

Brain, Pain, Beliefs and Pleasure

Neuroplastic Transformation

Let the Good Times Roll

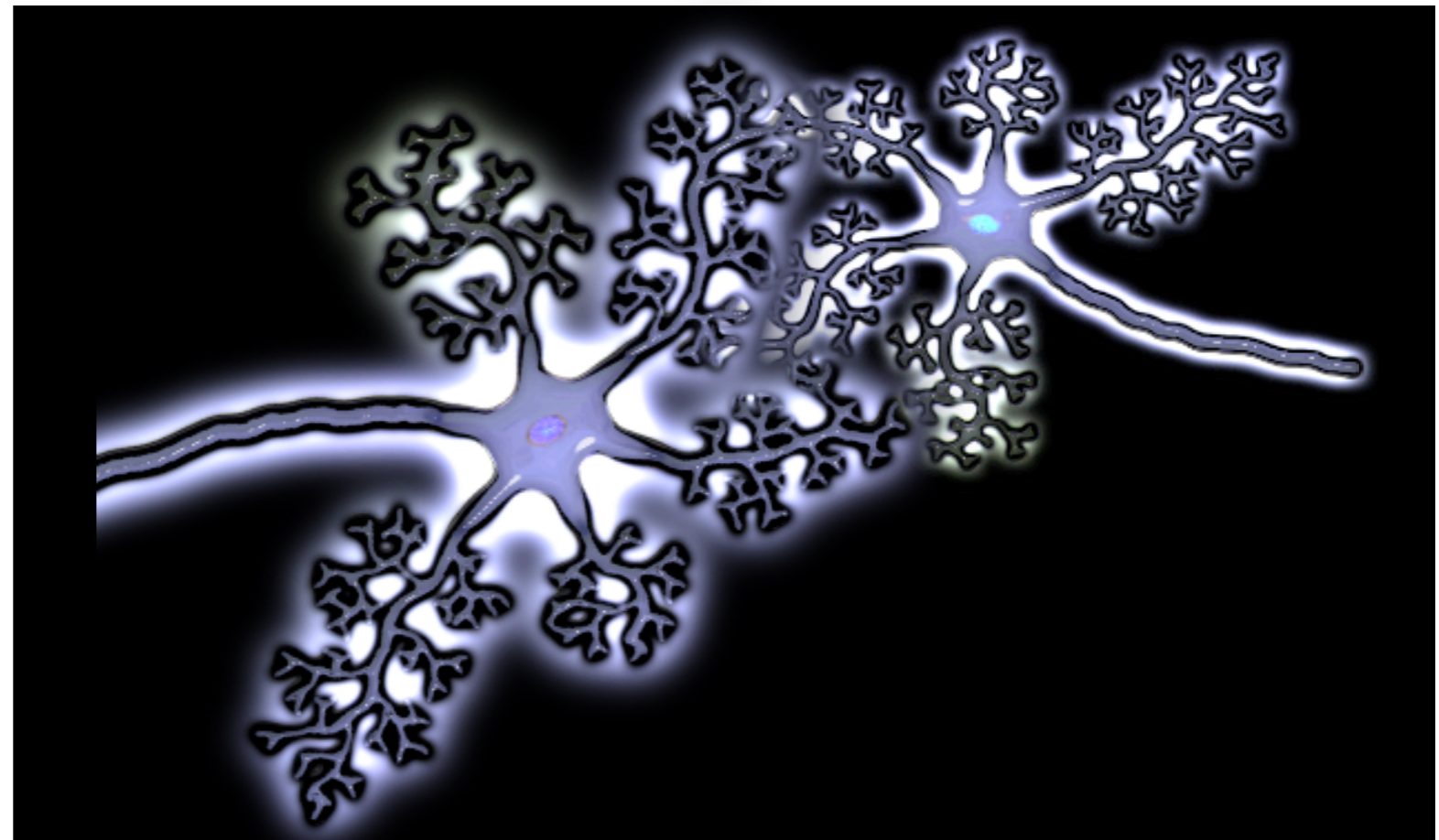


Neuroplasticity

- ■ Definition—the anatomical and physiological changes in the brain/body that occur from new learning
- ■ Special senses bring in constant brain altering data
- ■ The Brain/Body—every cell is connected to the brain for input and output
- ■ Neuroplasticity occurs in the PNS, spinal cord and brain
- ■ This is a highly energetic process- brain uses 20% of the body's energy

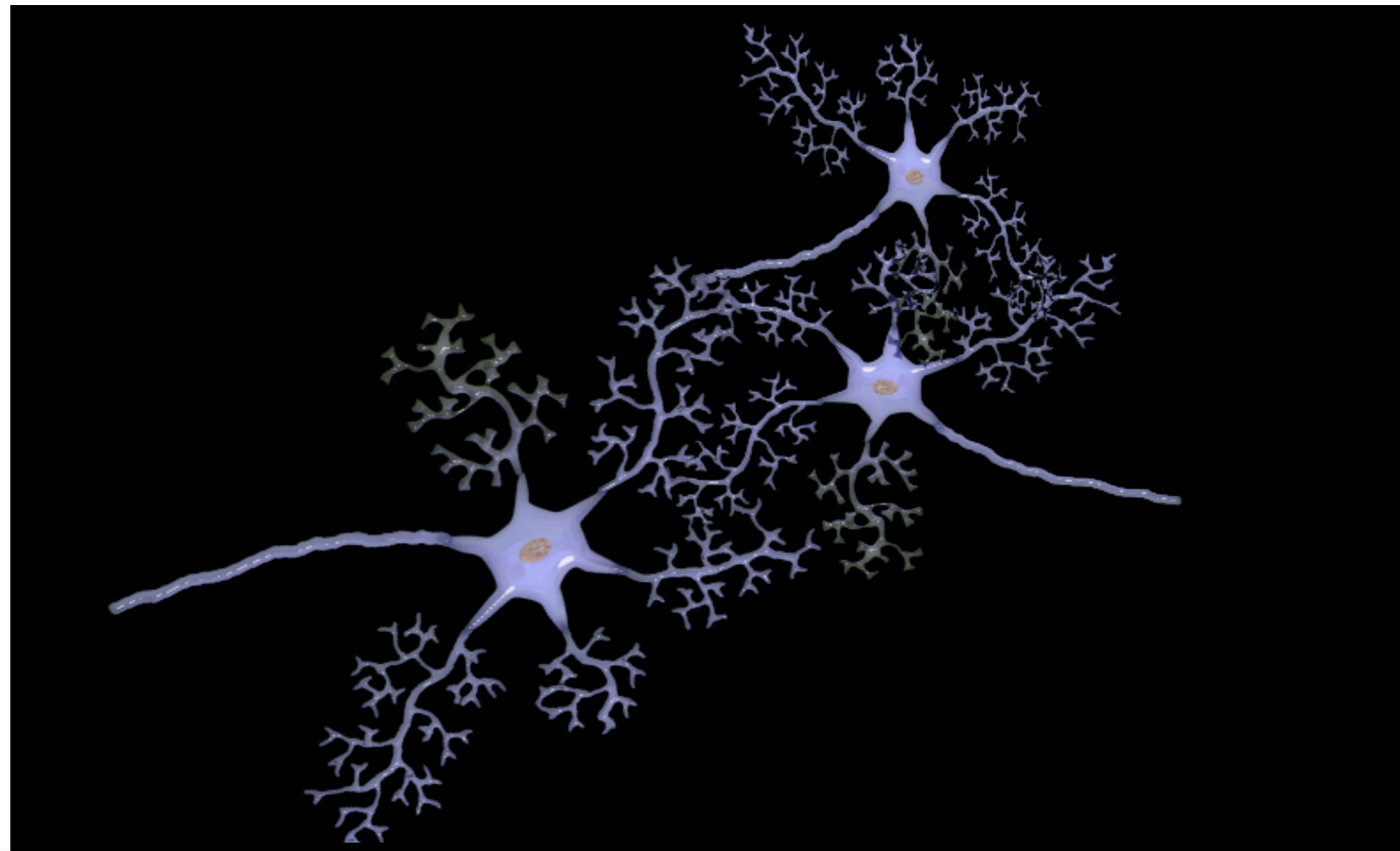


Short Term Potentiation

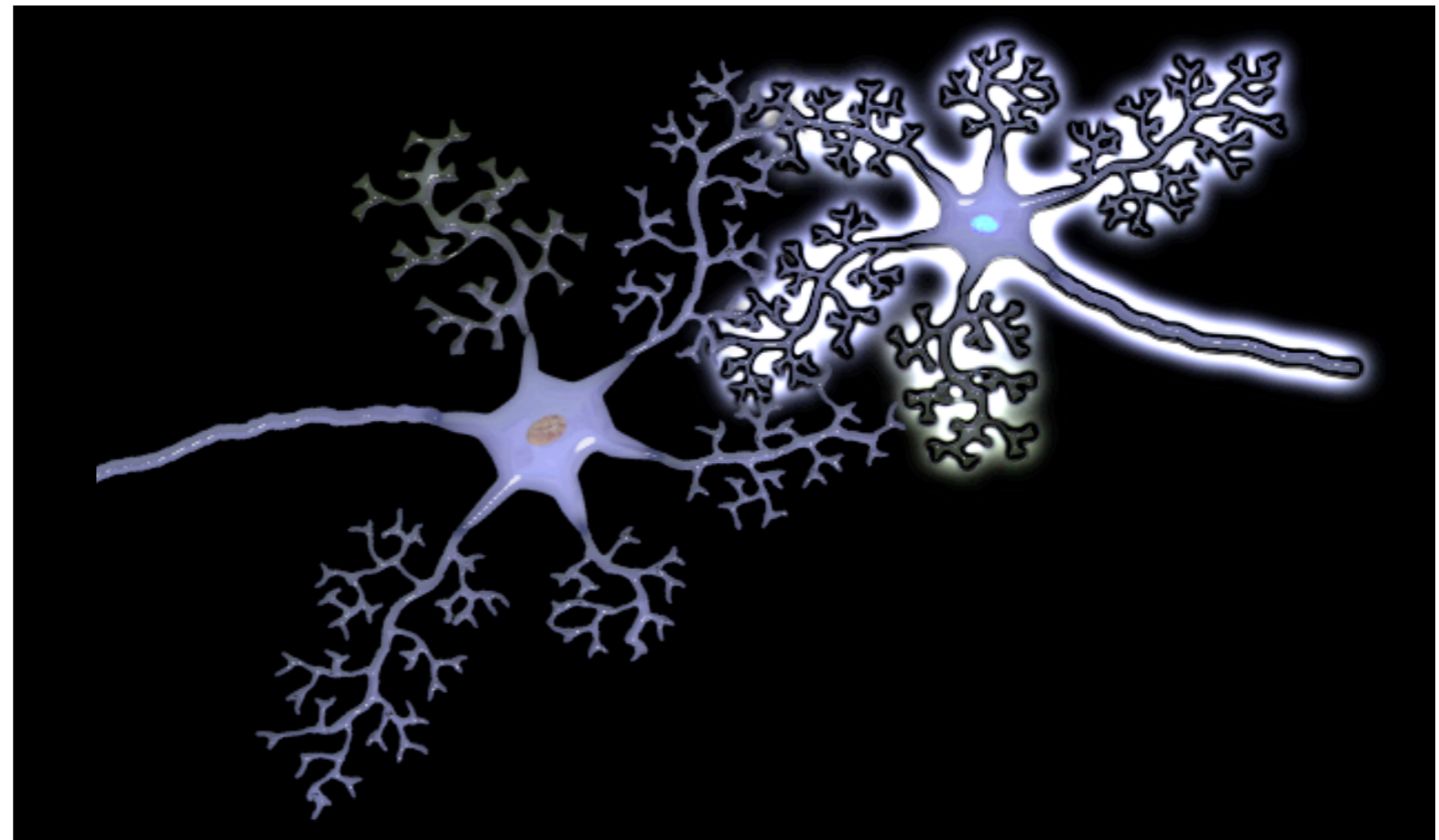




Short Term Depression

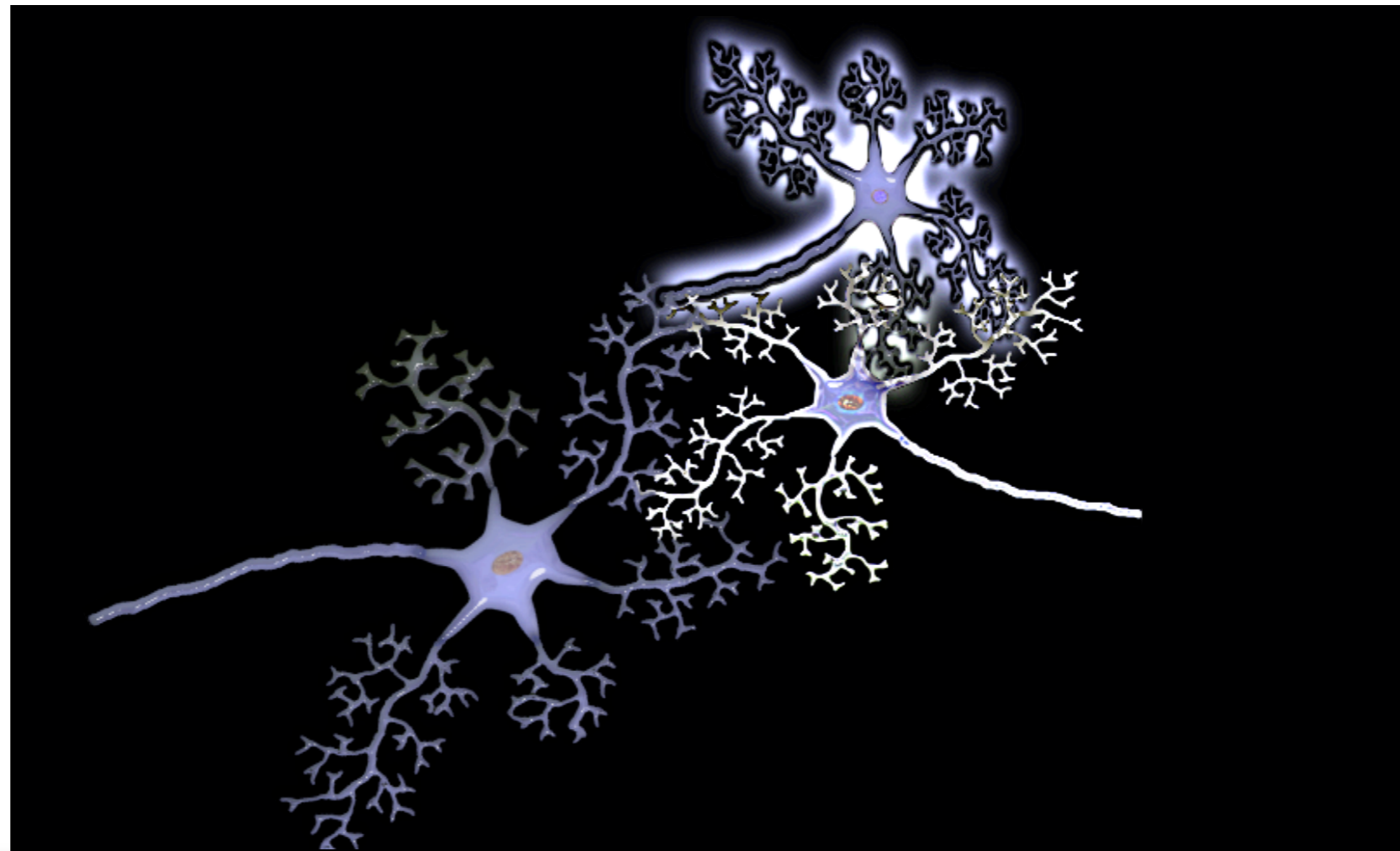


Long Term Potentiation





Long Term Depression





Neuroplasticity rules: What is fired is wired

- Everything we learn causes new connections to form and old connections to break based upon this principle
- The more we repeat something the stronger and more numerous the connections
- More connections means that we have become more skilled in the learned activity
- Every thing we do well has been improved by repetition and practice



Neuroplasticity rules: Use it or lose it

- ■ When we stop doing something, the connections melt away
- ■ The longer we stop doing something the more connections are lost
- ■ Some things are repeated frequently enough that even if we stop we maintain the ability to recapture the activity quickly when we start doing it again
- ■ Reading, riding a bike are examples



Neuroplasticity rules:

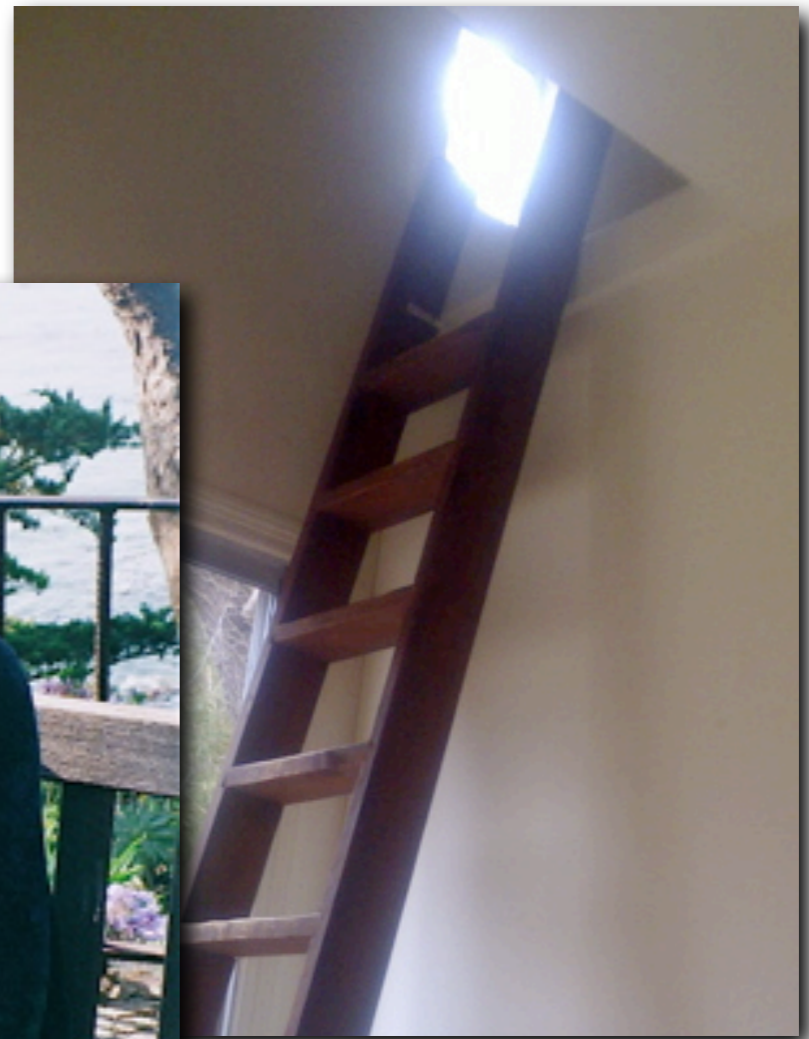
When you make 'em you break 'em;
when you break 'em you make 'em

- The brain uses 20% of the body's energy supply.
- Synapses use energy to change electrical signals into chemical processes and back into electrical signals
- Making or breaking a synapse uses energy
- No new connections can be made without breaking old ones



Head on Collision

- 56 year old woman with 30 years of back pain, due to scoliosis—once or twice a year it would be severe enough to put her in bed
- 13 years of neuropathic pain in right hand due to injury cutting all tendons and nerves
- CRPS secondary to the hand injury
- October, 2009 accident with severe head injury, brain surgery and deep coma for 2 and 1/2 weeks



Head on Collision



Head on Collision

- Awakened from coma
 - 10th rib and 10th vertebra fractured and very painful
 - Low back pain gone
 - CRPS gone
 - Neuropathic hand pain gone
- Rib and vertebra healed in two months—Low back, CRPS and Neuropathic pain never returned
- What happened?



Phases of Treatment: Reject the idea of the inevitability of persistent pain

1. Rescue Phase: Help the person out of unbearable pain
2. Stabilization Phase: Stabilize patient in a multimodal treatment program
3. Restorative Phase: Rebalance and focus on function
4. Transformative Phase: Replace pain with Pleasure

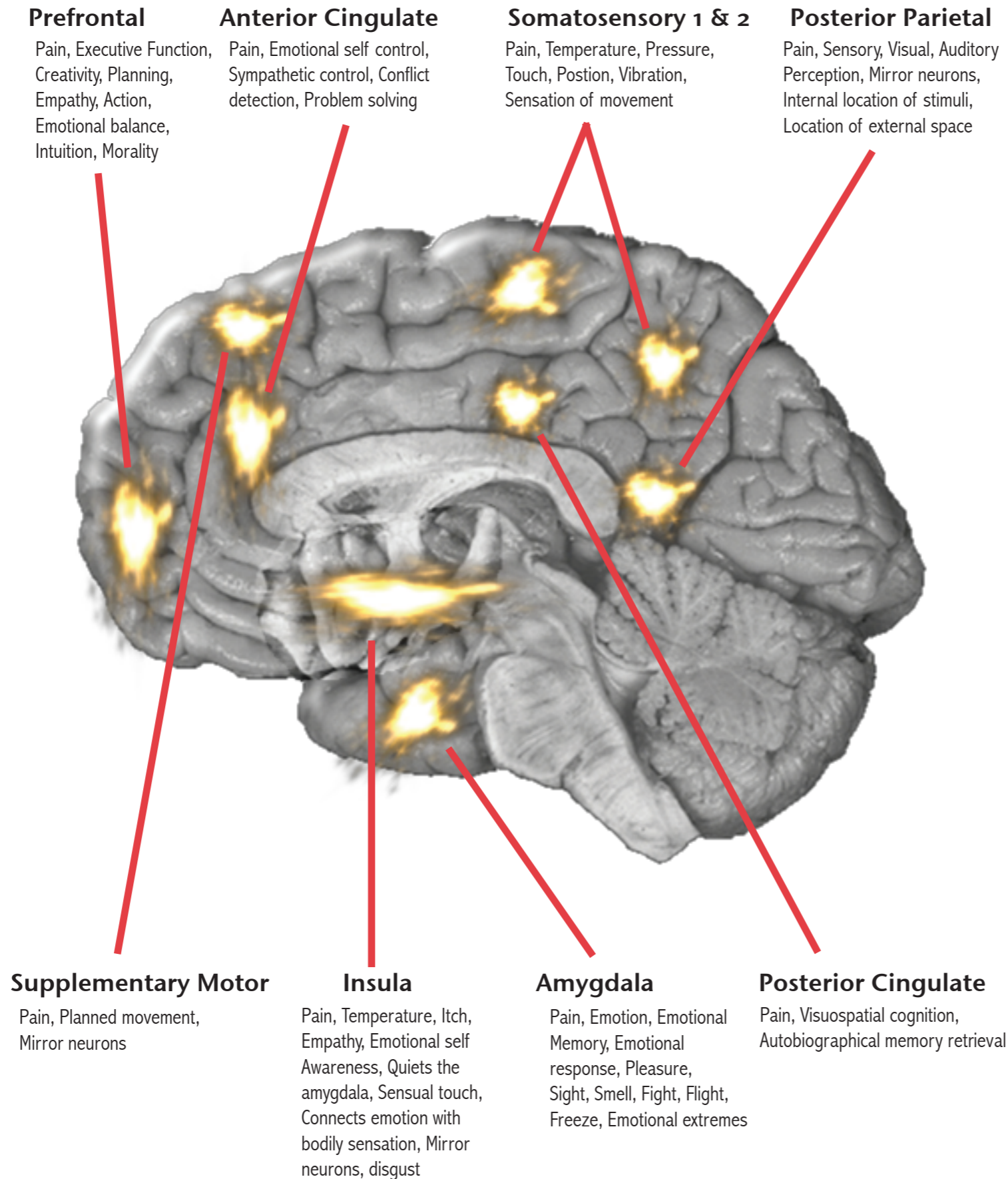


Every pain treatment alters the brain

- ■ There is no peripheral treatment
- ■ Pain is only perceived in the cerebral cortex
- ■ If pain processing is not reduced there, pain cannot be decreased
- ■ Pain can be successfully treated from the periphery to alter brain-based pain processing or from the brain to alter peripheral processes
- ■ Ultimate successful treatment of persistent pain must alter the constantly cycling brain/body loop

SHRINK THE PAIN MAP BY FLOODING THE BRAIN WITH:

Thoughts.....Images.....Sensations.....Memories.....Soothing Emotions.....Movement.....Beliefs





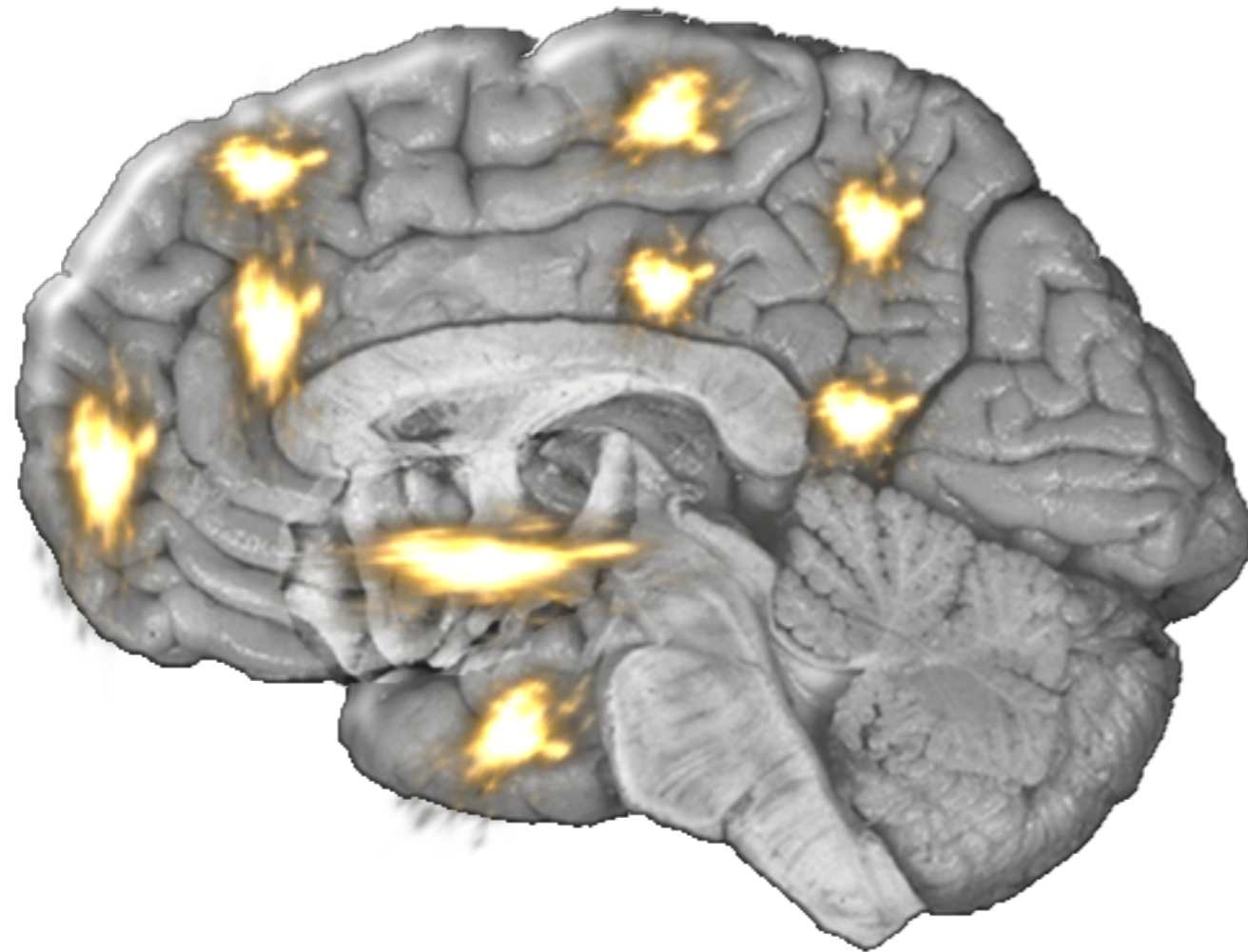
Thoughts

- ■ Intention must be to change the brain back to normal pain perception and peripheral adjustment to the body
- ■ Direct intervention at the highest functioning brain, the associational corteces
- ■ The danger of damage with normal activity is nil
- ■ If the brain can learn persistent pain, it can relearn normal acute pain, an alarm that stops when danger passes
- ■ Use simple thoughts: “disconnect the network, shrink the map, no pain in the brain.”



Images

- Use images of the brain map expanded and raging in persistent pain
- Use another image of the brain without activated pain areas
- Animations of pain networks connecting and disconnecting, long term depression of pain signals
- Use these and other images to disconnect networks, shrink the pain map and stop long term potentiated pain signaling
- Focus on brain imagery and brain-body loop





Sensations

- Use peppermint to block pain transmitters and stimulate cold receptors to send signal to S1
- Use citrus scents to evoke pleasure
- Use brain music to slow constant pain nerve firing and make nerves harder to fire even after you stop listening
- Use music to stimulate and soothe
- Pay attention to pain stimulus to separate out pain from vibration, pressure, touch, movement, position, hot, cold
- Look at things that evoke pleasure
- Self-massage, soothing touch



Memories

- Remember how your body felt before the persistent pain took over
- Involve family and friends in talking about activities done before injury.
- Stop avoiding the memory of how they felt before they were injured.
- During pain spikes patients should flood the brain with memories of how they felt and who they were before pain. If this brings up negative emotions, reject them.



Soothing Emotions

- Identify negative emotions as being stuck in the amygdala paralyzing higher associational cortices
- Taming the wild amygdala: insula, orbital frontal cortex, ventral medial prefrontal cortex, anterior cingulate cortex, posterior cingulate cortex have to be turned back on
- Rewire by rewriting personal narrative. Reject negative emotions as counterproductive and having nothing to do with the your self-image and everything to do with promoting persistent pain.
- Serenity, relaxation, empathy, gratitude, calm



Movement

- ■ Movement is not dangerous
- ■ Imitate healthy pain free body if pain is assymmetrical
- ■ Start with a movement enjoyed in the past, but only in limited way, building up repetitions over time
- ■ Plan movement consciously to evoke Supplementary Motor Area
- ■ Move to change the brain-body loop
- ■ If pain prevents movement, think about and visualize moving without pain

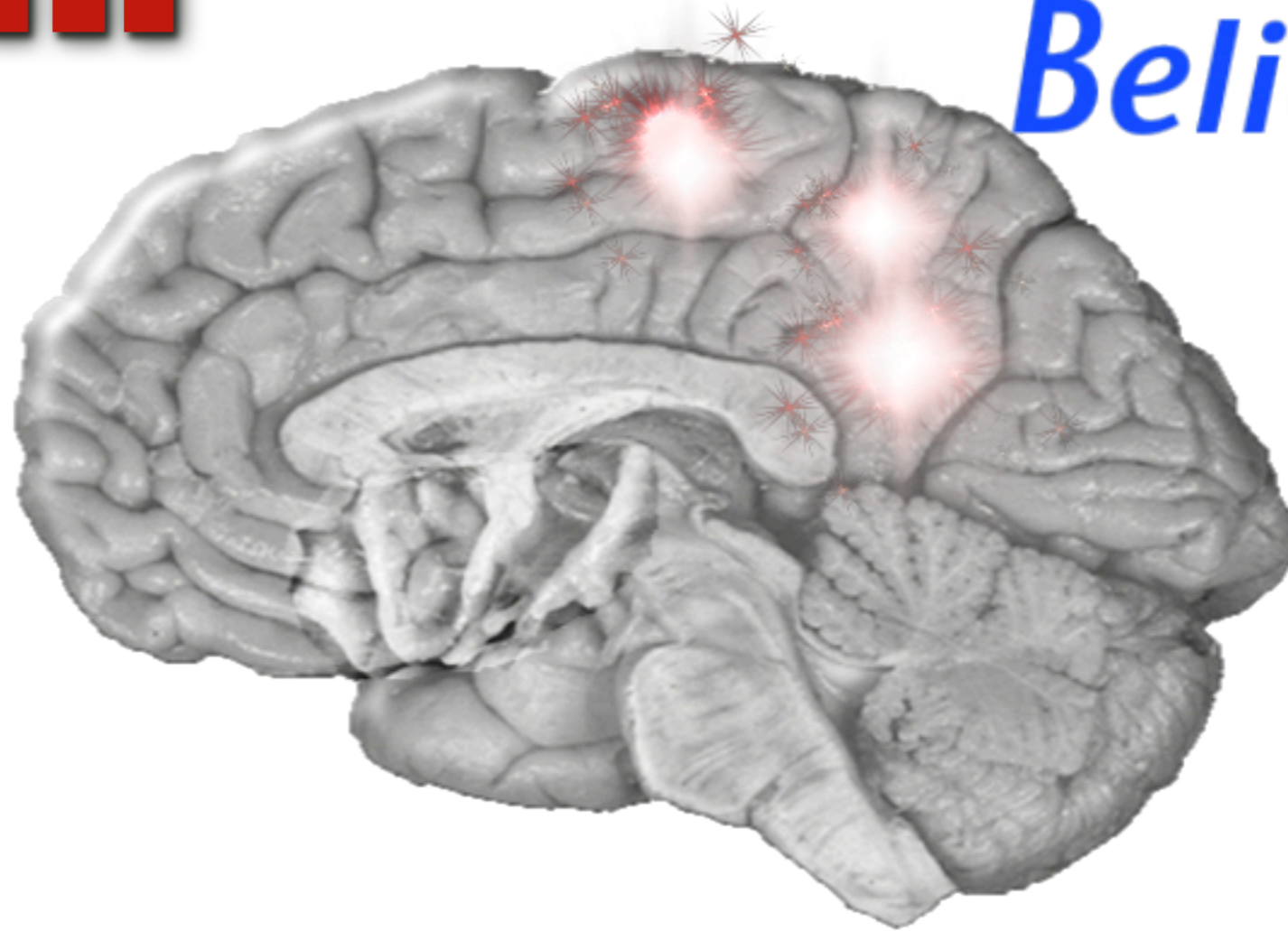


Belief

- We hold onto our beliefs fiercely, including our misconceptions about pain
- Belief increases activity in the the posterior parietal cortex, the primary somatosensory cortex and the secondary somatosensory cortex
- The same part of the brain is a major pain processing area
- Most important belief to bring up when pain spikes is that the pain can be stopped by believing it can be stopped
- This belief allows patients to continue to practice opposing pain during early lack of success

Pain

Belief





Transformation

- ■ “We have to grab your full attention”
- ■ “Right now your pain has your full attention”
- ■ “You have to practice to change this pattern”
- ■ “If you can train your brain to read you can retrain your brain to block the pain and break up the brain-body loop of constant pain.”
- ■ “This is a treatment partnership. We succeed and fail together.”
- ■ ***Days of passive treatment are over.***




The Cure For Persistent Pain: PERSISTENT PLEASURE

- Our basic imperative and that of all species is survival
- In its most elemental form this is accomplished by the avoidance of pain and the pursuit of pleasure
- People with persistent pain spend the vast majority of their time avoiding pain and pleasure
- For some, persistent pain induced brain change leads to avoiding pleasure and pursuing pain



Pleasure: Brain Hedonics

- This is a new field dedicated to studying Pleasure Circuits in the brain
- What gives us pleasure?
- How does the brain perceive pleasure?
- Is there a pleasure center?



What happens to people with persistent pain?

- Persistent pain leads to the trade off of the warm comfort of intimacy for the cold embrace of loneliness
- Loneliness is not about being alone: It is about feeling unlovable, undesirable, untouchable, self-loathing, self-disgust
- Intimacy is what we all strive for: feeling deserving of love, affection, contentedness ,attunement, happiness
- **Pain is the absence of pleasure**



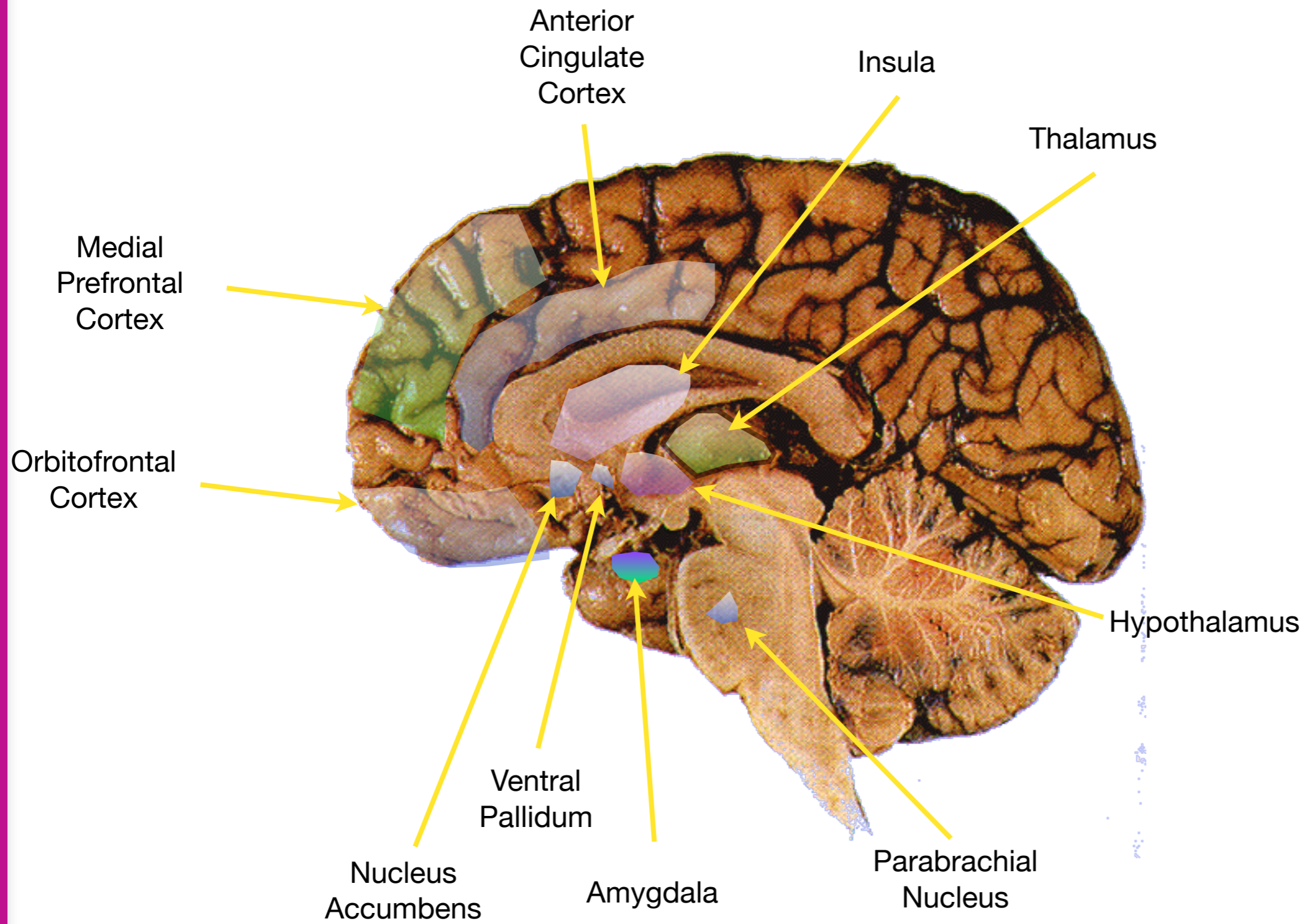
Pleasure circuits of the brain

- Amygdala is the conduit to and from regions below the thinking brain and thinking brain
- 3/4 of Amygdala is below thinking and 1/4 is thinking brain
- Pain and Pleasure are first perceived in the Amygdala
- From there they are essentially the same circuit



The Hedonic Brain

- The human Orbital Frontal Cortex is linked to determining if an experience is pleasant or unpleasant , sending this information back and forth to the Anterior Cingulate Cortex, Insula and Amygdala (hedonic circuit)
- All experiences have hedonic and emotional tones
- GABA, endorphins, endocannabinoids, oxytocin, vasopressin are about pleasure (liking) and paint all the senses with a positive gloss
- Human sexual response starts with the Amygdala and Orbital Medial Frontal Cortex and ends with a pan-sensory immersion in pleasure chemistry all over the brain





Neuroplastic Transformation

- **Pleasure is the absence of pain**

- Patient instructed to make a two column list: Pain I want to avoid/Pleasure I want to pursue
- This is reviewed with the patient and suggestions made
- Patient is asked to gather a Pleasure Pack using multisensory stimuli
- One day a week is dedicated to going on a Pleasure Hunt and this is increased with each subsequent visit



The greatest pleasure: Loving and being loved

- In the Insula we experience the ability to read our own physical sensations and attach those to an emotional response
- Mirror neurons in the Insula allow us to experience our own physical and emotional sensations based upon what we observe and perceive in others
- Love lights up pleasure centers in the Orbital Frontal Cortex, Insula and Amygdala
- Nucleus Acumbens, Ventral Pallidum involved in romantic and maternal love, spinal shivers, pleasure of listening to music- only respond to pleasurable stimuli



“Love is all we need” -Lennon and McCartney

- ■ What is Happiness?
- ■ We can measure liking (hedonics), but not happiness
- ■ Love is how we are first wired (loving maternal touch, sounds, vibrations, taste, smell, gaze, proprioception)
- ■ Initial goal is to soothe the agitated infant
- ■ Biological aim is to teach self-soothing
- ■ Happiness is soothing the amygdala while stimulating it

Brain, Pain, Pleasure and Love: Love is all we need

