

Non-invasive imaging of brain function



fMRI



PET



EEG



MEG

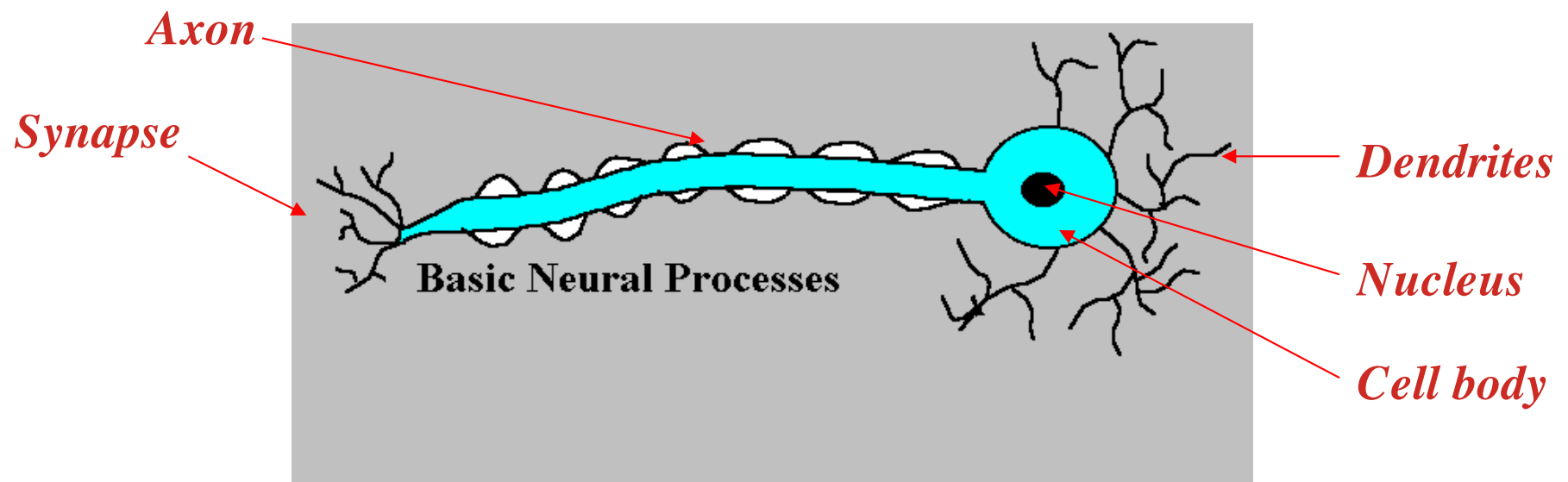
How can we look into the brain and “see” what it’s doing, non-invasively?

The brain is *bloody* & *electric*



The brain is *bloody* & *electric*

- Blood
 - **increase in neuronal activity → increase in metabolic demand for glucose and oxygen → increase in cerebral blood flow (CBF) to the active region**
- Electricity
 - **the brain works because neurons communicate with each other and they do this by sending out tiny electrical impulses. We can measure correlates of this electricity outside the brain.**
- Blood is an indirect, slow (because blood flows slowly), measure of neural activity.
- Electricity is a direct measure of neural activity



**EEG and MEG offer
the measurement of
the work as it is
happening**



**PET and fMRI offer a
measurement of the
energy supply needed
for the work**



Non-invasive
recording from
human brain
(Functional
brain imaging)



**Hemodynamic
techniques**

**Positron emission
tomography
(PET)**

**Excellent spatial
resolution (~1-2mm)
Poor temporal
resolution (~1sec)**

**Functional magnetic
resonance imaging
(fMRI)**

**Electro-
encephalography
(EEG)**

**Poor spatial
resolution (esp. EEG)
Excellent temporal
resolution (<1msec)**

**Electro-magnetic
techniques**

**Magneto-
encephalography
(MEG)**