Possible Role of Hydrogen Sulfide (H$_2$S) in Ulcerative Colitis
Toxicity of H$_2$S

20 ppm is irritating to eyes and bronchial mucosa
100 ppm requires immediate building evacuation
500 ppm is lethal in one hour

Cecal concentration: up to 4,000 ppm!!!
Rectal Recovery of Gases Infused at the Cecum of the Rat

- **H₂**:shows a significant increase in percent of infused gas passing rectum over time, peaking at around 80% at 40 minutes, then declining gradually.

- **H₂S**:remains low and almost constant throughout the infusion period.
Forms of Sulfide in Feces

\[ \text{Na}_2\text{S} \rightarrow \text{NaHS} \rightarrow \text{H}_2\text{S} \rightarrow \text{Leaves feces as gas} \rightarrow \text{Absorbed} \]
Hydrogen Sulfide Production by Feces from UC Subjects and Healthy Controls

Hydrogen Sulfide Release (ml/g dry weight)

- Active UC
- Inactive UC
- Controls

Hours of Incubation

1 hour:
- Active UC: 0.1
- Inactive UC: 0.05
- Controls: 0.01

5 hours:
- Active UC: 0.3
- Inactive UC: 0.2
- Controls: 0.02
Ileal Pouch
Ileal Pouches

1) If colectomy for ulcerative colitis, about 40% of subjects develop inflammation of pouch that usually responds rapidly to antibiotics.

2) If colectomy for familial adenomatous polyposis, virtually never develop pouchitis.

Therefore…ulcerative colitis subjects seemingly must produce some unusual fecal bacterial product that causes inflammation of ileum.
Figure 1

- UC (n=34)
- UC on antibiotics (n=11)
- FAP (n=5)
Conclusions:

1) The fecal production of $\text{H}_2\text{S}$, a highly toxic compound, is markedly increased in active UC or pouchitis.
2) This elevated $\text{H}_2\text{S}$ release could play a role in the etiology or perpetuation of the disease process.

Questions:

1) Is the high fecal $\text{H}_2\text{S}$ production secondary to excess substrate for sulfide production or to increased numbers and/ activity of sulfide-producing bacteria? (Broad Foundation funded research project)
2) Is this increased $\text{H}_2\text{S}$ production a cause or effect of ulcerative colitis?