The human brain

- An extension of the spinal cord which has become bigger and bigger as the species has evolved.
Cerebral hemispheres
Corpus callosum
Breathing, heart rate, digestion...

Cerebrum: higher functions

Coordinating senses, muscle movement
Lobes
Cortex
- about two millimeters thick and has a total surface area of about 1.5 square-meters
Some oversimplified characterizations of the functions of the lobes.
Frontal lobe

- Located in front of the central sulcus.
- Decisions, judgements, emotions.
Temporal lobe

- Located below the lateral fissure.
- Perception, recognition.
Parietal lobe

- Located behind the central sulcus.
- Perception of stimuli related to touch, pressure, temperature and pain.
Occipital lobe

- Located at the back of the brain, behind the parietal lobe and temporal lobe.
- Vision at large.
Blown-up cortex
Figure 4.21  Approximate representation of sensory and motor information in the cortex
(a) Each location in the somatosensory cortex represents sensation from a different body part. (b) Each location in the motor cortex regulates movement of a different body part. (Source: After Penfield & Rasmussen, 1950)
The mind/brain view of the body
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Broadmann’s areas
Brain lingua
Brain lingua
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Bilateral - On both sides
Ipsilateral - On the same side
Contralateral - On the opposite side
Neurons

- Central nervous system is made up of about 100 billion neurons.
- Unlike other cells in that they can both receive and send out signals to neighboring neurons in the form of electrical pulses.
Neurons

- Typically a given neuron is connected to about ten thousand other neurons.
- The specific point of contact between the axon of one cell and a dendrite of another is called a synapse.
Neurons

- We are born with a complete set of neurons.
- What changes in maturation, is the connections between the neurons.
- On average, we lose about 20% of our neurons by the time we die.
How fast is the brain?

- After a neuron has fired, it takes it about one millisecond to return to its normal state.
- Much slower than your computer!
- The secret of the brain lies in the vast number of neurons (tens of billions) and the complicated way they are connected.