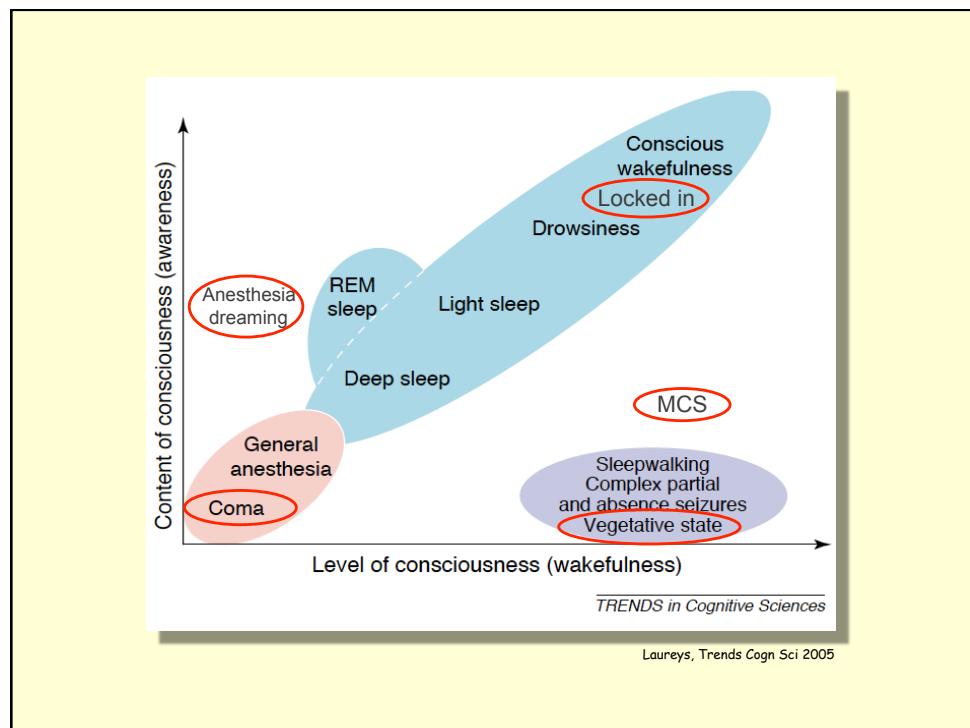


Miksi tutkia tietoisuutta ?

- Ymmärrys tietoisuuden neurobiologiasta (normaalista fysiologiasta) on välttämätöntä mikäli haluamme kehittää patologisten tietoisuuden tilojen diagnosointia ja hoitoa
- Yleisanestesian mekanismien ymmärtäminen voi myös auttaa kehittämään uusia anesthesia-aineita ja menetelmiä
- Tutkimuksesta saatavan tiedon avulla voidaan lisäksi kehittää uusia menetelmiä anestesian ja unen/väsymyksen "syvyyden" mittauiseksi ja siten vähentää leikkauksen aikaista tahatonta hereilläoloa sekä parantaa tehohoitoa
- Ihmisen tietoisuus on yksi tieteen suurimmista vielä ratkaisemattomista mysteereistä

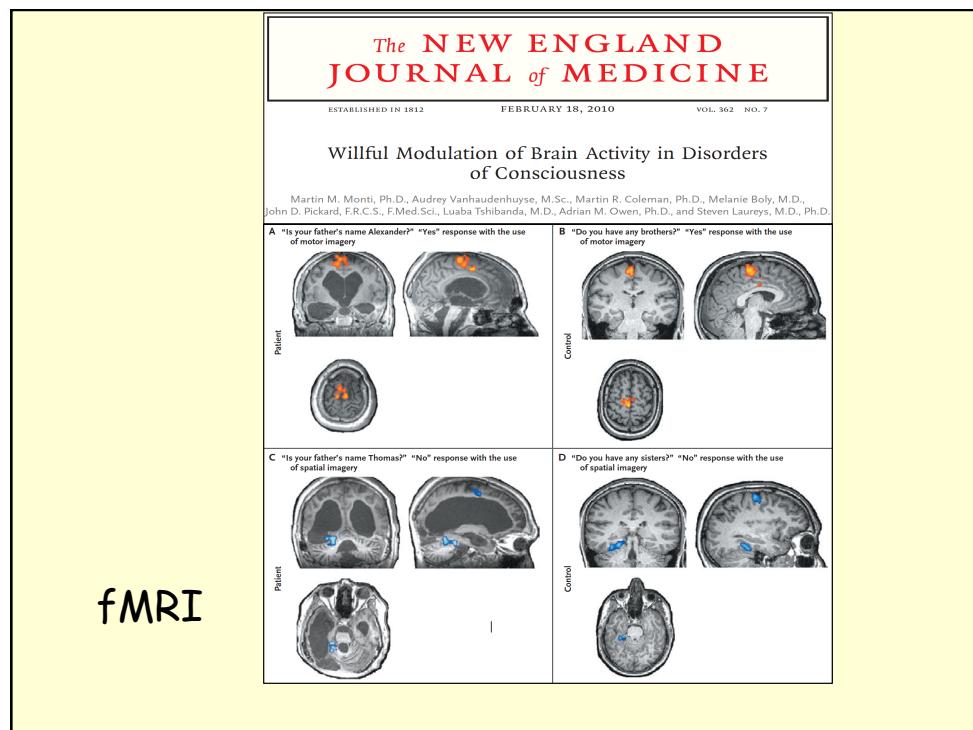
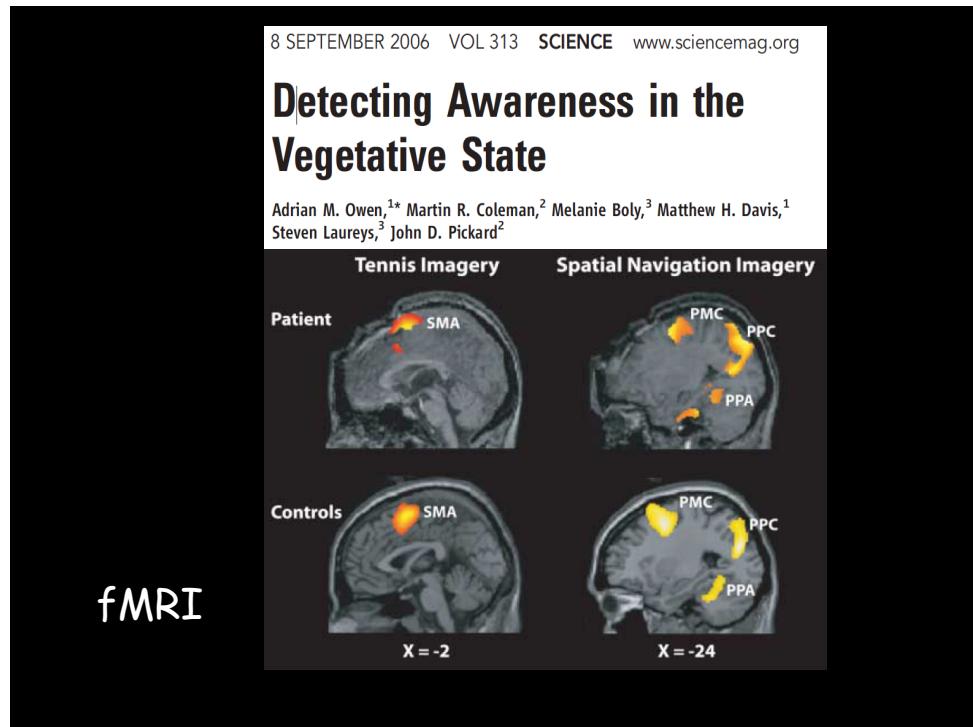
Voiko tietoisuutta tutkia ?

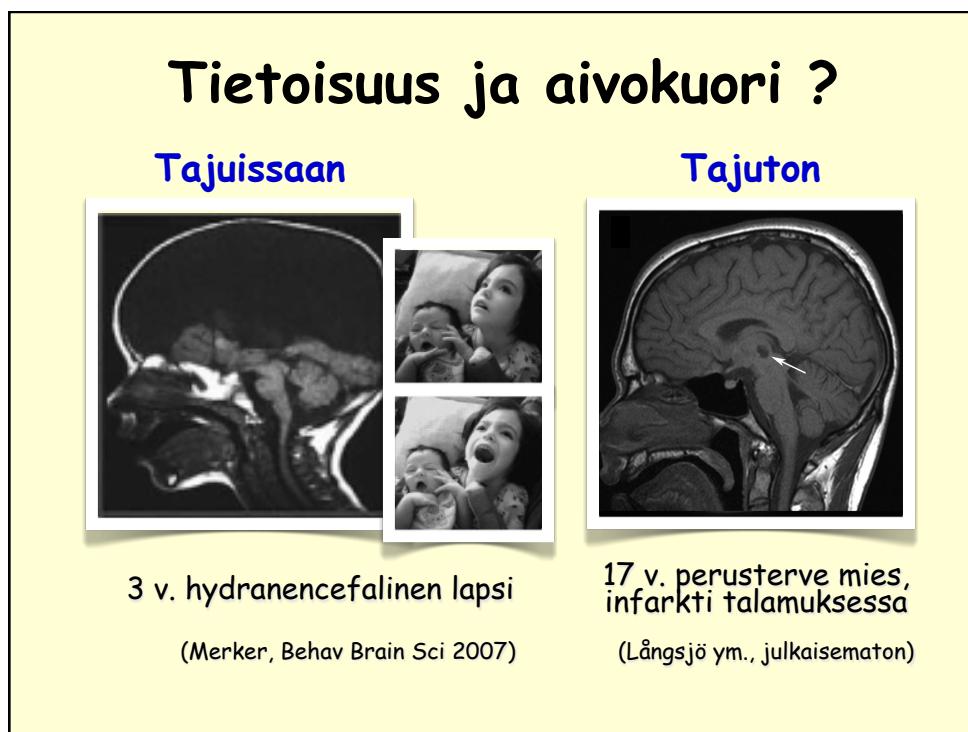
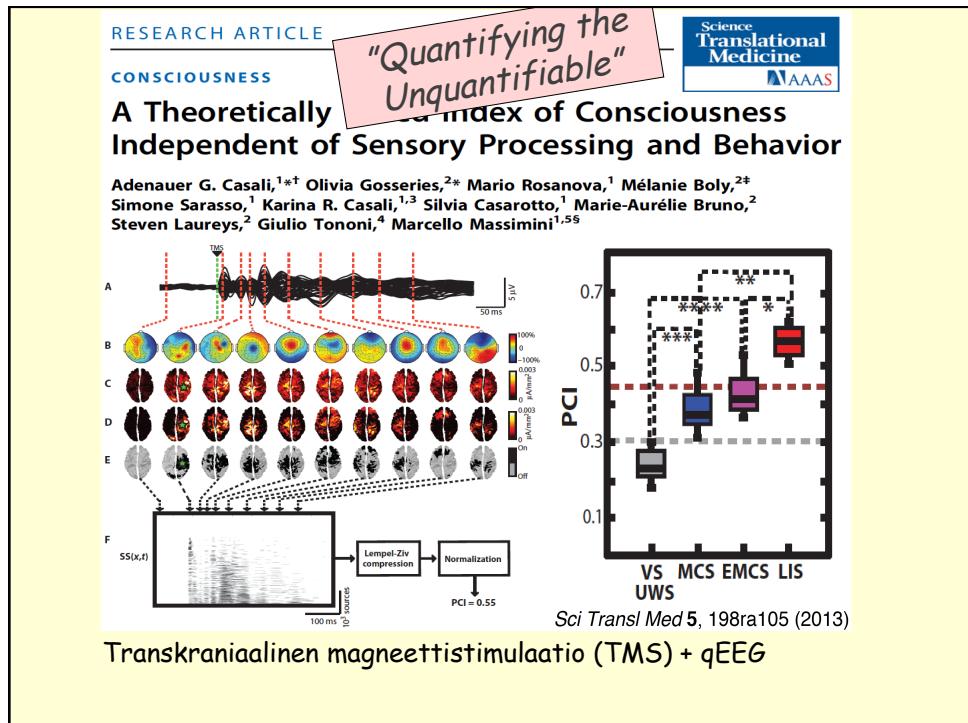
- **Kvantamistutkimukset**
 - Funktionaalinen MRI (fMRI)
 - Positroniemissiotomografia (PET)
 - Magneettienkefalografia (MEG)
- **Neurofysiologiset menetelmät**
 - Kvantitatiivinen EEG ja konnektiivisuus
 - Herätevasteet
 - Transkraaniaalinen magneettistimulaatio (TMS)
- **Yleisanestesia työkaluna !**
→ Tietoisuuden "neuraaliset korrelaatit"

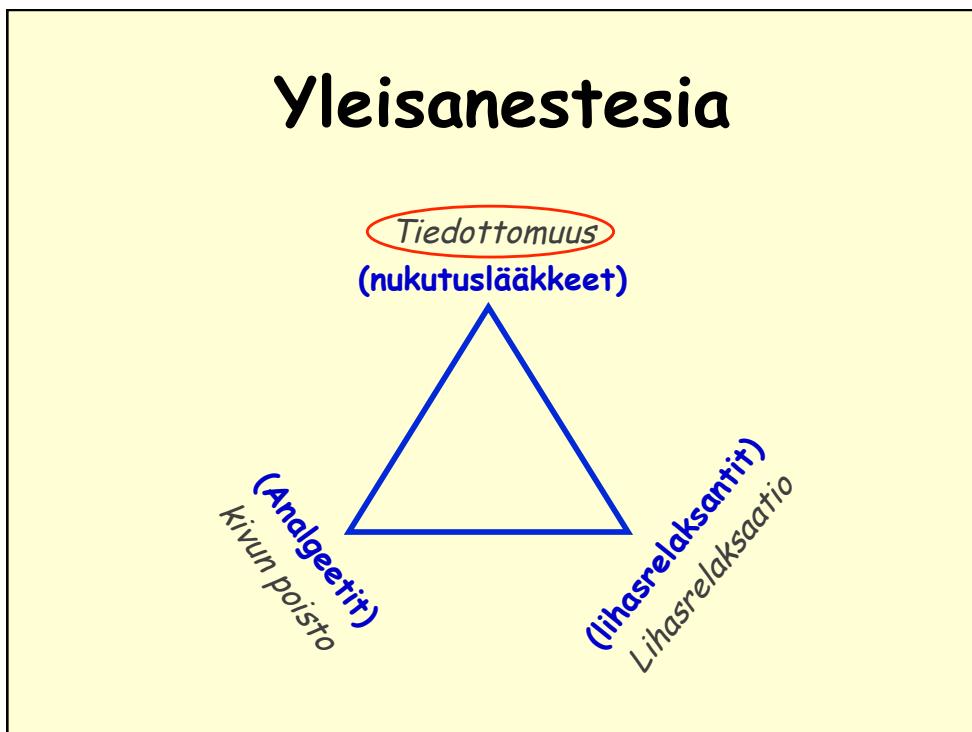


| Glasgow Coma Scale | | |
|--------------------|---|--------|
| Category | Response | Points |
| Eye opening | Spontaneous, open with blinking at baseline | 4 |
| | Opens to verbal command, speech, or shout | 3 |
| | Opens to pain, not applied to face | 2 |
| | No response | 1 |
| Verbal response | Oriented conversation | 5 |
| | Confused conversation, able to answer questions | 4 |
| | Inappropriate responses, words discernible | 3 |
| | Incomprehensible speech | 2 |
| | No response | 1 |
| | Intubated | 1T |
| Motor response | Obeys commands for movement | 6 |
| | Purposeful movement to painful stimulus | 5 |
| | Withdraws from pain | 4 |
| | Abnormal (spastic) flexion, decorticate posture | 3 |
| | Extensor (rigid) response, decerebrate posture | 2 |
| | No response | 1 |

Teasdale and Jennett, Lancet 1974



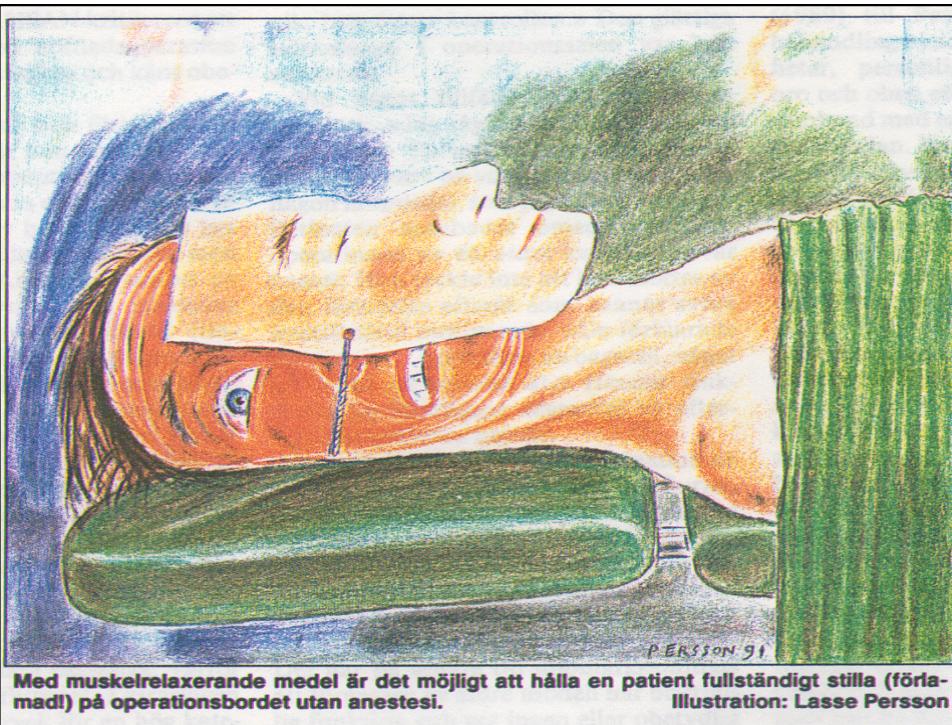


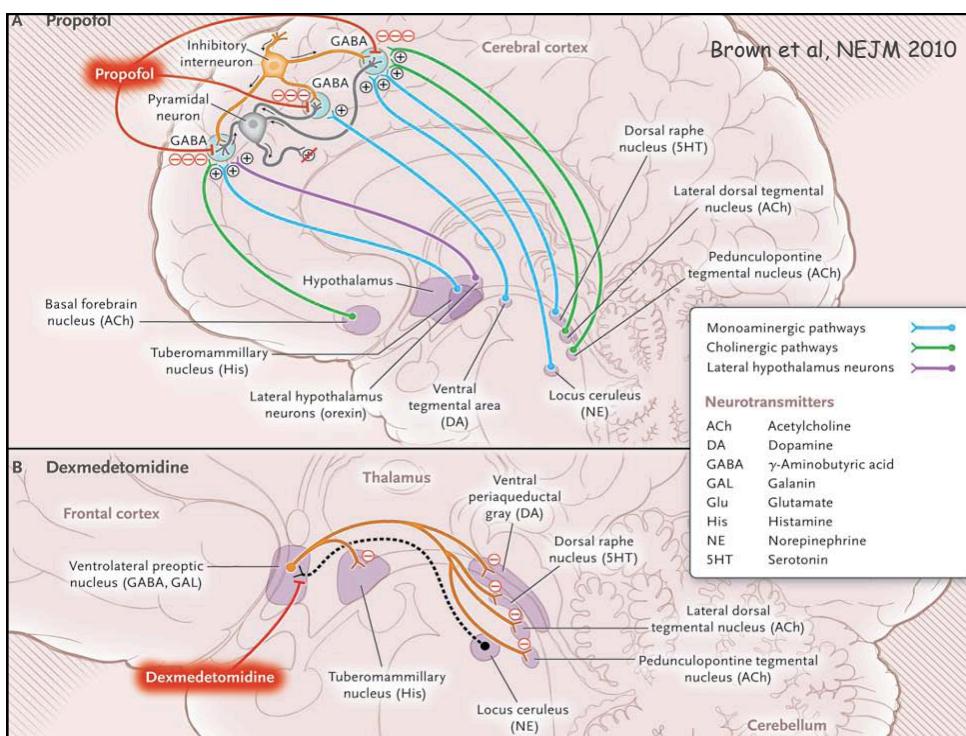
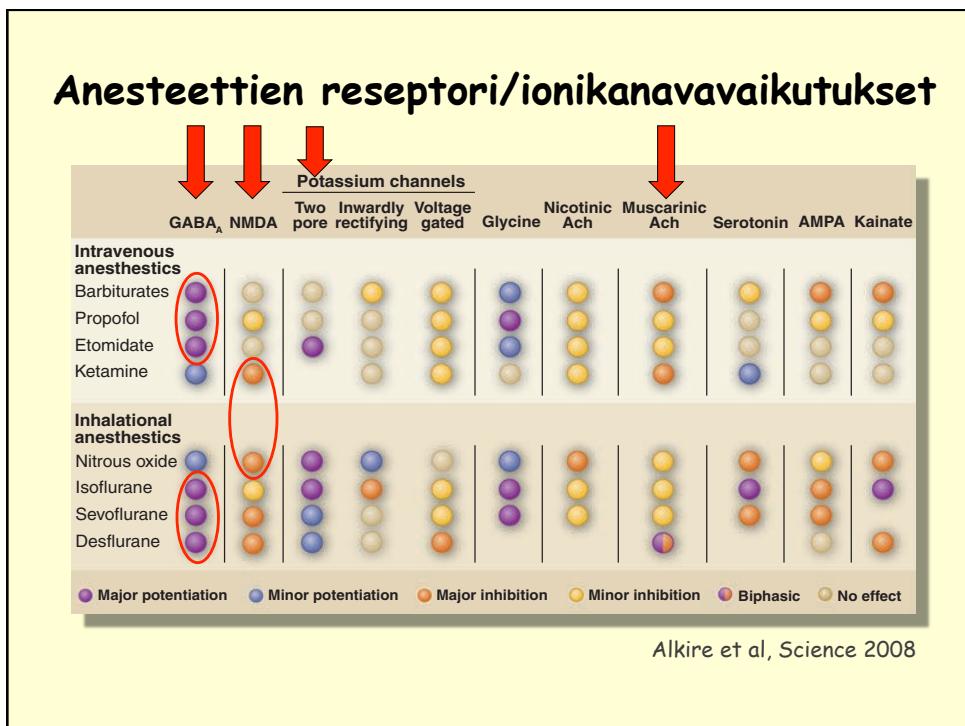


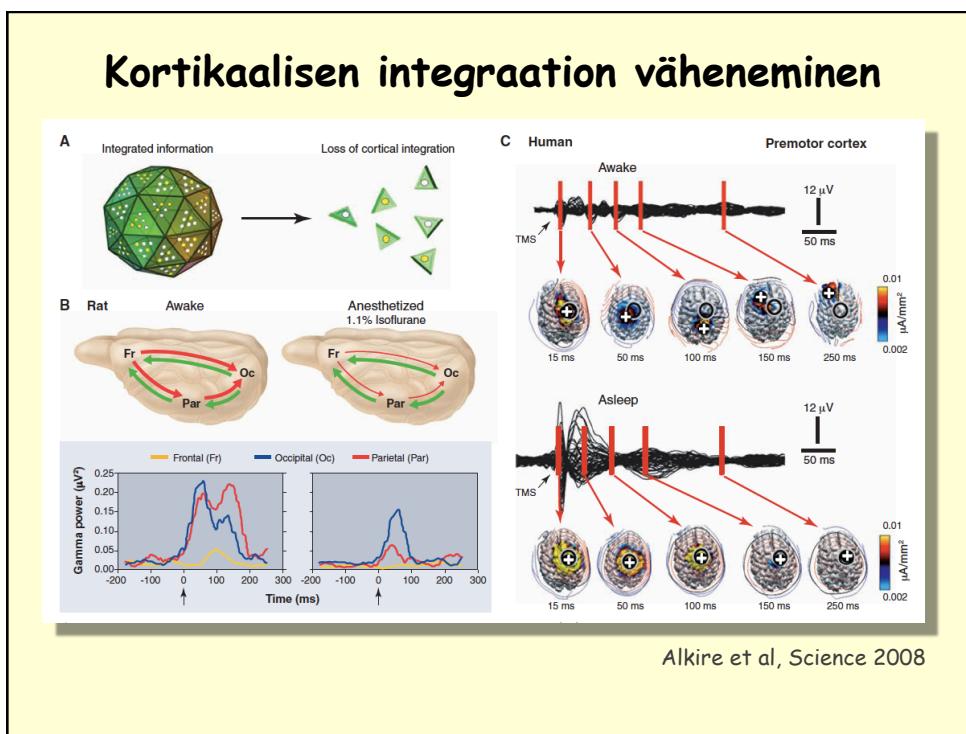
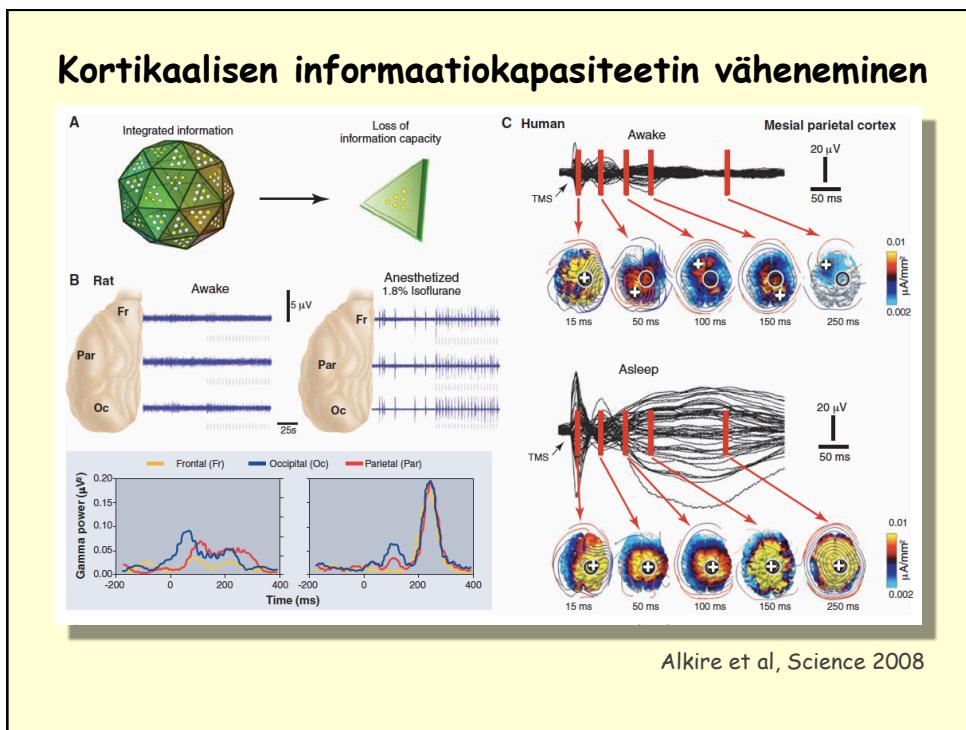
“Yleisanestesia”

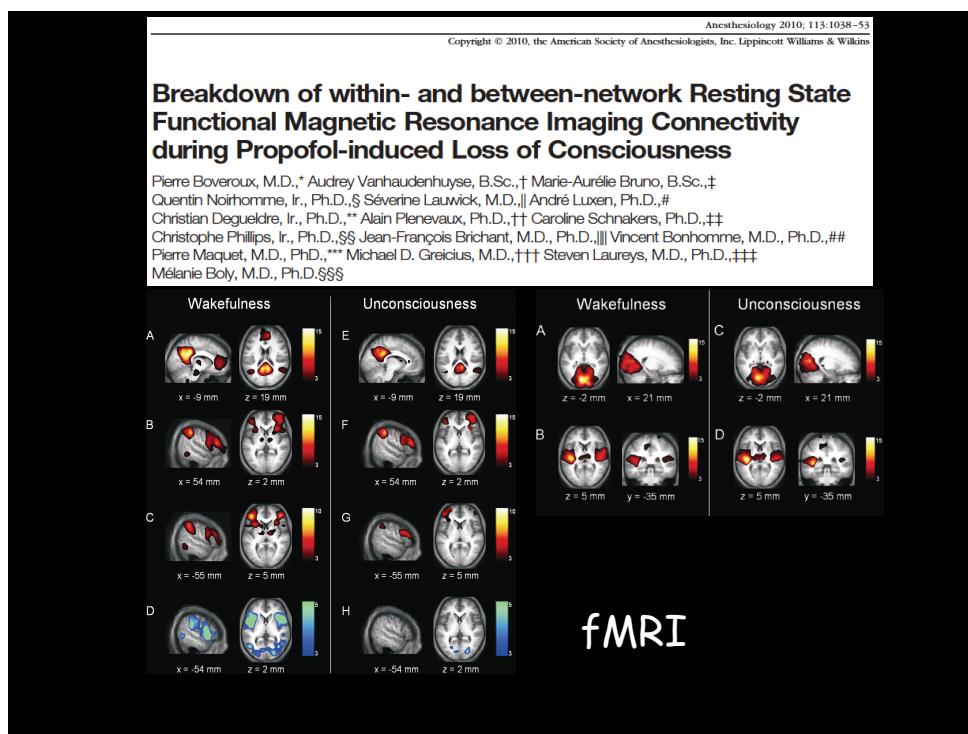
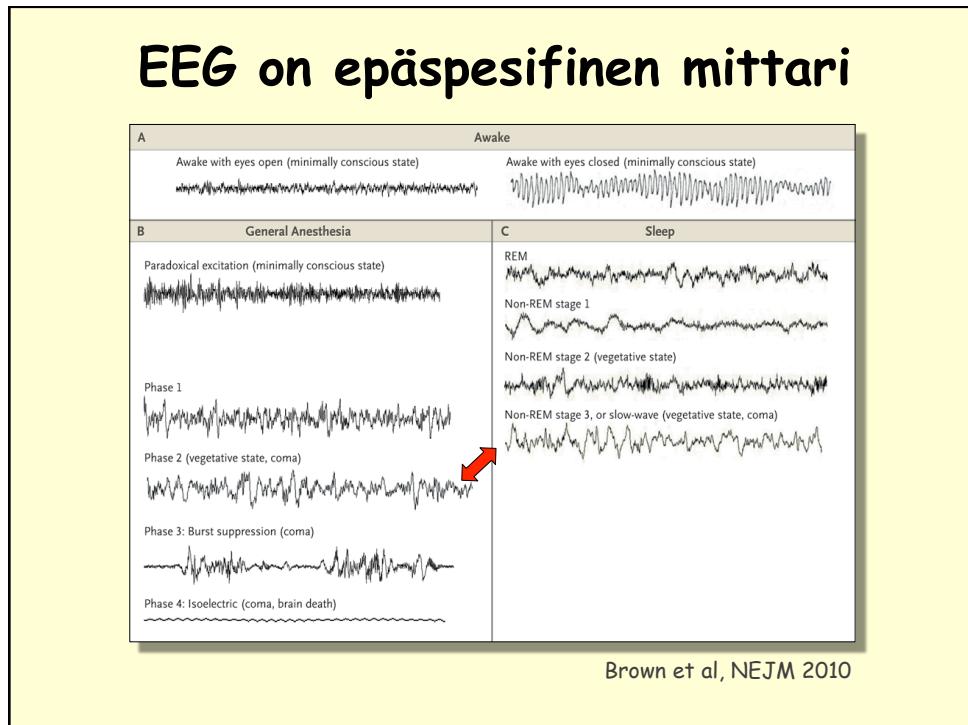
- Anestesian induktio
 - Sedaatio (paradoksikaalinen ekskitaatio)
 - Tajuunnan/reagoinnin/reagointikyvyn häviäminen
 - Ripsi-, kornea- ym. heiasteiden vaimeneminen/häviäminen
 - Apnea, lihastonus ↓
 - Verenpaine ↓ , syke ↑
- Anestesian ylläpito/Kirurginen yleisanestesia
 - Syvä tajuttomus
 - Ei reagointia kipun
 - Aivorunkorefleksit ↓
 - Hengitysdepressio
 - Kardiorespiratoriisen ja termoregulatorisen tuen tarve
- Heräämisvaihe
 - Aivo(runko)kuolemaa muistuttava tila
→ "kooma"
 - "vegetatiivinen tila"
 - "minimaalisen tietoisuuden tila" (MCS)
 - täydellinen herääminen

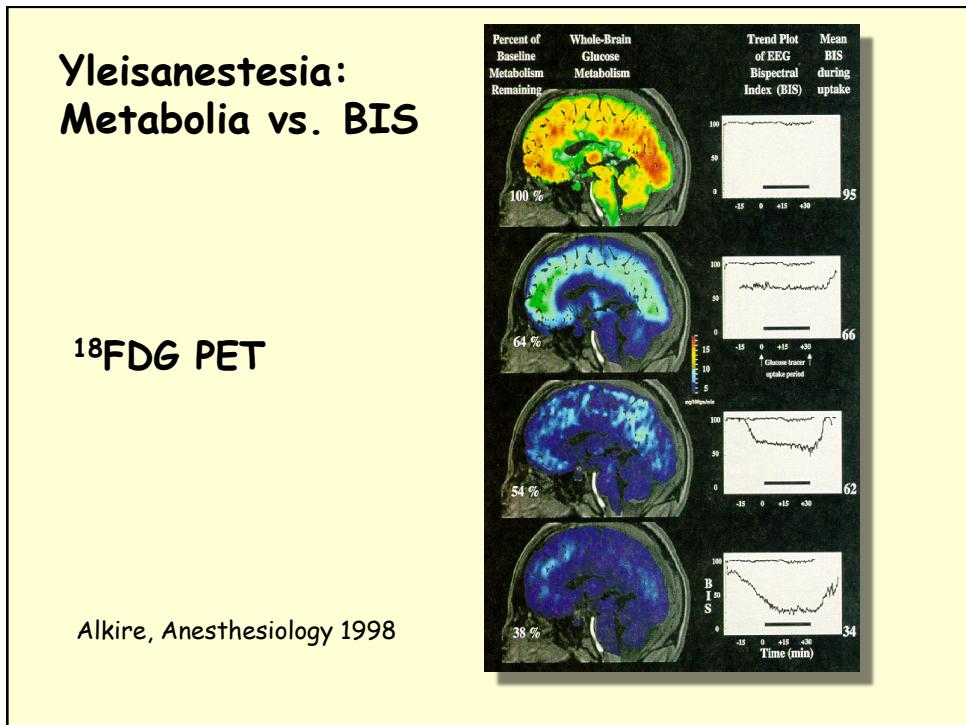
*Muistuttaa aivo-
(runko)kuolemaa !*

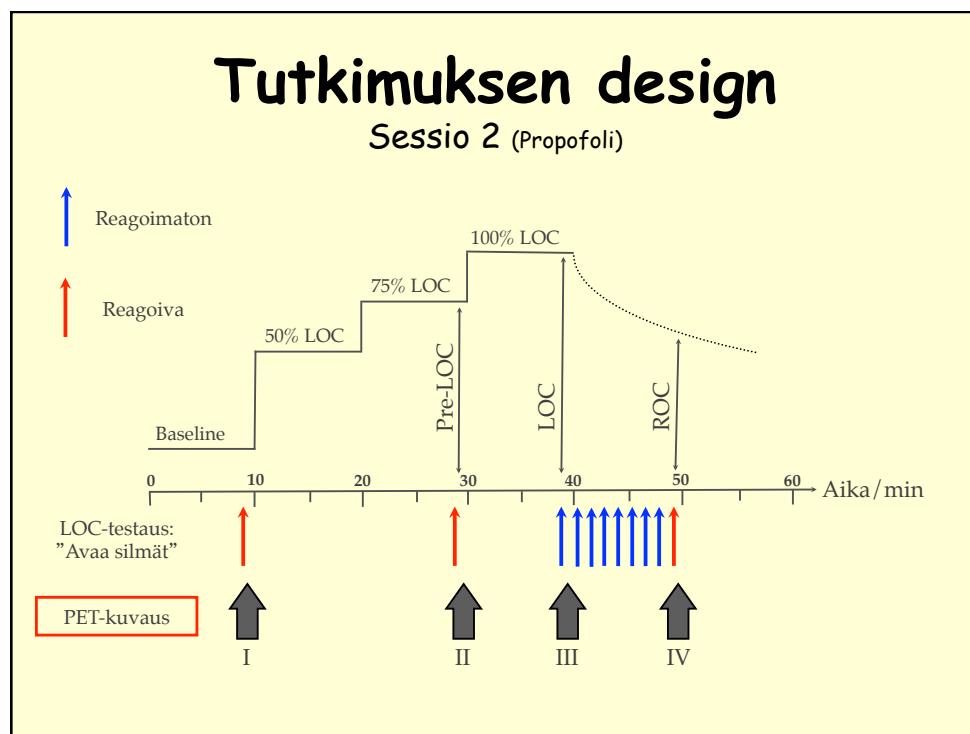
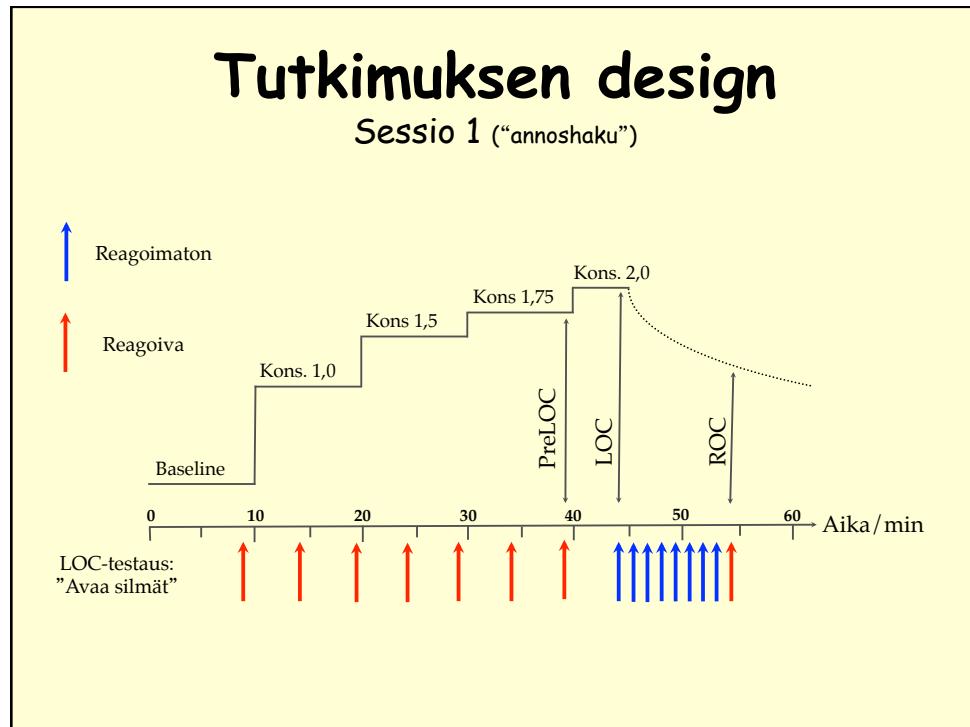


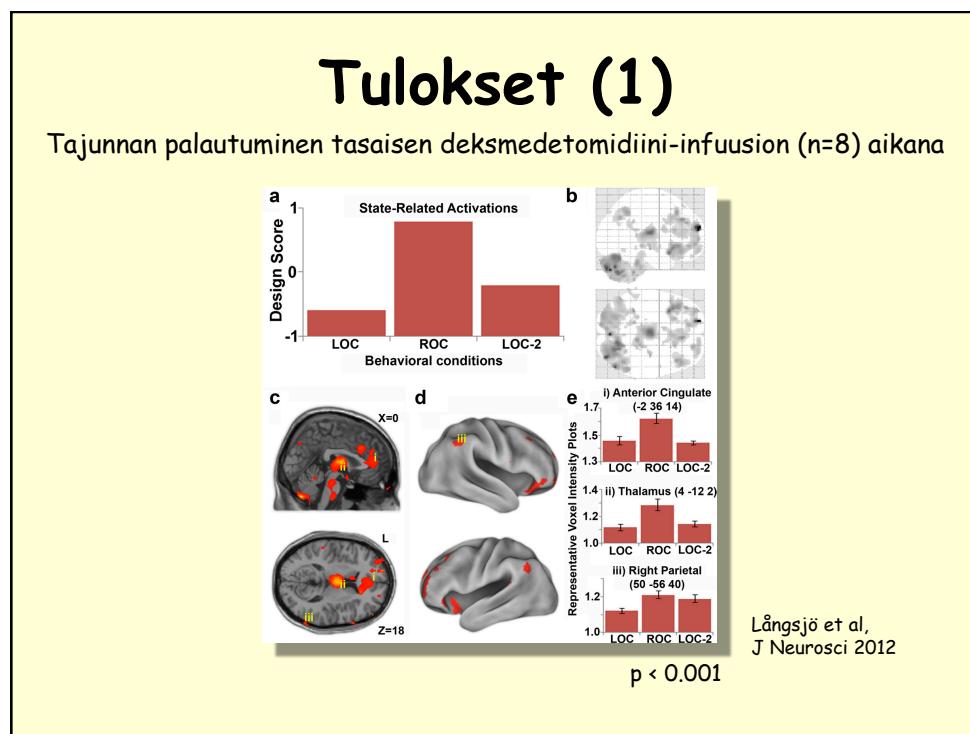
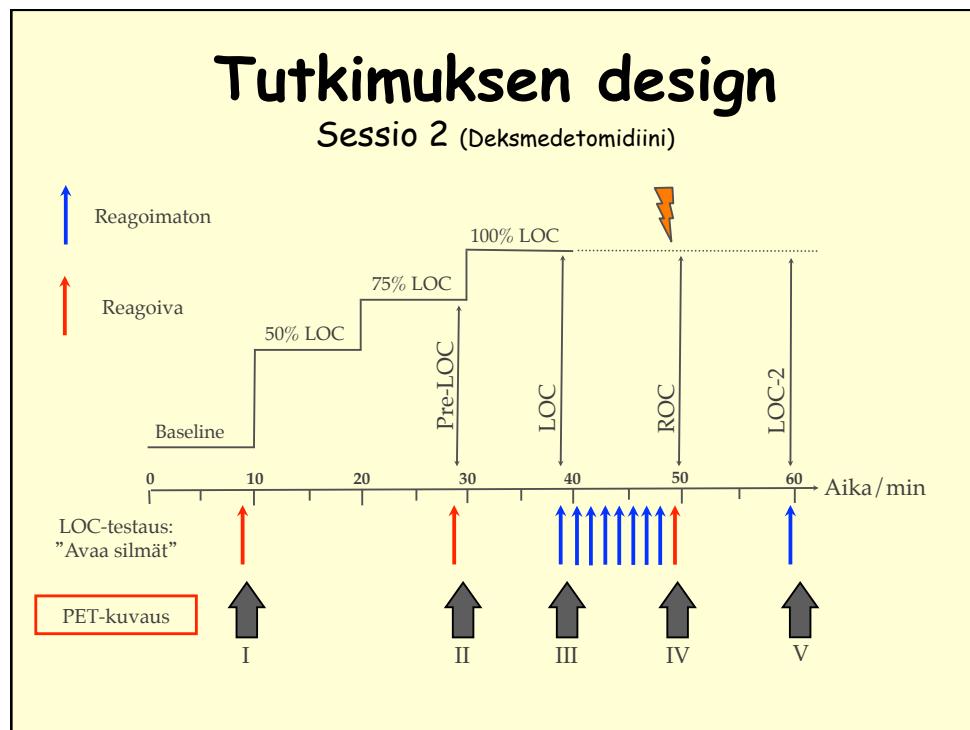


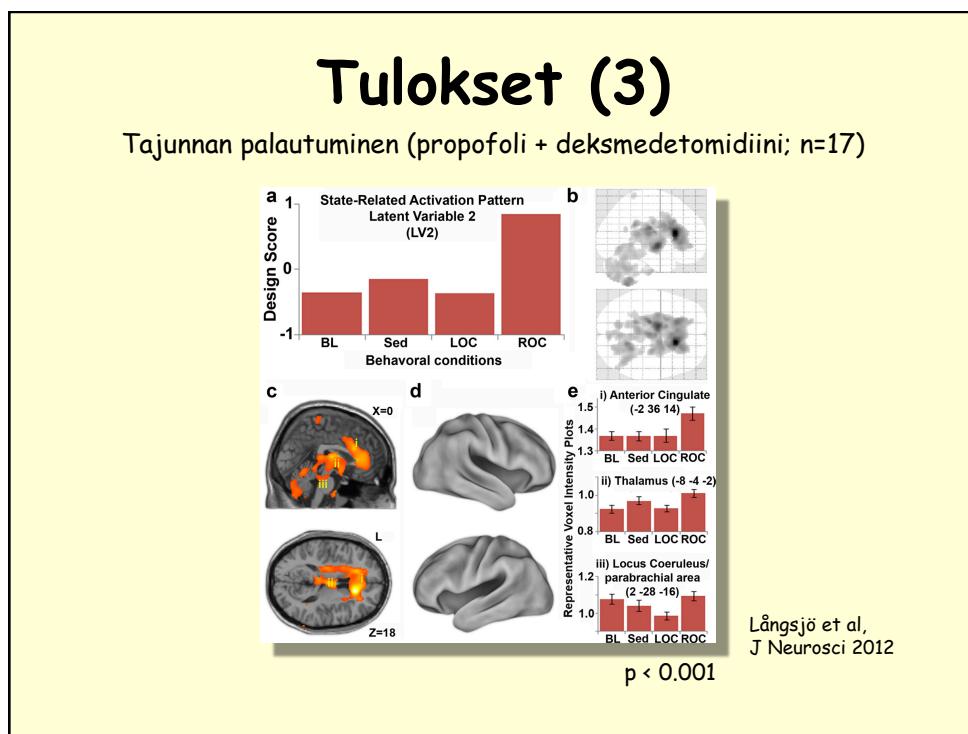
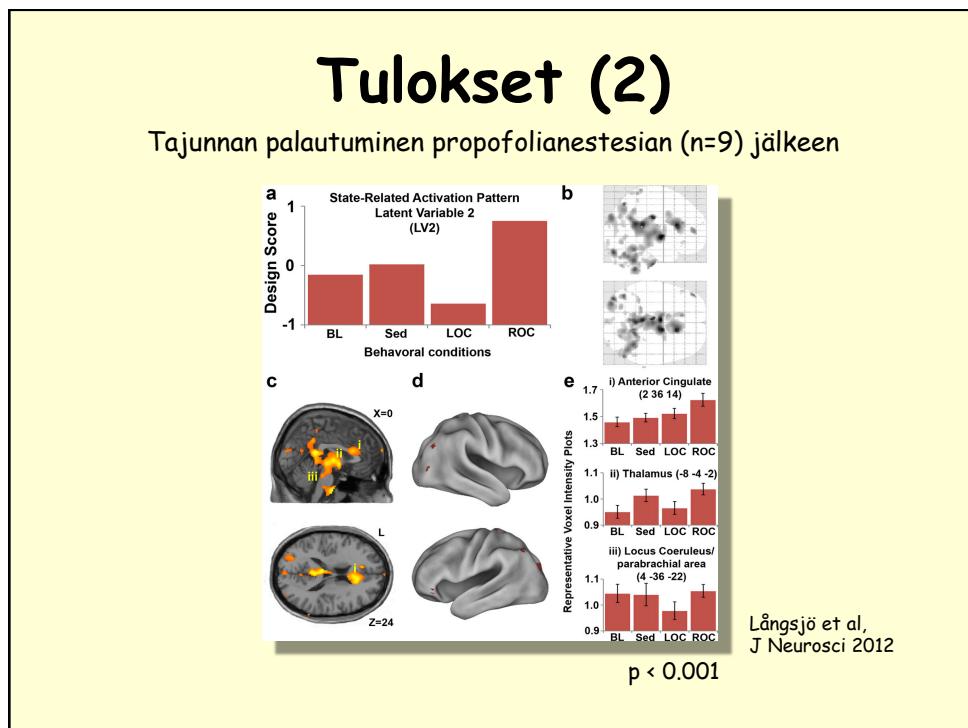


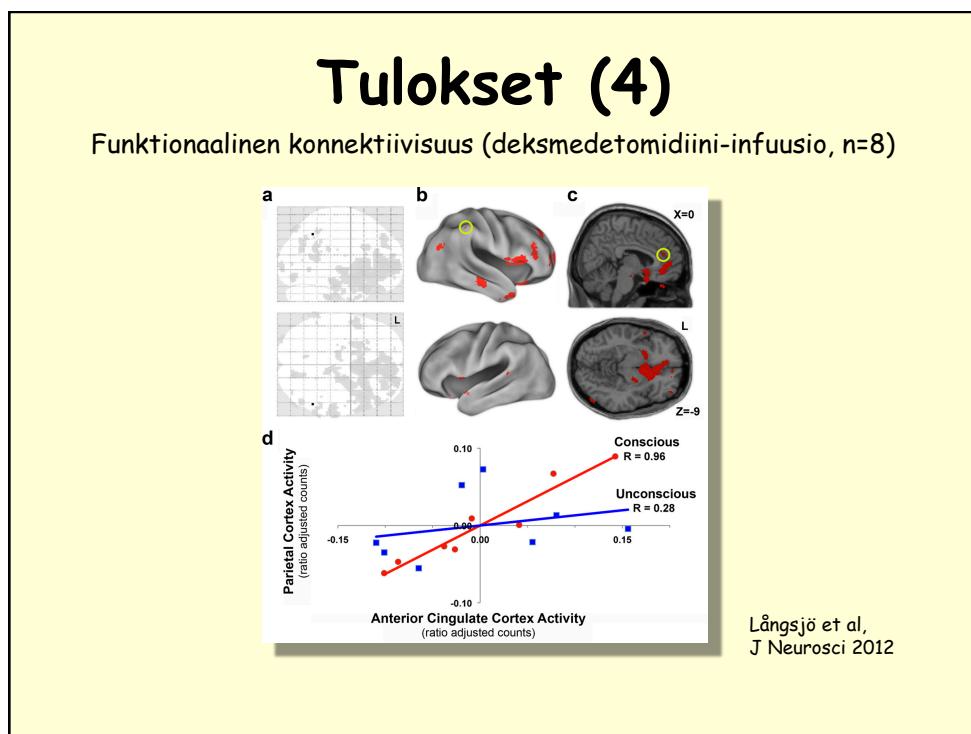
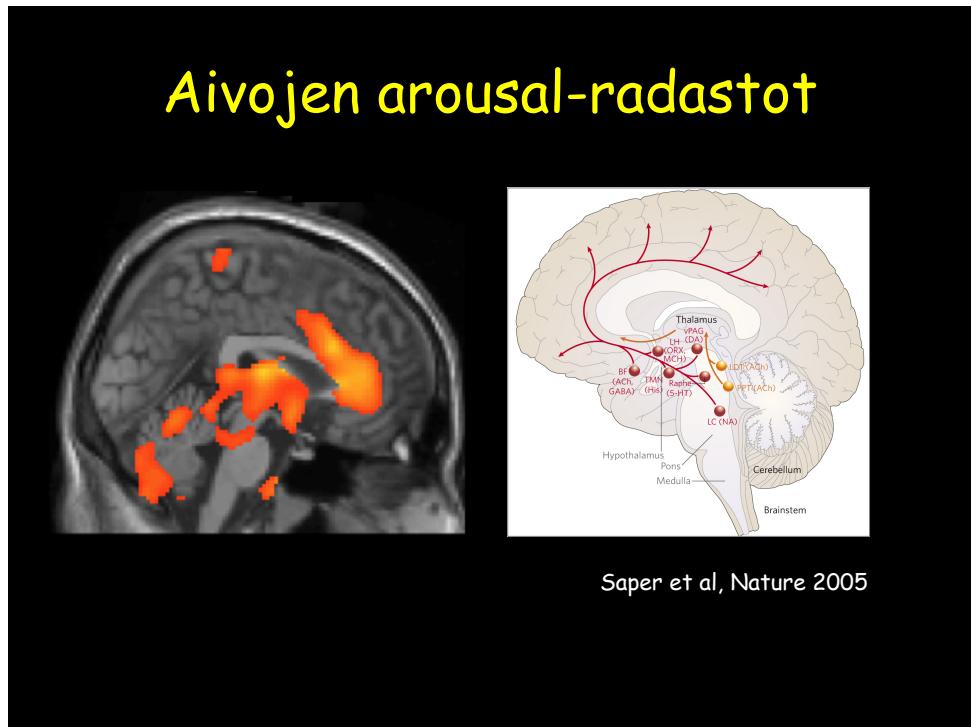


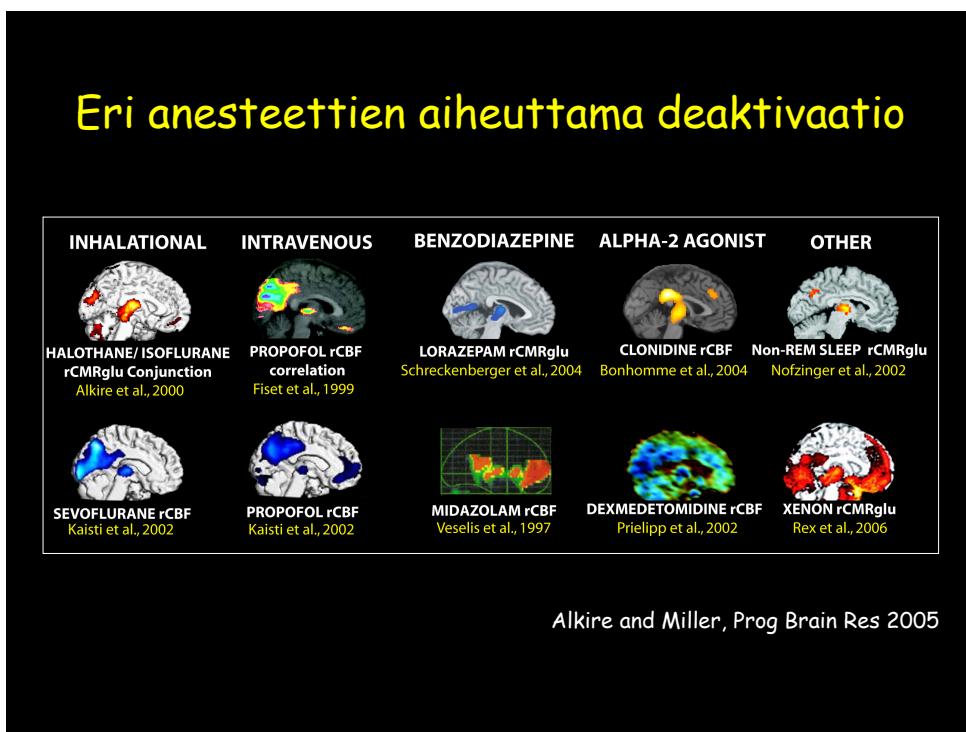
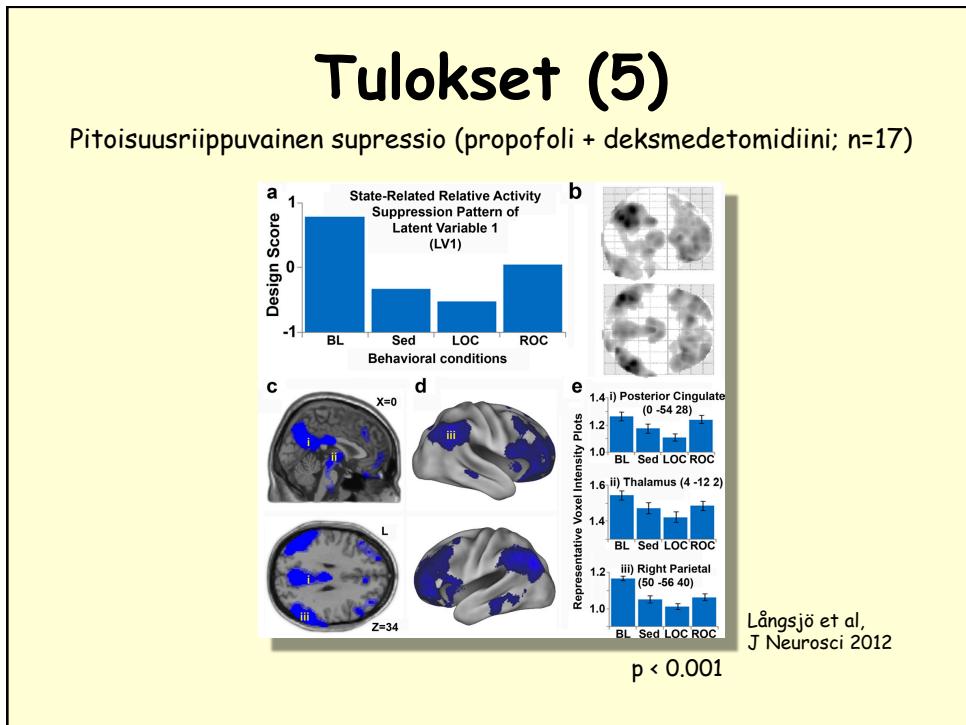


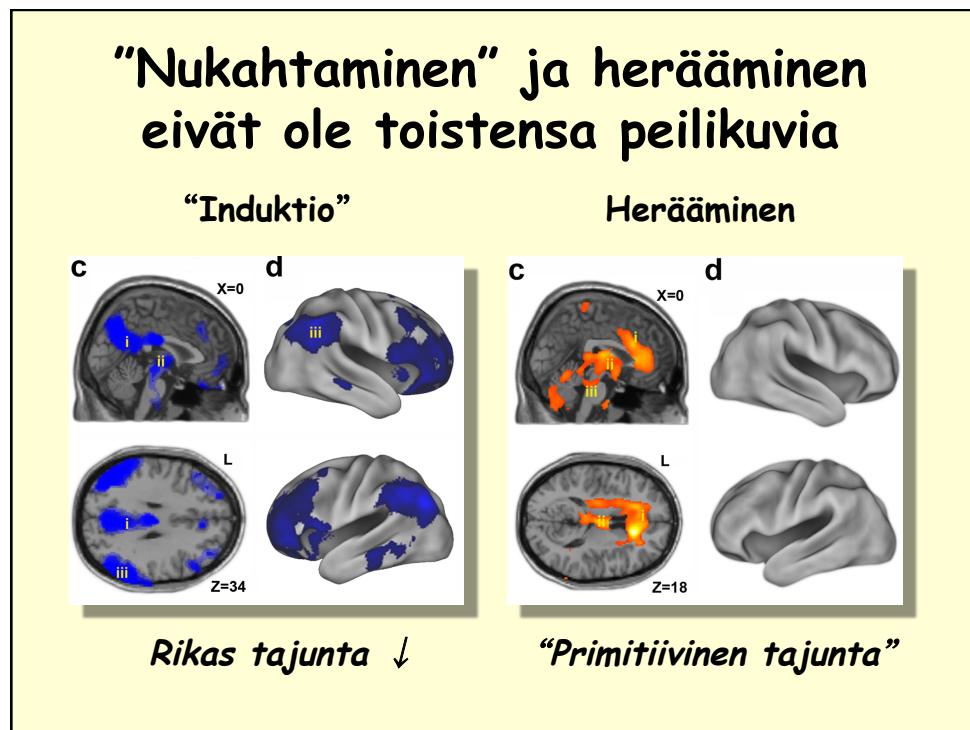
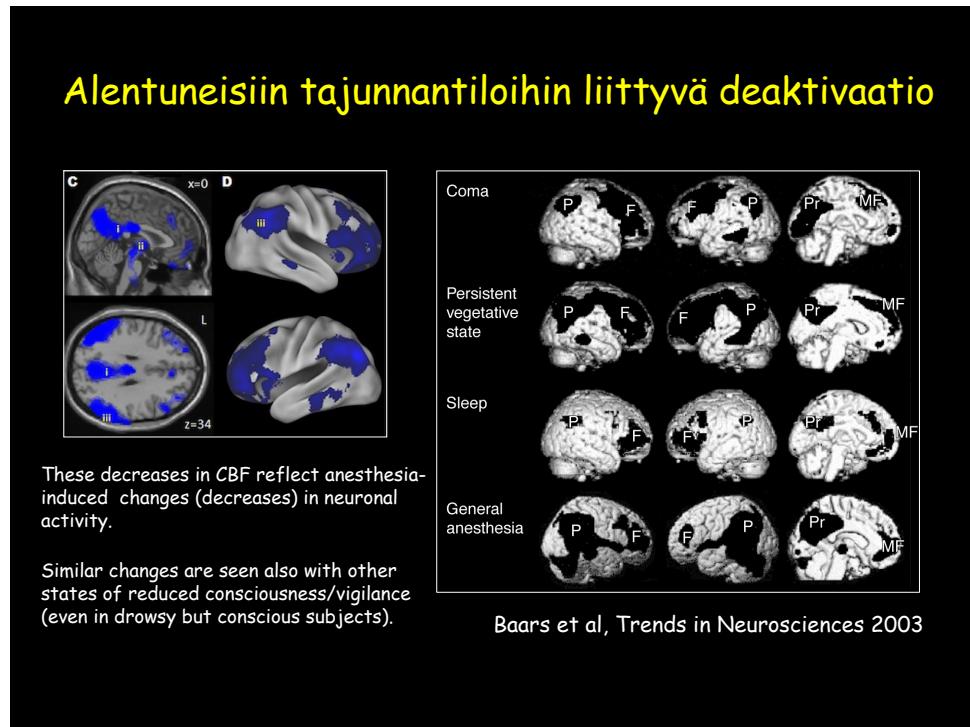




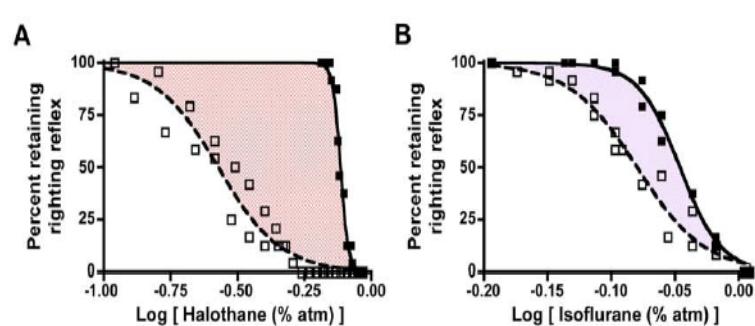








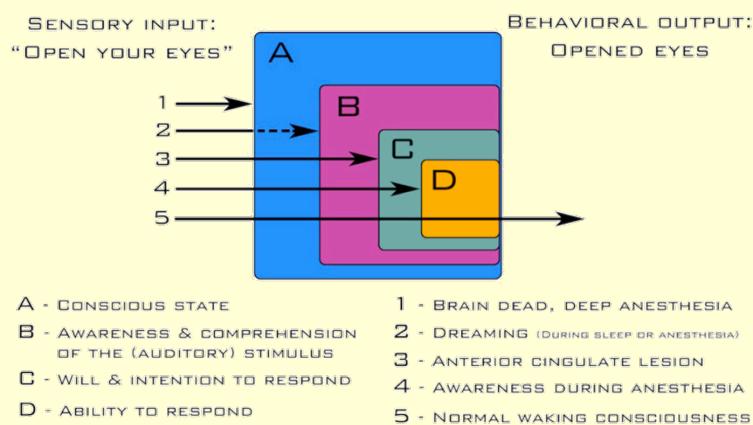
"Nukahtaminen" ja herääminen eivät ole toistensa peilikuvia



Friedman et al, PLoS ONE 2010

→ "Neural inertia"

Tajunta vai reagointikyky ?



Långsjö et al, J Neurosci 2012



Aims ...

LOC-2013 study

A joint effort with Antti Revonsuo and his Consciousness Research Group

- To study what happens in the brain when consciousness is lost and when it returns using general anesthesia in healthy human subjects
- To find tools to distinguish consciousness, connectedness and responsiveness
- To develop new methods to measure consciousness and "depth-of-anesthesia"
- To compare general anesthesia and normal sleep
- To compare the state of ("primitive") consciousness and higher forms ("contents") of consciousness



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