Psychotherapy and Persistent Post-Concussion Symptoms
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OBJECTIVES

- Describe the relationship between concussion and mood/anxiety disorders
- Describe neuroplasticity and its importance in recovery from PCS
- Describe the benefits of exercise and meditation in the treatment of PCS
- Explain how CBT is effective in the treatment of prolonged PCS
Prevalence of Psychological Issues after Concussion

- Estimated 12-44% within first three months
- Depression
- Anxiety
- Pre-morbid functioning
Concussion and Recovery

- Factors that affect recovery
  - Neurologic findings
  - Physical factors
  - Psychosocial factors
  - Litigation
  - Psychological and personality factors
Models of PCS

- Disruption in sense of identity
- Psychological distress
- Cognitive compromise
- Anxiety & avoidance
- Depression
- Disability above and beyond initial injury

Models of PCS

Fear Avoidance

- Misinterpretation of effects of injury
- Symptoms interpreted as sign of disease
- Results in avoidance

Adapted from Weijenberg, et al., 2017
Models of PCS

Physiological Abnormalities

- Increased heart rate
- Exaggerated sympathetic nervous system activity

Failure to return to baseline results in prolonged ANS dysfunction and persistent symptoms.
Neurobiology of Depression

- Multi-dimensional
- Frontal-Limbic-Subcortical
  - Reduced connectivity in default mode network
  - Mayberg’s limbic-cortical model
- Increased blood flow in ventral limbic and paralimbic regions
  - Ventromedial PFC
- Decreased blood flow in neocortical and limbic regions
  - Dorsolateral PFC
- Some evidence for decreased hippocampal volume
Concussion and Depression

Intracranial abnormalities
- Frontal lobe
- Temporal lobe

• Athletes with concussion and depression
  - Less task-related activity in DLPFC, dorsal anterior cingulate cortex, insular cortex, thalamus, and striatum
  - More grey matter volume loss in medial frontal and temporal regions, including rostral anterior cingulate cortex
Neurobiology of Anxiety

Limbic-Medial Prefrontal Model

- Fear-related emotions
- Hyperactivation of amygdala and insula
- Dorsomedial PFC and dorsal anterior cingulate express fear
- Ventromedial PFC and ventral anterior cingulate regulate, modulate, or inhibit fear reactions
- Ventral hippocampus
Concussion and Anxiety

• Misattribution
  – Misattributing symptoms to concussion
  – Creates anxiety sensitivity
    • Anxiety regarding body sensations
    • Affects injury perception

• “Good ole’ days”
  – Overestimation of pre-injury functioning
Neuroplasticity

- Ability of the brain to change its own structure and functioning in response to activity and mental experience.
- As learning occurs, connections among neurons increase.
- Learning can activate genes that change neural structure.
- “Neurons that fire together, wire together”
- Repetition, repetition, repetition
Treatment of Persistent PCS

Two Arms

Coping Skills; Self-Care
Exercise
Meditation (covered in Brenda’s talk)
Nutrition

Cognitive-Behavioral Therapy
Exercise

- Increase immune function
- Decrease inflammation
- Increases hippocampus size
- Improves cognition
- Decrease depression

Exercise

Brain Benefits of Exercise

Improve depressive symptoms
Improve sleep
Decrease anxiety
Reduce pain
BDNF
Oxidative stress
Exercise

Benefits in persistent PCS

Subsymptom threshold exercise (Leddy et al., 2010)
  Symptom reduction
  Improved cerebral auto regulation

Vasper Study (Wu, et al., 2018)
  Blood Flow Restriction and cooling
Cognitive Behavioral Therapy

- Form of psychotherapy
- Cognitive model
  - Reaction to situations depends on perception
  - Core beliefs
  - Automatic thoughts
- Modifies:
  - Emotions
  - Behaviors
  - Thoughts
Cognitive Behavioral Therapy

- Cognitive Distortions
  - Filtering
  - Black and white thinking
  - Overgeneralization
  - Control fallacies
  - Catastrophizing
- Metacognition
  - Thinking about thinking
Cognitive Behavioral Therapy

- Identify & combat cognitive distortions
- Automatic thought record
  - Situation
  - Automatic thought
  - Feelings
  - Respond to thought
  - Create a more balanced thought
- Repeat the process
- Repetition is learning new ways of thinking (neuroplasticity)


