

## Brain Term Glossary for Australia – Deb Antinori

Ventral – bottom, more accurately the front – think of a dog’s body (terms come from animal science)

Superior - top

Inferior – bottom

Anterior - front

Posterior - back

Medial - middle

Lateral - side

Neuroplasticity – reconfiguring of already existing circuits

Neurogenesis – creation of new cell by “parent” cell splitting off to create “daughter” cell, leaving parent cell to be able to split again

Midbrain (top of the brainstem containing SC – Superior Colliculus

SC Superior Colliculus (Colliculi – plural) – 7 layered multimodal nucleus (different sensory modes - first of its kind in the brain)

First 3 layers are referred to as Superficial – 1&2 Visual, 3<sup>rd</sup> layer Visuo-motoric

Bottom 4 layers referred to as Deep Layers – 4<sup>th</sup> layer - Visual, 5<sup>th</sup> layer - Auditory, 6<sup>th</sup> layer - Somatosensory/Visceral, Nociceptive/Pain & Temperature, 7<sup>th</sup> layer - Tactile

Retinocollicular Pathway – Retina to Superior Colliculus, “The Fast Track”, 1<sup>st</sup> Responder for Orienting, becomes the “Where” visual pathway – dorsal pathway (goes from visual cortex in occipital lobe up to parietal cortex which is in the dorsal area of the neocortex)

Agranular Isocortex – 3-5 layered cortex, doesn’t have the 4<sup>th</sup> granular layer the granular isocortex has (neocortex)

Agranular Isocortex

Comprised of: - ventromedial PreFrontal Cortex – vmPFC

- OrbitoFrontal Cortex – OFC (social cues and norms, empathy)
- Anterior Cingulate Cortex – ACC (our “gear shifter” - one thought, action, behavior to another, flexibility, adaptability)

Function: Regulation of the “alarm centers”: Amygdala, Hypothalamus (HPA Axis – Hypothalamus to Pituitary to Adrenal producing Cortisol, the stress hormone), PAG (periaqueductal grey – house all the defensive survival programs – flight, fight, freeze, faint, dissociation)

## Other terms for Agranular Isocortex – Middle PreFrontal Circuits or Regions

Amygdala: Implicit memory, birth to 18 months implicit/unconscious memory is the only kind we have. Assesses - safe and warm? Or bad/threatening? If assessed as threatening/dangerous contacts Hypothalamus and PAG

Hypothalamus: Beginning of the Stress Axis – HPA Axis. With threat – hypothalamus to pituitary to adrenals which produce cortisol (and adrenalin, of course). Cortisol is the fuel for the defensive survival programs housed in the PAG

PAG, periaqueductal grey – holds the defensive survival programs – fight, flight, freeze, faint, dissociation (dissociation was seen in a 2016 fMRI study – Ruth Lanius).

It is located next to the SC.

Granular Isocortex – the executor of the left hemisphere – conscious, analytic, rational, linear, thoughts, goals, plans, decisions, understanding consequences.

AKA dorsolateral PreFrontal Cortex - dlPFC

Named “granular” for the 4<sup>th</sup> layer which is the Thalamic Recipient Zone – input from the senses and body come into the thalamus which is a “hub” for information from the body and senses – from there this input goes to the 4<sup>th</sup> granular layer of the isocortex/neocortex.

Thalamus – a Hub, collection of nuclei. Like a Post Office – all the info coming from the body and senses (except smell which goes to the amygdala) arrives at a specific area of the Thalamus which then relays it to the appropriate part of the neocortex. In some nuclei, the thalamus has modulatory functions, being more than just “relay” of info.

Oxytocin – produced by the Hypothalamus, “feel good” social connection hormone

Hippocampus- encodes and retrieved conscious explicit memory and delivers to working memory, and with reptation long term memory. Mediates context, time significance, as memorial significance – how real or abstract it is in the moment