Drug Residues

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We are what we eat
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Chemicals in food of animal origin
Ensuring chemical food safety
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Abraham Lincoln’s mother

October 5, 1818
Milk Sickness

- Sick stomach
- Trembles
- Puking fever
- Slows
White snakerooot
Tremetol
Milk Sickness
Increased clearance

![Graph showing increased clearance with time and concentration for non-lactating and lactating individuals, with a toxic level indicated.]
How long do residues persist?
Setting a withdrawal time

• Oral Toxicity Studies
  – Acute
  – Subacute
  – Chronic

• Tissue residue studies
  – Total residues (radiolabeled)
  – Marker residue
One compartment model

\[ V \]

\[ k_{01} \]

\[ k_{10} \]

Concentration vs. Time graph:

- Concentration axis ranges from 100 to 1
- Time axis ranges from 0 to 30
Two compartment model

$V_1 \xrightarrow{k_{01}} V_2 \xrightarrow{k_{10}}$

$V_1 \xrightarrow{k_{12}} V_2 \xrightarrow{k_{21}}$

Concentration

Time

0 10 20 30

1 10 100

Kansas State University
Aminoglycoside residues

1. Filtration
2. Binding
3. Adsorptive pinocytosis
4. Lysosomal trapping and storage

Lysosomal phospholipidosis
- Above threshold: lysosomal swelling, disruption or leakage
- Below threshold: exocytosis shuttle

Regression of drug-induced changes
- Cell necrosis regeneration
- Hydrolase
- Toxins
Aminoglycoside residues
Conclusions

1. Consumers must be protected from chemical residues in food of animal origin
2. Requires regulatory oversight (FDA)
   a. Establishing safe concentrations in edible tissues
   b. Setting withdrawal times
   c. Monitoring and testing
3. Challenges
   a. Expensive toxicity and tissue residue studies
   b. Difficult to trace adverse effects directly to food