

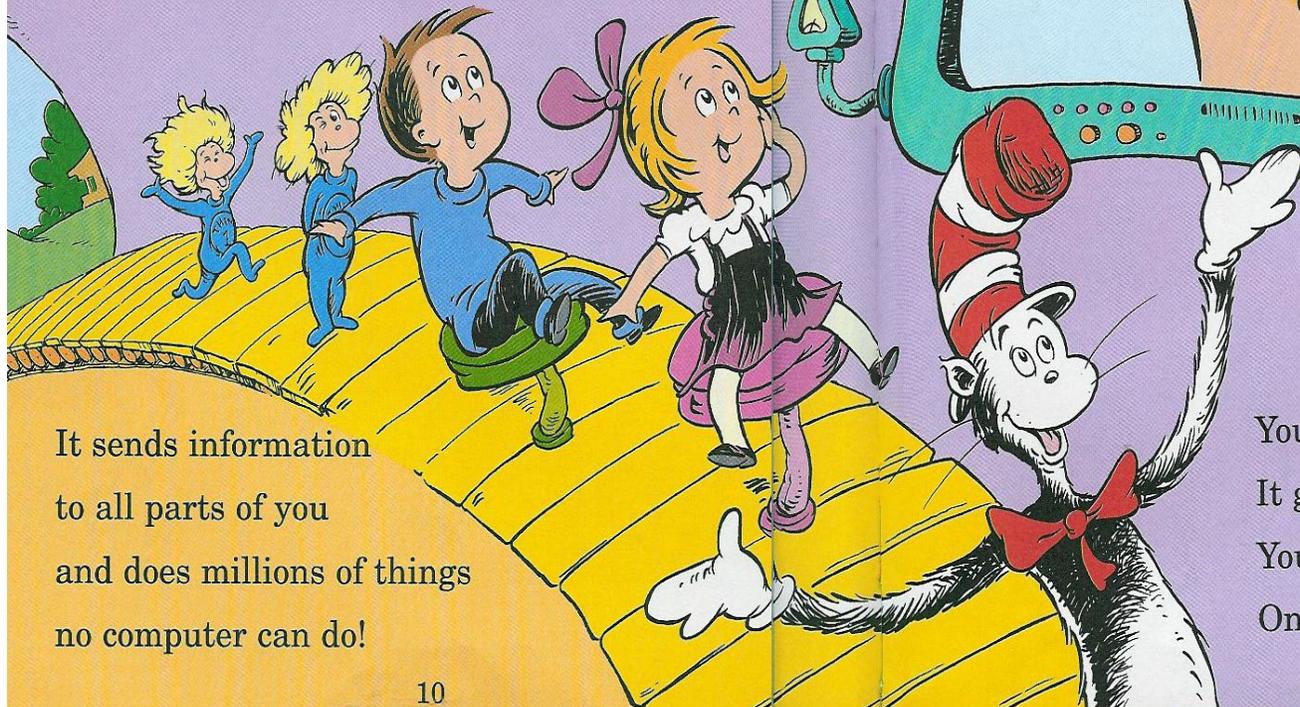
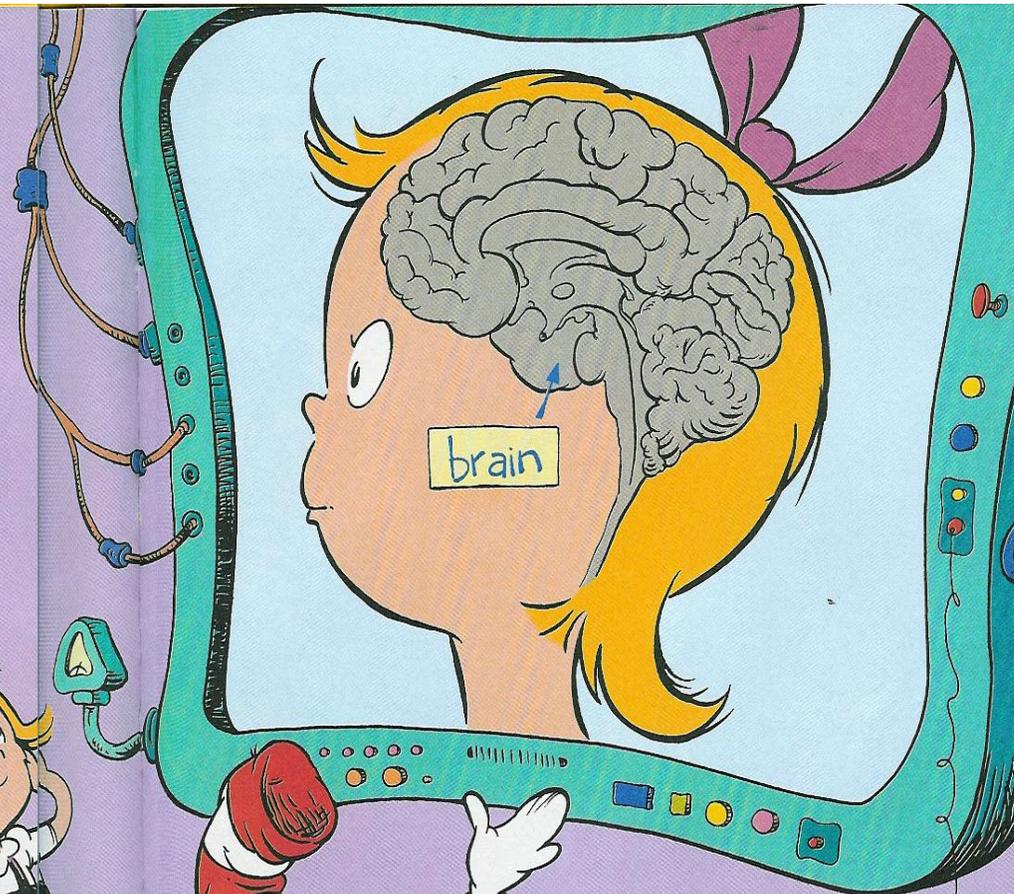
Technology



Let's start at the top with
your brain. It is key.
It controls all you do—
helps you laugh, learn, and see.

It makes your legs move
when you run, jump, or walk.
It makes your face move
when you blink, smile, and talk.

It sends information
to all parts of you
and does millions of things
no computer can do!



Your brain never stops.
It goes all day and night.
Your brain has two sides.
One is left. One is right.

Neurological dysfunction with hyperthermia

- In the brain, the cerebellum is deemed the most vulnerable tissue to heat stress and is among the first areas to show signs of damage
- Neurological complications include cerebellar ataxia, cognitive impairment, dysphagia, and aphasia



Patient 1

- 35 y/o male
- Trec 107.7°F (42°C)

Neurological dysfunction with hyperthermia

- Cognitive dysfunction
- Agitation
- Seizures
- Unsteadiness
- Disturbance of consciousness from lethargy to coma

Neurological effects

- Related to the magnitude and duration of the hyperthermia
- Genotypic and phenotypic differences in the physiological response to hyperthermia (inflammatory response, induction of thermo-protective mechanisms) may also affect an individual's risk of developing neurological deficits

Cerebellar damage

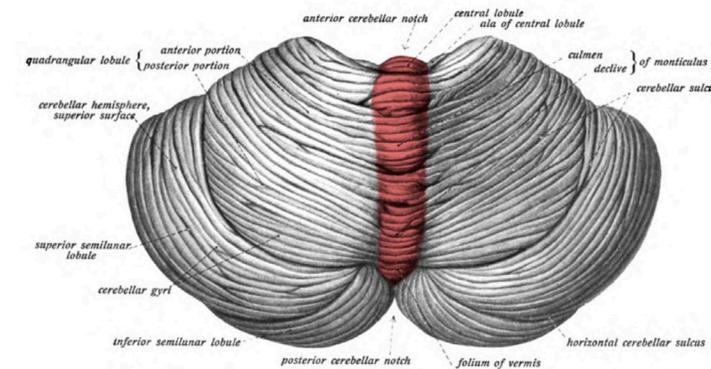
- In patients with classic heat stroke, Purkinje cells displayed the most marked thermal damage
- Purkinje cells are found predominantly in the cerebellum and regulate motor function
- Almost complete loss of Purkinje cells may be seen when death occurs after 24 hours

Cellular effects

- The most temperature-sensitive cellular elements of neural cells are mitochondrial and plasma membranes
- Irreversible alterations to protein structure appear to occur at temperatures above 40 °C (104°F)
- Cell death occurs at temperatures above 40-41°C and increase in an exponential manner as temperature exposure time increases

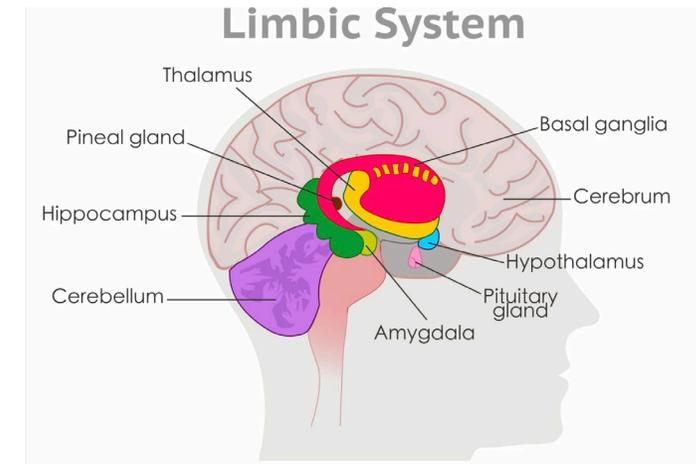
The cerebellum

- The cerebellum is not only implicated in sensorimotor function but also plays a cardinal role in the modulation of cognitive and affective processes
- The posterior lobe is considered the cognitive cerebellum
- The cerebellar vermis includes zones connected with the limbic system sub-serving emotion



The cerebellum

- Reciprocal neuroanatomical connections linking the cerebral association areas and paralimbic regions with the cerebellum constitute the basis to explain the pathophysiological mechanisms of the cerebellar induced cognitive and affective deficits
- Limbic system=emotional nervous system



<https://www.simplypsychology.org/limbic-system.html>

The cerebellum

- With the introduction of the concept “cerebellar cognitive affective syndrome” (CCAS) in the late 1990s by J.D. Schmahmann opened an entirely new area in behavioral neuroscience and established a fundamental role of the cerebellum in the modulation of neurocognition and affect
- Cerebellar motor syndrome (CMS)- limb ataxia, postural/gait deficits
- Vestibulo-cerebellar syndrome (VCS)- oculomotor deficits, vertigo

The cerebellum

- In his study, most patients had flattening of affect or disinhibition occurred, taking the form of overfamiliarity, flamboyant and impulsive actions, and humorous but inappropriate comments
- Posterior lobe damage was particularly important in the genesis of this novel syndrome
- Damage of the vermal regions was consistently present in patients with disruption of affect