



# Steering Toward Genomics & Pain



80% of patients reporting Adverse Drug Reactions were shown to have poor CYP2D6 metabolism

Genetics can explain why some people hurt more and why meds act differently

Sensory input is processed through an individual's genetic composition

Clinicians who treat pain have noted that the response to opioids varies widely among patients, with opioid dose requirements varying in the clinical setting by as much as 40-fold

The cytochrome P450's are a multi-gene family of enzymes responsible for the metabolism of many, if not most, drugs, including tricyclic antidepressants, codeine, tramadol, and dextromethorphan

\*Ultra-metabolizers = Risk of increased toxicity & death

\*Extensive metabolizers = Normal metabolizers

\*Poor = Slow metabolism of meds with risk of untreated pain

All can lead to over & under-treatment of pain and Safety concerns due to metabolism of pain meds

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## Genetic Pain

Did you inherit your pain?

HEREDITY accounts for approximately:

- 50% of migraine pain
- 55% menstrual pain
- 35-68% low back & neck pain
- 50% shoulder & elbow pain
- 40% of carpal tunnel pain

- Chronic Pain
- Fibromyalgia
- Rheumatoid Arthritis
  - Sickle Cell
- And more....

Noxious Opiate Side Effects:

- ✓ Nausea
- ✓ Sedation

➤ 30% variability for respiratory depression

❖ Genetic propensity to addiction

## Codeine & Kids

Codeine is dependent on hepatic metabolism (CYP2D6) for conversion to its active form, Morphine

- ▶ When codeine is ingested, it is converted to morphine by cytochrome P450.
- ▶ Some people have DNA variations (CYP2D6) that cause codeine to be converted to Morphine faster and more completely than in other people.
- ▶ Ultra-rapid metabolizers - toxicity from excessive morphine in 10-30% of population
- ▶ RN should question pediatric prescriptions for codeine
- ▶ High levels of morphine can result in breathing difficulty, which may be fatal