12 Steps to Changing Neuropathways

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Objectives

- Review the neurobiology of the brain
- Understand the basics of neurological damage to the brain from addiction
- Understand how medications and psychotherapy change Neuropathways
- Understand the changes in brain functioning in early recovery
- How the 12 steps work
- The Big Book as the original psychotherapy
• Six Key Neurotransmitters
  • Serotonin (mood, appetite, sleep)
  • Norepinephrine (vigilant concentration)
  • Dopamine (motor control, cognition, reward, arousal, motivation)
  • Acetylcholine (anti-excitatory actions)
  • Glutamate (excitatory)(learning and memory)
  • GABA (inhibitory)

• Neurotransmitters that are similar to drugs:
  • β-endorphins (morphine)
  • Anandamide (marijuana)

God’s pharmacopeia
Adaptation of the Brain to Alcohol

- Chronic alcohol exposure
- Changes in brain chemistry
- Neuroplasticity
Addictive substances affect the brain function at the level of the nerve cell in an attempt to adapt to the presence of the substance.

These changes modulate the person's response to the drug, the subsequent addiction to the drug and long-term craving that contributes to relapse.
Dopamine response

- **High Dopamine Levels:**
  - Normal Pleasure & Interest

- **Low Dopamine Levels:**
  - Lack of Pleasure

**Healthy Subject**

**Drug Abuser's**
Mouse party

http://learn.genetics.utah.edu/content/addiction/mouse/
• Naltrexone- blocks the u-opioid receptors. These receptors contribute to the euphoria and high of heavy drinking. As an antagonist it blocks the enjoyment of drinking and alters the reward pathway. If people drink ‘over’ the naltrexone they may not get the buzz or enjoyment out of drinking and may stop after a few drinks. Ultimately this may aid in abstaining from alcohol.

• Acamprosate - interacts with both the glutamate system (to inhibit) and the GABA system (to enhance). In this way Acamprosate is a like ‘artificial alcohol’, it mitigates the absence of alcohol in both of these systems. In this way it reduces relapse. (Stahl, 2013)
• Cozolino (2010) “Psychotherapy can be thought of as a specific type of enriched environment that promotes social and emotional development, neural integration, and processing complexity. The way the brain changes during therapy will depend upon the neural networks involved in the focus of treatment” (p. 20)

• Psychotherapists are applied neuroscientists who create individually tailored enriched learning environments designed to enhance brain functioning and mental health (p. 341)
The analysis of parametric [carbonyl-11C]WAY-100635 binding potential (BP\textsubscript{ND}) maps at the voxel level showed 2 large clusters \([k = 9515, T_{\text{max}} = 5.32 \text{ at } (-26, 0, -38)]\) and \([k = 18,231 \text{ voxels, } T_{\text{max}} = 4.10 \text{ at } (-46, -20, 42)]\) located mainly in frontal, temporal, and parietal cortices. These clusters represent significantly increased BP\textsubscript{ND} in the psychotherapy group compared with the fluoxetine group. The results are visualized on a T1-weighted MRI template in stereotactic standard space; the color bar represents the \(T\) statistic at voxel level.

SPM, statistical parametric mapping.
Immature brain

Genetic and environmental factors

Low anxiety

Rapid therapy (benzodiazepines)

Low anxiety

Slow therapy (SSRIs, psychotherapy)

High anxiety

Plastic changes

Low anxiety

GABA inhibition
Accurate Interpretation

Emotional response

Activation of Cortical and Subcortical Networks

Regain equilibrium

Plasticity and New learning in Prefrontal Regions
Orienting/Emotion Identification
Automatic Emotion Regulation
Voluntary Emotion Regulation
Regions Implicated in Both Automatic and Voluntary Emotion Regulation
Brain Recovery

Crews et al. (2005)
Recovery from alcohol

Active drug and alcohol abuse

A year drug and alcohol free
• Characterization of 12-steps in terms of psychotherapy for research purposes:
  • Steps 1-3 are surrender steps
  • Steps 4-9 are action steps
  • Steps 10-12 are maintenance steps
• Behaviorally Oriented (4, 5, 8, 9, 10, 12)
  • Step 4: written self-inventory
  • Step 5: sharing that inventory
  • Step 8: make a list of those harmed
  • Step 9: making amends
  • Step 10: daily inventory and prompt acknowledgement
  • Step 12: working with others

• Spiritually Oriented (1, 2, 3, 6, 7, 11)
  • Step 1: powerlessness
  • Step 2: belief
  • Step 3: self-will
  • Step 6: humbling
  • Step 7: ask God for help
  • Step 11: prayer and meditation

AA View of 12 Steps
1. Frequency of 12 step attendance was positively associated with increase endorsement of spiritual beliefs.
2. Many participants reported concurrent formal treatment and those experiences increase spiritually directed practices.
3. Behavioral prescriptions are realized through sponsorship.
4. Spiritual beliefs are acquired through 12 step meeting attendance.
   • This is in accordance with four prospective studies that have reported that 12 step attendance is predictive of later increases in spirituality.
   • Future studies such as this should attempt replication but utilize longer follow ups and recording attendance at specific 12 step meetings.

Findings of Greenfield and Tonigan (2013)
Major Goal of 12 step Facilitation Therapy in Project MATCH

Acceptance

- Acceptance by patients that they suffer from the chronic and progressive illness of alcoholism
- Acceptance by patients that they have lost the ability to control their drinking
- Acceptance by patients that because there is no effective cure for alcoholism, the only viable alternative is complete abstinence from the use of alcohol

Surrender

- Acknowledgement on the part of the patient that hope for recovery exist, but only by accepting the reality of loss of control and having faith that some higher power can help the patient, whose own will power has been defeated by alcoholism
- Acknowledgment by the patient that the fellowship of Alcoholics Anonymous has helped millions of alcoholic sustain their sobriety and that the patient’s best chances for success are to follow the AA path
• “The main benefit of AA in aiding addiction recovery may lie in its accessibility and its long term extensive focus. The fact that individuals can gain exposure to these therapeutic elements on demand at a self-regulated dosing intensity for as long as desired adds to its efficacy. The fact that it is free and widely available in almost every community on every day of the week, (especially after hours when professional services are not) also make AA a highly cost-effective public health resource.”

A systematic review (Kelly et al. 2011)
1. Some of us have tried to hold on to our old ideas and the result was nil until we let go absolutely. (p. 58)
2. The point is that we are willing to grow along spiritual lines. (p. 60)
3. The first requirement is that we be convinced that any life run on self-will can hardly be a success. (p. 60)
4. This short word (fear) somehow touches about every aspect of our lives. It was an evil and corroding thread; the fabric of our existence was shot through with it. (p. 67)


