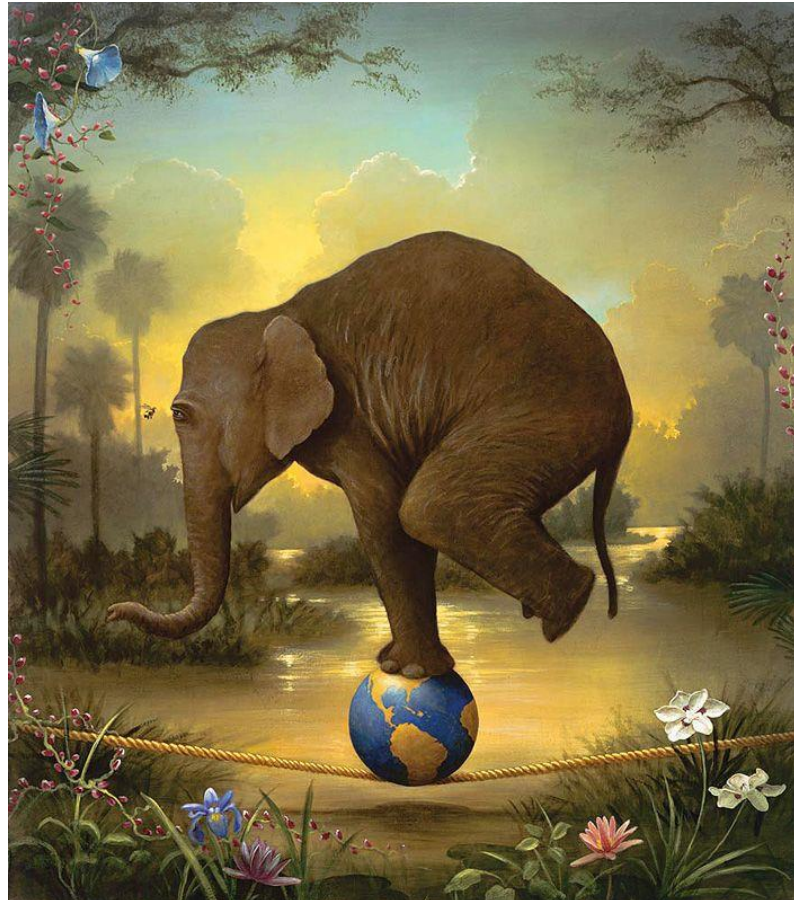
- Mental fatigue scale
- Fatigue severity scale
- VAS

- Bedömning i reell miljö
- Självmonitorering
- Tester

Fatigability
(Utröttbarhet)

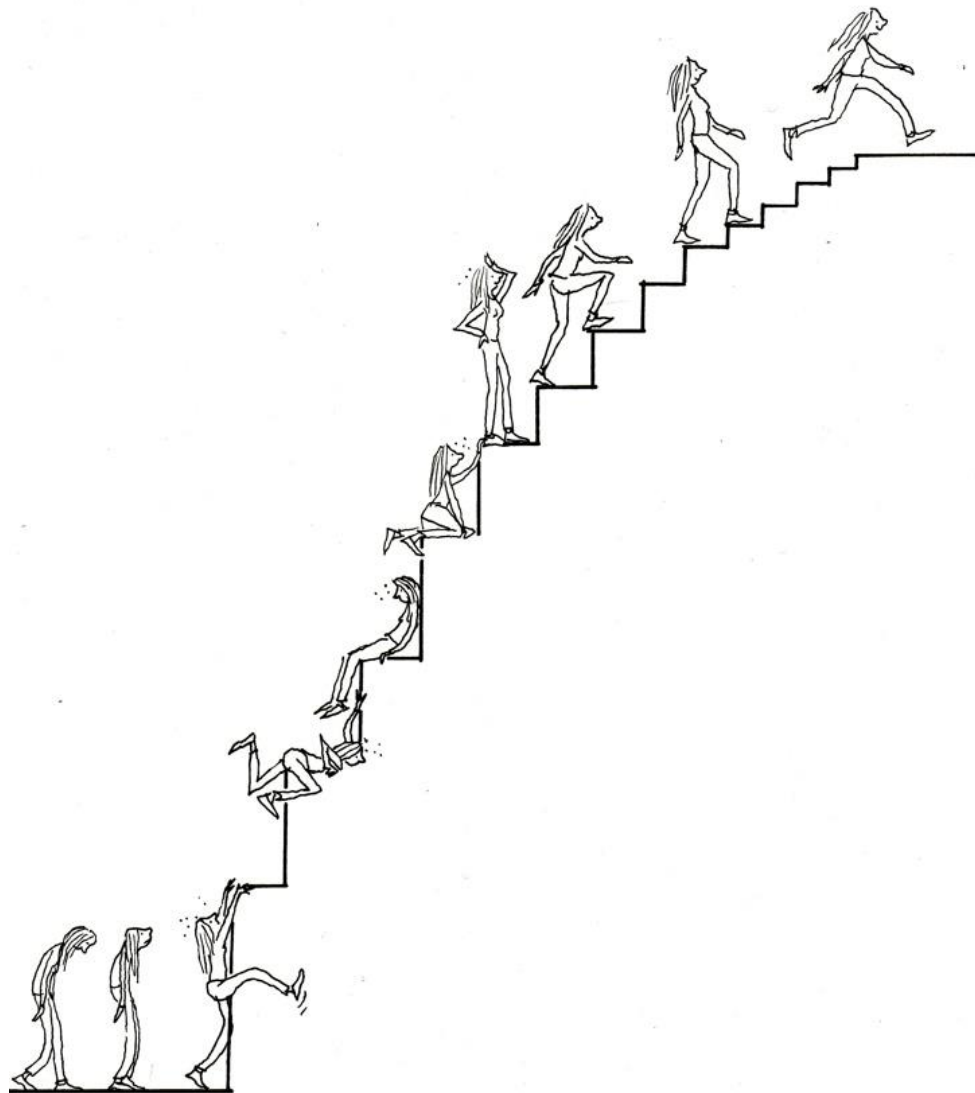
(Kluger 2013, Möller 2017, Schönberger 2017)

Adaptiv rehabilitering



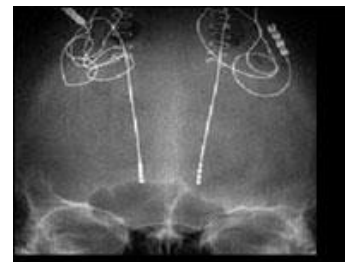
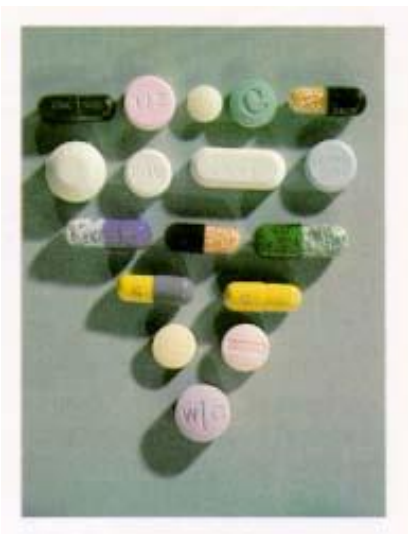
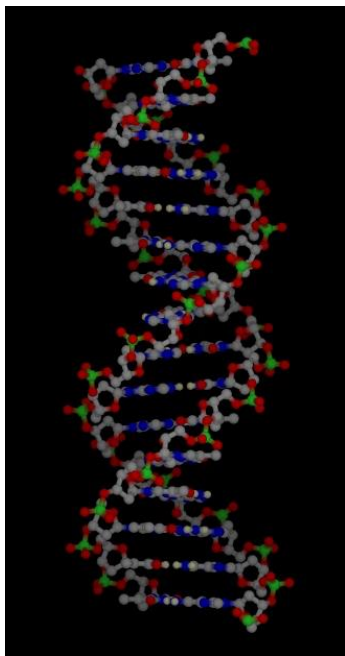
Struktur - Pacing





”Catch the wave”!





Intensiv rehabilitering

Timing, intensitet, duration, individanpassad

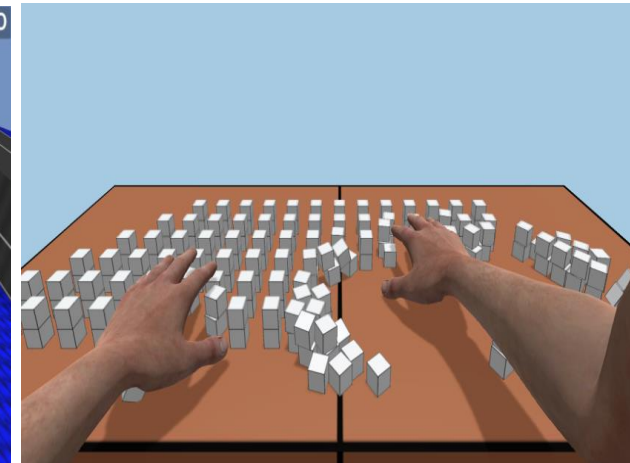
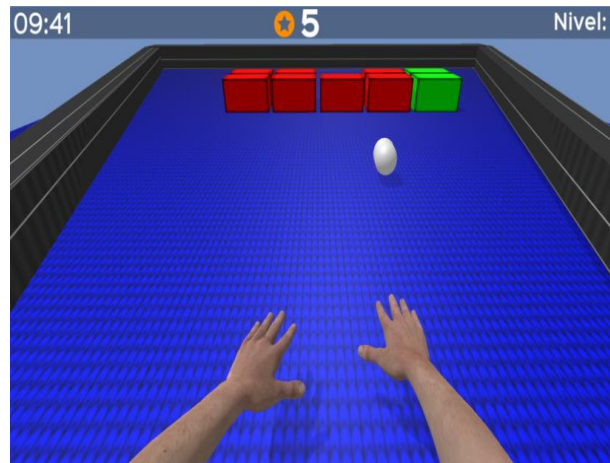
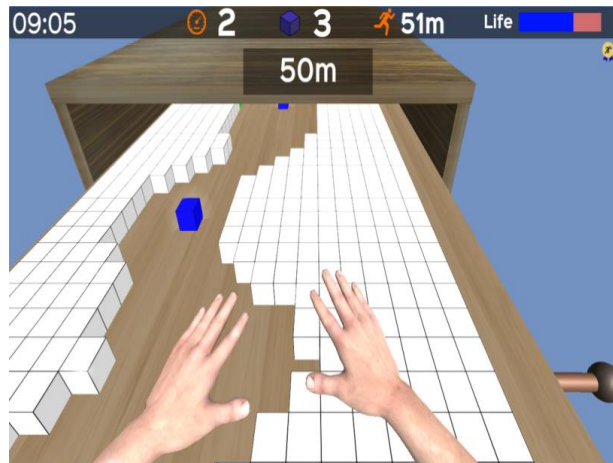
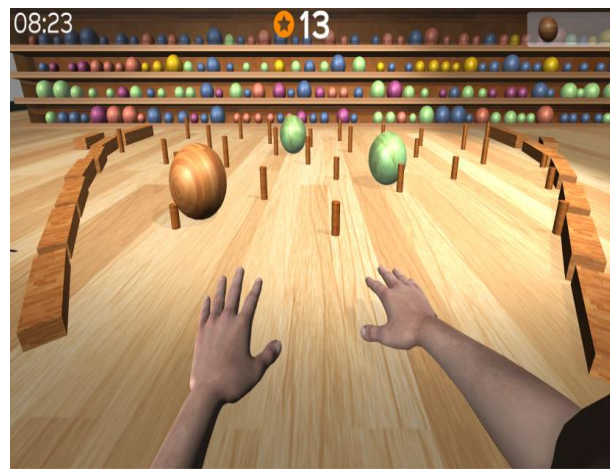


RGS@home

Rehabilitation Gaming System



The Rehabilitation Gaming System



RGS@home projektet

Kognition

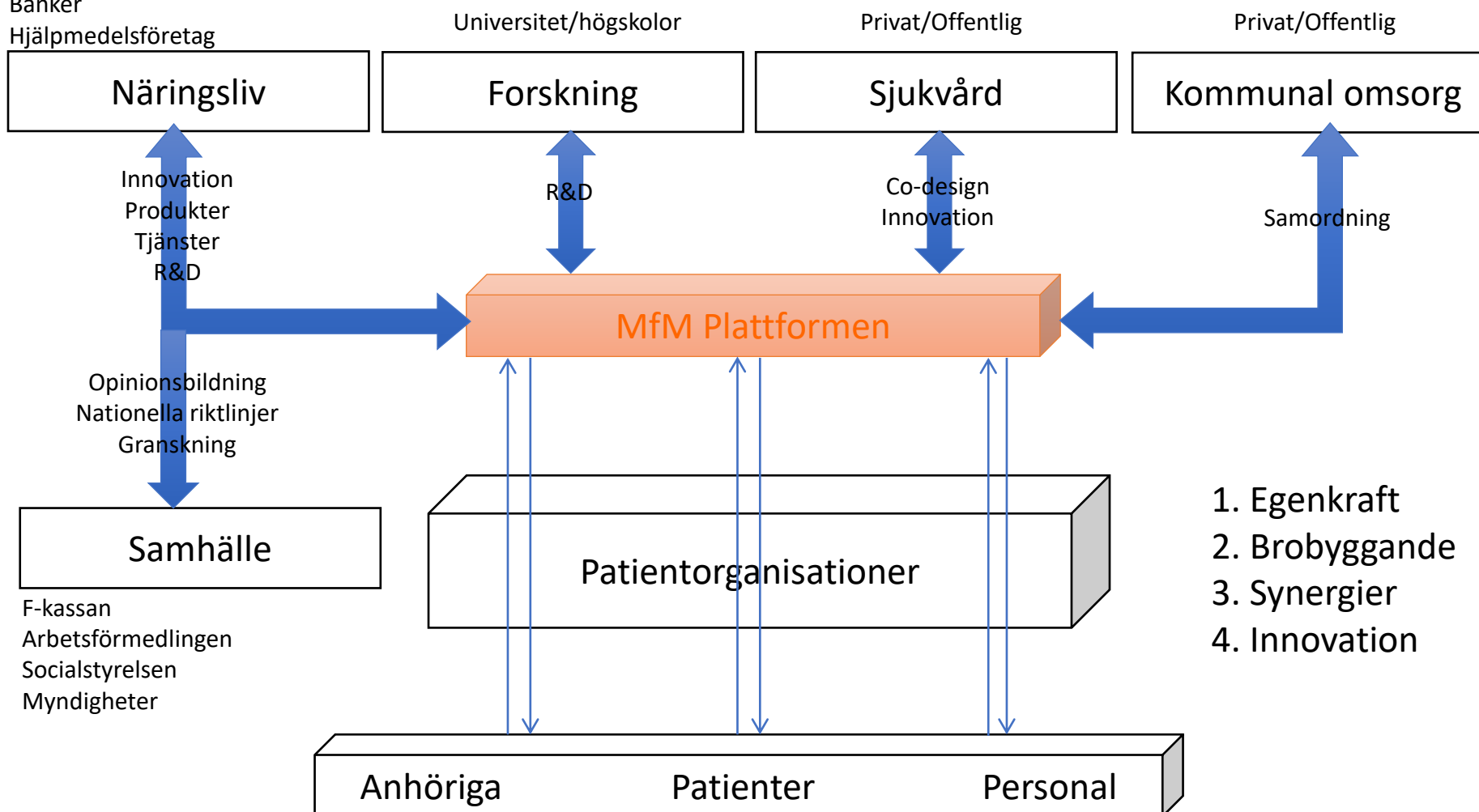
- Dual task
- Divided attention
- Visospatialt
- Arbetsminne
- Uppmärksamhet
- Go/no go
- Exekutiva funktioner
- Reaktionshastighet
- Målinriktad koordination
- Undvika hinder
- Timing
- Avståndsbedömning
- Timing/precision
- Motorisk afasi

Motorik

- Flexion/extension armbåge
- Flexion/adduktion skuldra
- Utåt-rörelse med armen
- Lateral armrörelse
- Flexion/adduktion skuldra
- Rörelse framåt
- Arbete mot tyngdkraften
- Gripfunktion
- Bimanuell samordning
- Handfunktion
- Pronation
- Supination
- Korsa medellinjen
- Bål och huvudstabilitet
- Viktöverföring
- Knälyft
- Höft abduction
- Lateral rörelser i bålen

Läkemedelsföretag
Med techbolag
Banker
Hjälpmedelsföretag

Erfarenhetsbaserad kunskap



1. Egenkraft
2. Brobyggande
3. Synergier
4. Innovation

Tack!

