History of Adulterants

- Adulterants vs Diluents
  - Diluents: lactose, mannitol, sucrose, dextrose, starch
- By-products and precursors
  - benzoylcegonine, methylecgonine, ecgonine, cis- and trans-cinnamoyl cocaine, α- and β-truxillines, and tropacaine.
  - Hydrocarbons from kerosene
- Heroin – quinine
Adulterants Found in Cocaine

- Benzocaine, lidocaine, procaine, tetracaine
- Caffeine
- Diltiazem
- Phenacetin
- Levamisole
Identification of Adulterants/Diluents

- Quantitation
  - Cocaine penalties based on amount
- Tracking or “Fingerprinting”
Levamisole

(Ergamisol, HCl salt) is an antibiotic belonging to a class of synthetic imidazothiazole derivatives. It was discovered at Janssen Pharmaceutical in 1966.
Levamisole

- Originally used as an antihelminthic to treat worm infestations in both humans and animals.
- It has been tested in combination with 5-FU to treat colon cancer and some other cancers.
- Human dose was 150 mg/day
- Half life of about 4 hrs
- Used in aquariums for control of internal parasites
Levamisole

- Extensively metabolized in liver – 5% excreted unchanged
- Main metabolite is p-hydroxy and glucuronide
- Toxicity
  - Leucopenia, agranulocytosis, thrombocytosis
- Nausea, vomiting, diarrhea, mouth sores, loss of appetite, stomach pain, change in taste and smell, muscle aches, fatigue, dizziness, headache and skin rash
- May diminish effectiveness of vaccines
Cocaine Adulterant

- All cocaine positives for a 3 month period in fall 2007 – 33% contained levamisole -3% Diltiazem
- UK – 2005-2006 in coroners cocaine positive cases - 14% positive
- DEA seizure cases beginning 2003
- Found in UK with MDA known as “E”
Testing For Levamisole

- GCMS base screen
Levamisole & Aminorex

- 2007 horse racing laboratories reported positives for aminorex

\[ \text{(-)-(S)-R} \]
\[ R = \text{HCl or PO}_4 \]

4-Methylaminorex
Aminorex