Notes on The Aging Brain

Neurons can live for 120 years – but neural circuits do slow down

Case: Kent who had a stroke which caused damage and blockage in an artery.

Kent was an accountant.

The signaling was interfered with and it caused impairments – neurons died after the stroke

Kent wants “to be whole again”

His left arm and leg are now partially paralyzed.

Issue: how can we revive parts of the brain that were damaged?

Part of the brain that regulates movement was damaged when neurons died and signaling shut down.

The treatment he received helped the injured neurons recover – neighboring circuits came into action and for example – signals were sent to left arm.

The problem with Kent is that he learned not to try – so we need to counter-condition him and start to use the weak arm.

The exercises he was made to do by the therapists working with him – like flipping dominoes helped him regain movement in his left arm.

However – he needs to practice lots, over and over and repeat movement to expand the part of the brain that was injured.

Remember – the brain is a muscle- you must exercise it.

The damaged brain can return to its original size with practice.

The brain begins to slow down after age 20 – cognitive processing slows with every decade of life.

By age 70 – there’s obviously more cognitive decline.

We call this age related decline.

Hippocampus – neurons send messages – we need strong connections.

The NMDA receptor is important in memory – low number of NMDA receptors for people with poor memory and drugs can replace loss of NMDA receptors.

Case: Milton Adamson

Proteins help neurons grow – so when you exercise and run it helps.

Exercise keeps neurons healthy – it builds vital brain proteins that helps neurons be stronger.

Running is great for older adults because it increases molecules in the brain.

In older adults – neurons can grow.

Questions: can stem cells make new neurons?

Can we rebuild circuitry?

In mice – killed neurons and gave them stem cells and they moved to the right location and rebuilt brain circuitry.

Intellectual functioning won’t decrease with aging if we exercise the brain.

Alzheimer’s Disease

In Alzheimer’s – we need to stop tangles from forming.

Neurons die with Alzheimer’s – tangles are dark twisted filaments, plaques are sticky masses

Neurons need long chain of molecules for nourishment

Tau starts to curl and twist and can’t transport nourishment now and cells die as a result.

We need to stop Pin 1 which is a protein because it bends tau.

Beta amyloid forms plaque and it destroys neurons – plaque kills neurons – need to lower beta amyloid.

With Alzheimer’s we see neuronal loss, loss of cognitive functions and thinking; emotional problems and we see personality changes; motor function problems, ADL’s worsen (activities of daily living)

Brain tissue decreases in size; we see atrophy in Parietal and Frontal Lobes

Cerebrum also decreases in size; Temporal lobe issues with not forming new memories.

We see abnormalities in loss of neurons, plaque: amyloid which is made of protein called beta amyloid in the space between cells there is clumps of tis protein.

Tangles: neurofibrillary tangles all around the brain; abnormal clumps of protein called Tau and they are inside of neurons.

In Alzheimer’s – synapses don’t function normally

The person can’t form new memories, is confused and disoriented and it’s progressive

**Stem Cells**

They are the body’s raw material – can divide and form new cells which are called daughter cells

They can become specialized cells – like blood cells, brain cells, heart muscle cells

Can repair damaged tissues

Get them from 3-5 day embryos or adults