Exercise and Pain: A Traffic Jam Analogy

**PAIN INFORMATION HIGHWAY**
- A-delta comes in first. Impact gone before C-fiber signal arrives
  - (e.g., carpool express lane)
- C-fiber travels at sluggish speed
  - (e.g., school zone)
- Becomes important in chronic pain states

**Brain**
- Pain-Inhibiting DNIC system
  - (Diffuse Noxious Inhibitory Controls)
  - Pours out opioids, noradrenaline, serotonin, GABA, etc.

**Spinal Cord**
- Pain-Facilitating System
  - Amplifies pain by activating the NMDA receptors. Causes spreading of pain by activating wide dynamic range (WDR) neurons.

**Healthy Men & Women**
(Ignore A-deltas, focus on C-fiber inputs)

**Activates DNIC System**
- Similar to turning the traffic light green
- **Post-Exercise**: pours out extra opioids and other pain relievers to produce increased pain thresholds and to tell brain, “I feel great!”

**FMS Patients (Before Exercise)**

**DNIC System Faulty**
- Intersection at spinal cord operates like a 2-way stop sign; cars pass slowly, creating congestion.
- **Pain-Facilitating System**
  - Congestion causes this system to be chronically activated in FMS patients
    - NMDA receptors and WDR neurons already turned on.
    - Persistent, widespread pain is status quo

**FMS Patients (After Exercise)**

**DNIC System Faulty**
- Intersection at spinal cord operates like a 4-way stop sign: increased traffic congestion, cars pile up.
- **Pain-Facilitating System** in overdrive; inability to handle C-fiber inputs in a timely fashion causes amplification of body-wide pain over baseline pre-exercise conditions.

**FMS Patients (After RX Treatments)**

**DNIC System Improved with Fentanyl**
- (opioid) to relieve traffic congestion; intersection at spinal cord operates like a yield sign, instead of a stop sign.
- **Pain-Facilitating System Minimized**
  - Reduced NMDA activation leads to reduced pain, fewer cars on the side street.

Fentanyl (opioid) and dextromethorphan (Dex) were tested individually; each produced reduced windup and reduced pain in FMS patients.

Originally printed in the AFSA 2003 Special Update Edition
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