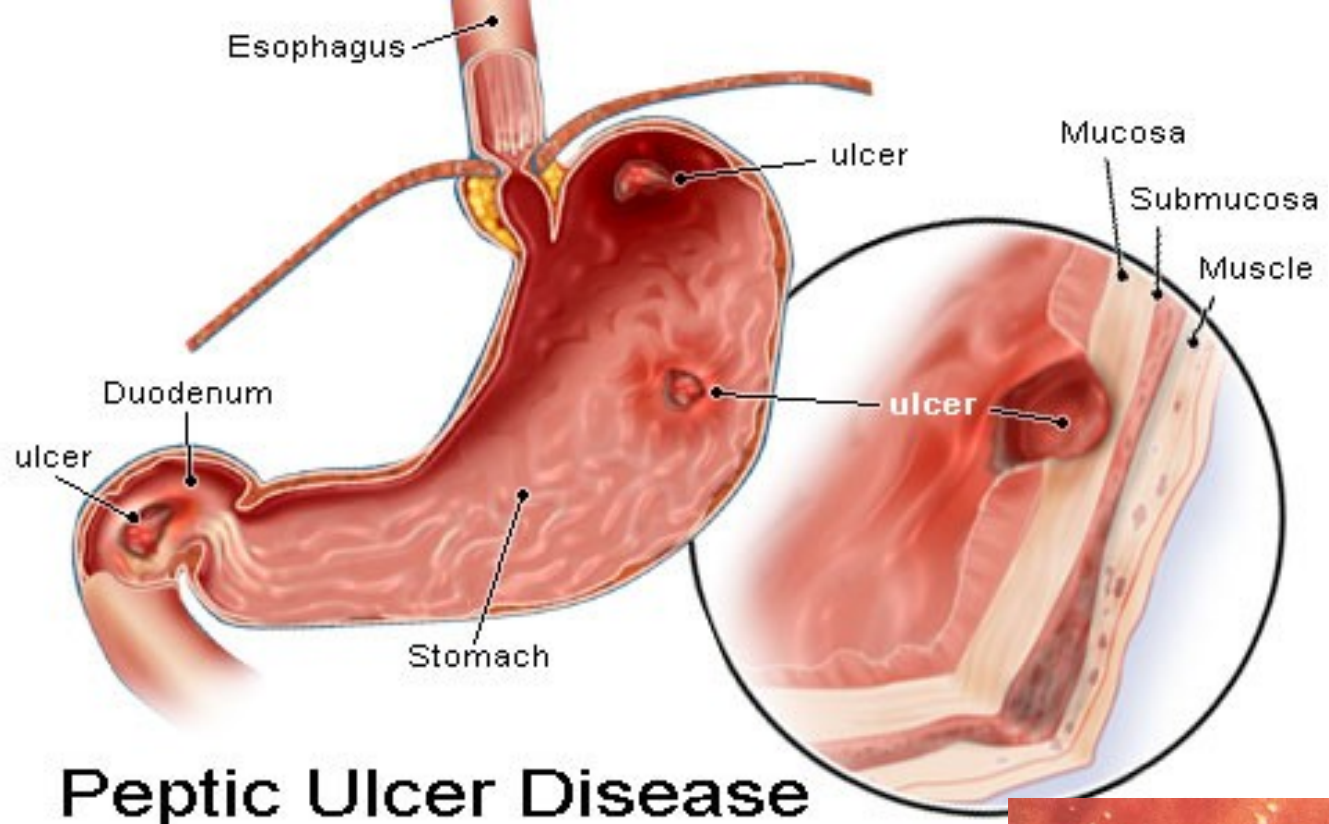
- **Labs start this week**
- **Inquiry 1 proposal due in lab next week**
- **Class communication via Blackboard and/or webpage**

Studying Biology:

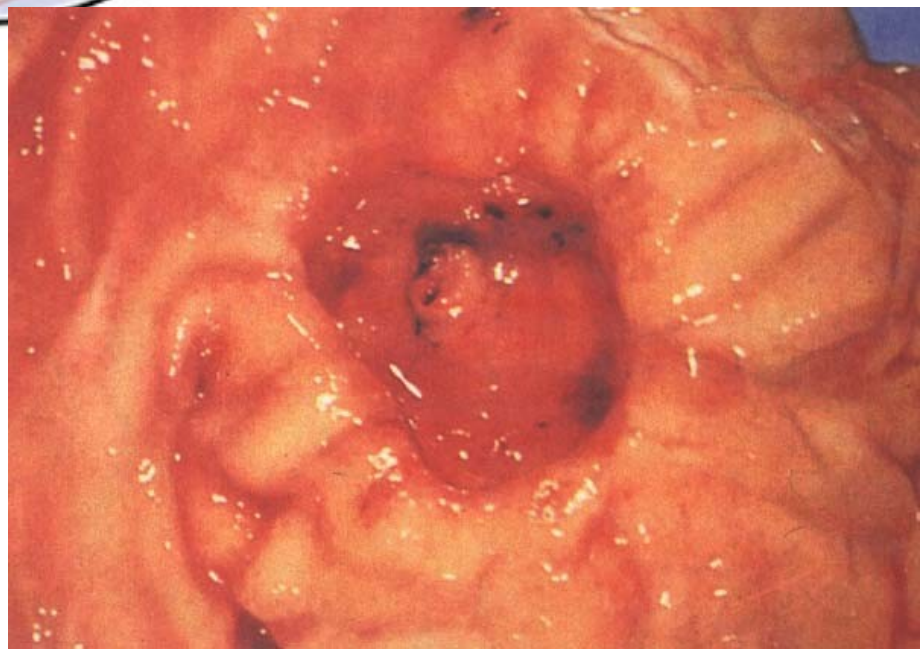
- Start with a question.
  - –For example:

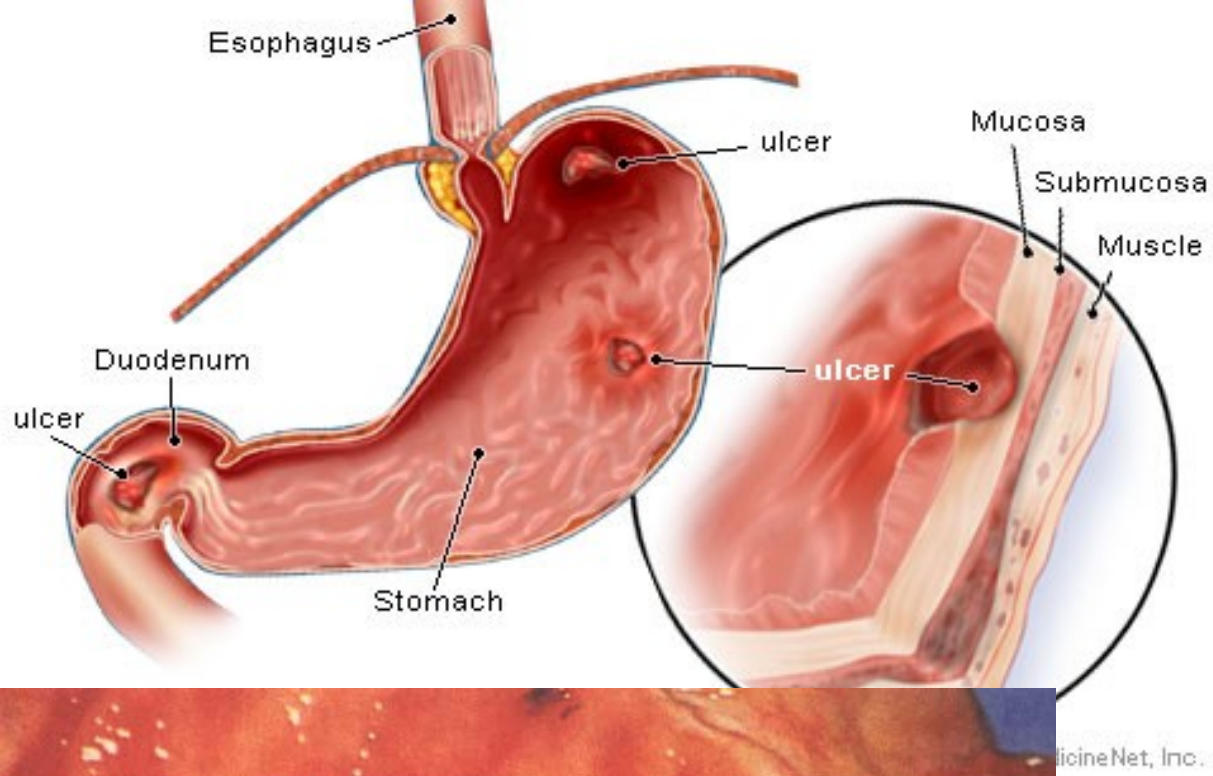
How? Why? When? Where? Etc?

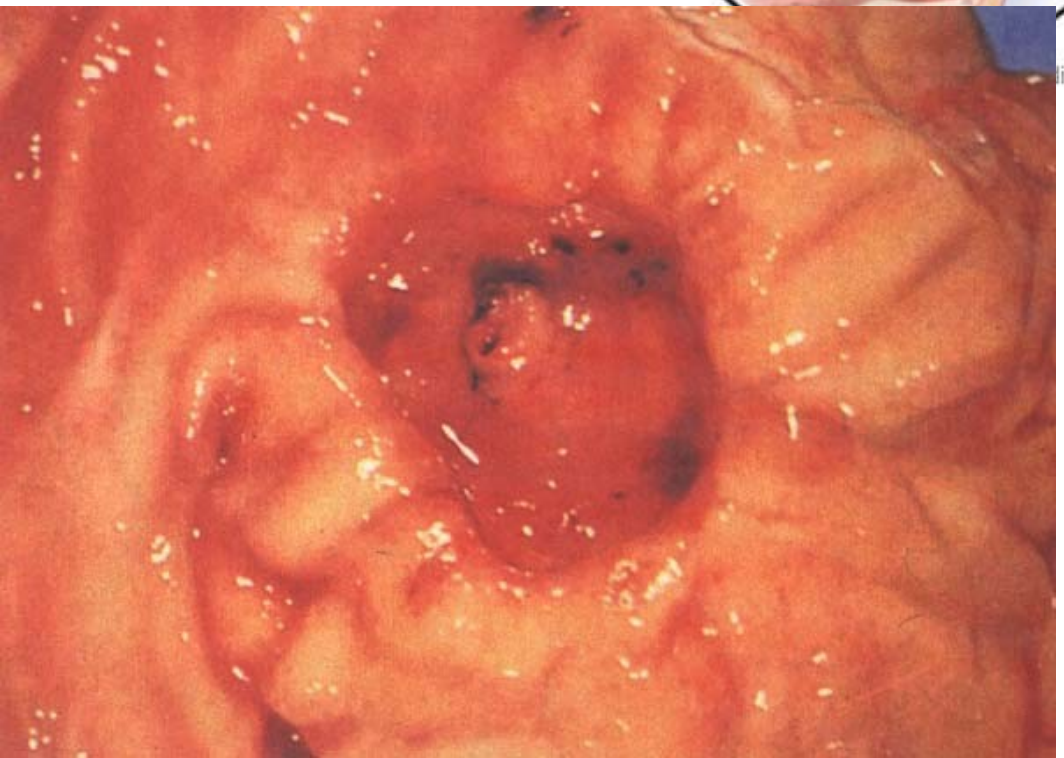
- How do we get answers?
  - –Strong Inference presents one method (article on webpage)



Peptic Ulcer Disease

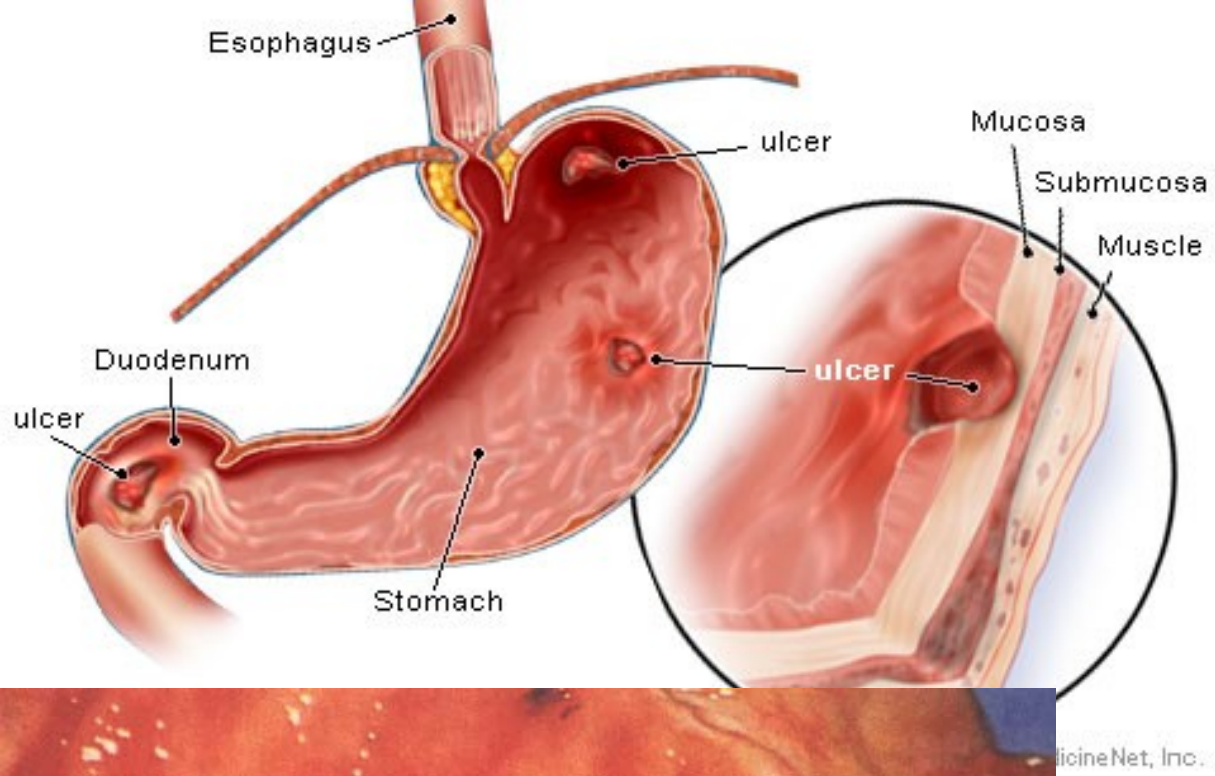


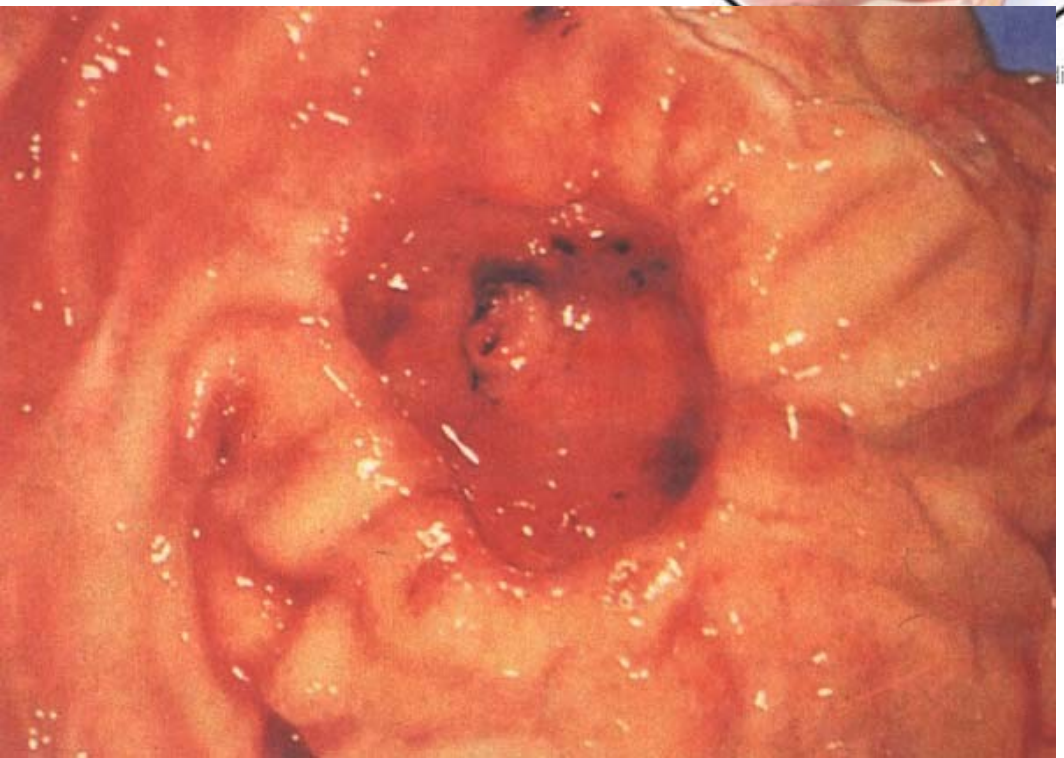




Cause of Peptic Ulcers: Overabundance of stomach acid due to

- Stress
- Anxiety
- Diet





Cause of Peptic Ulcers:
Overabundance of stomach acid due to

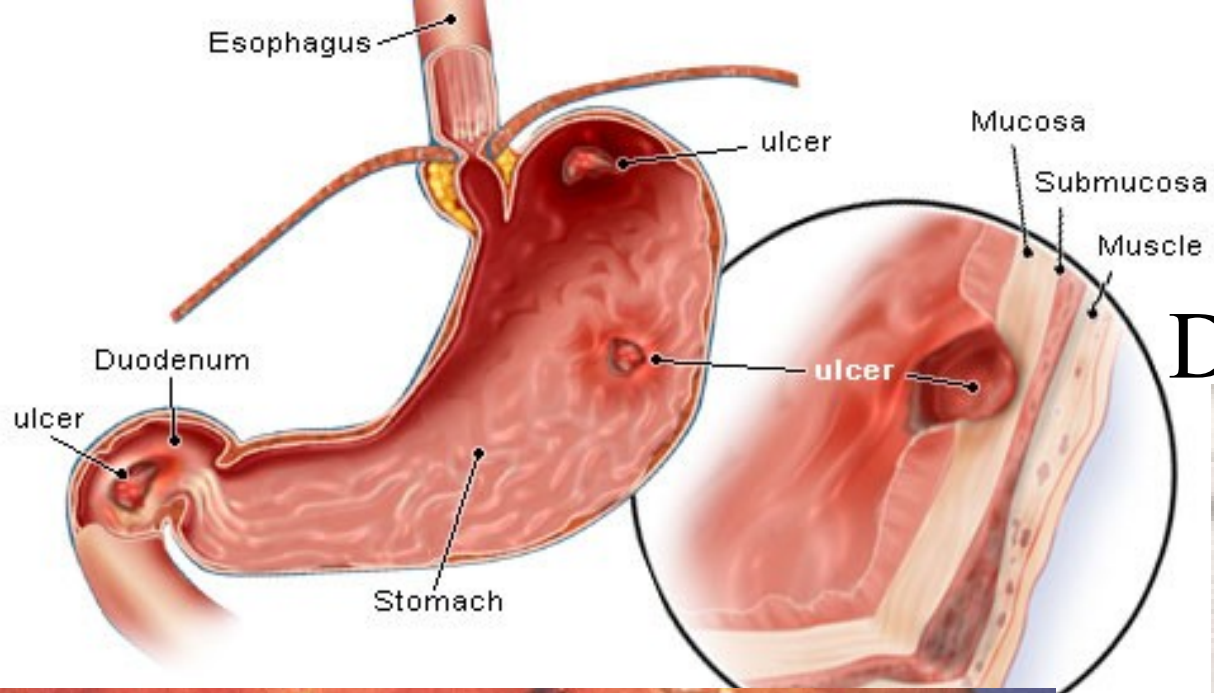
- •Stress
- •Diet
- •Anxiety

Treatment:

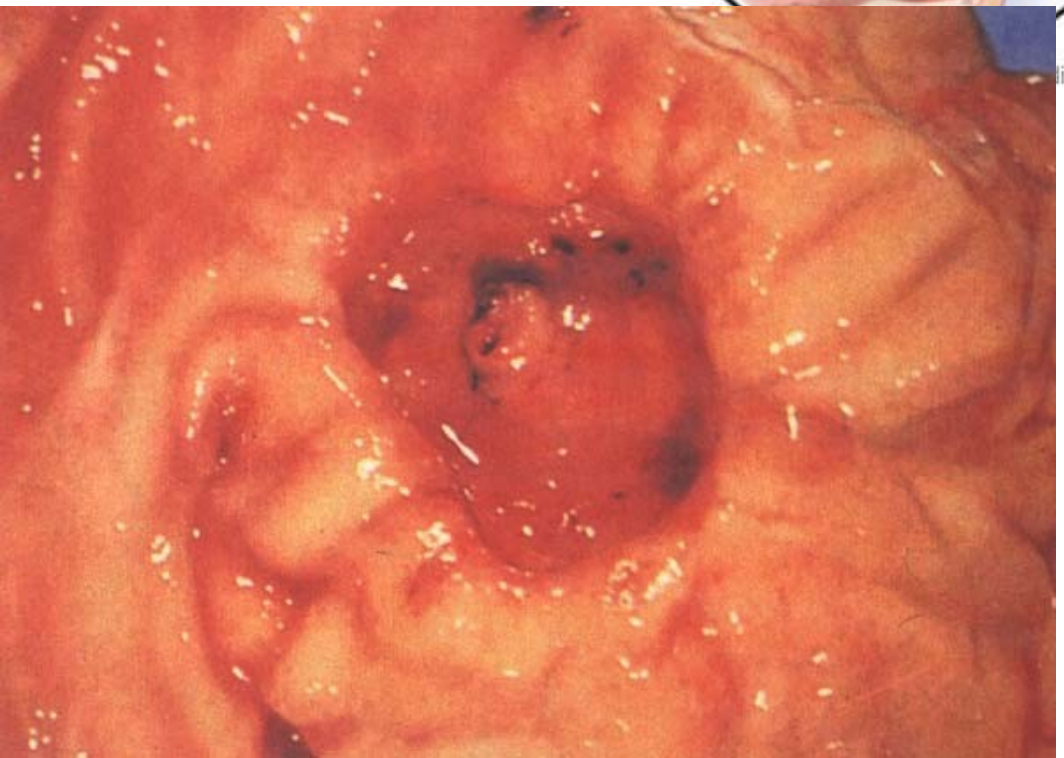
- •Antacids

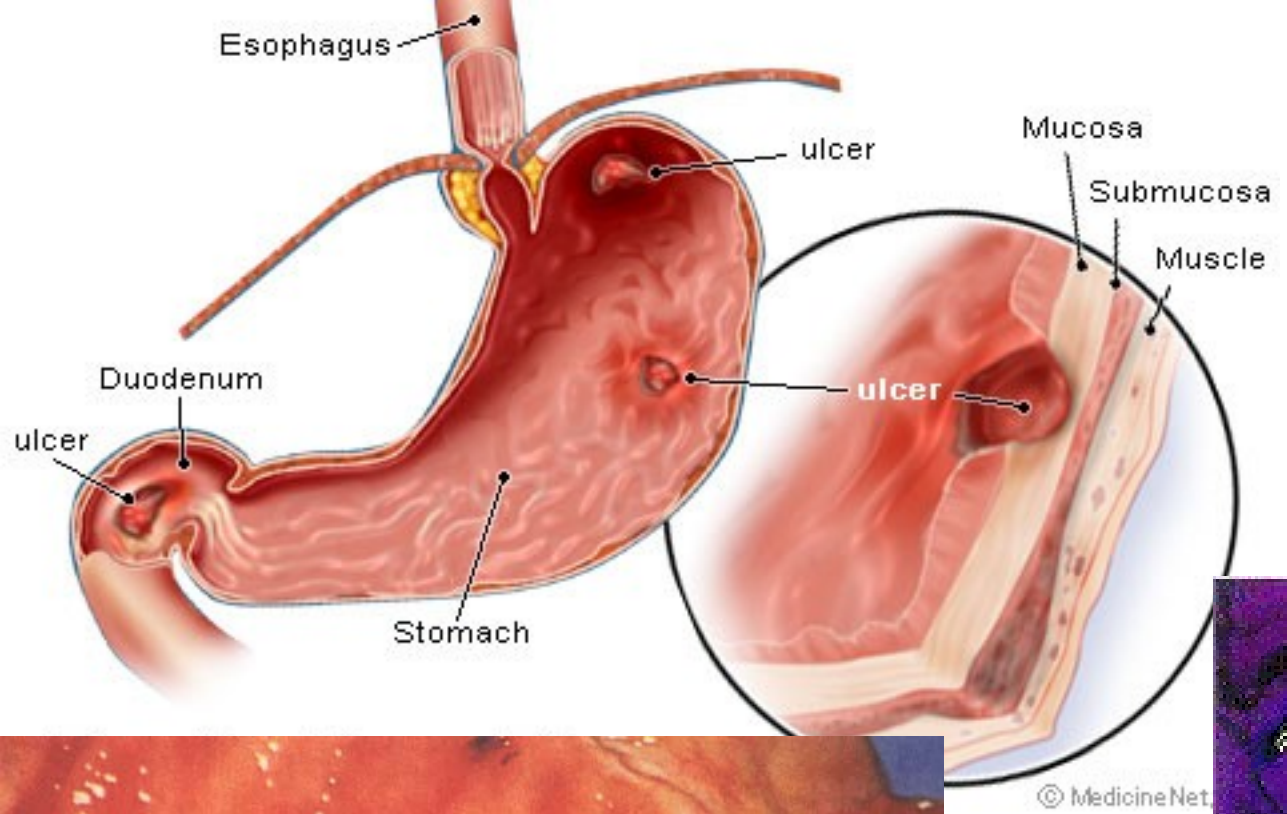
U.S. bought
$4.4 billion in 1992

- •Tranquilizers

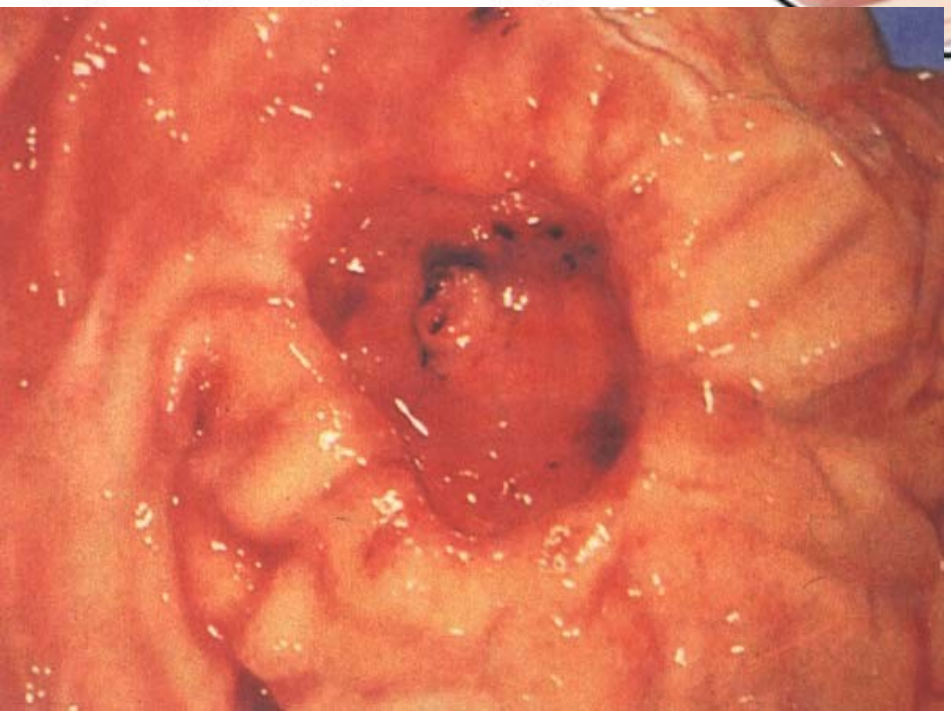


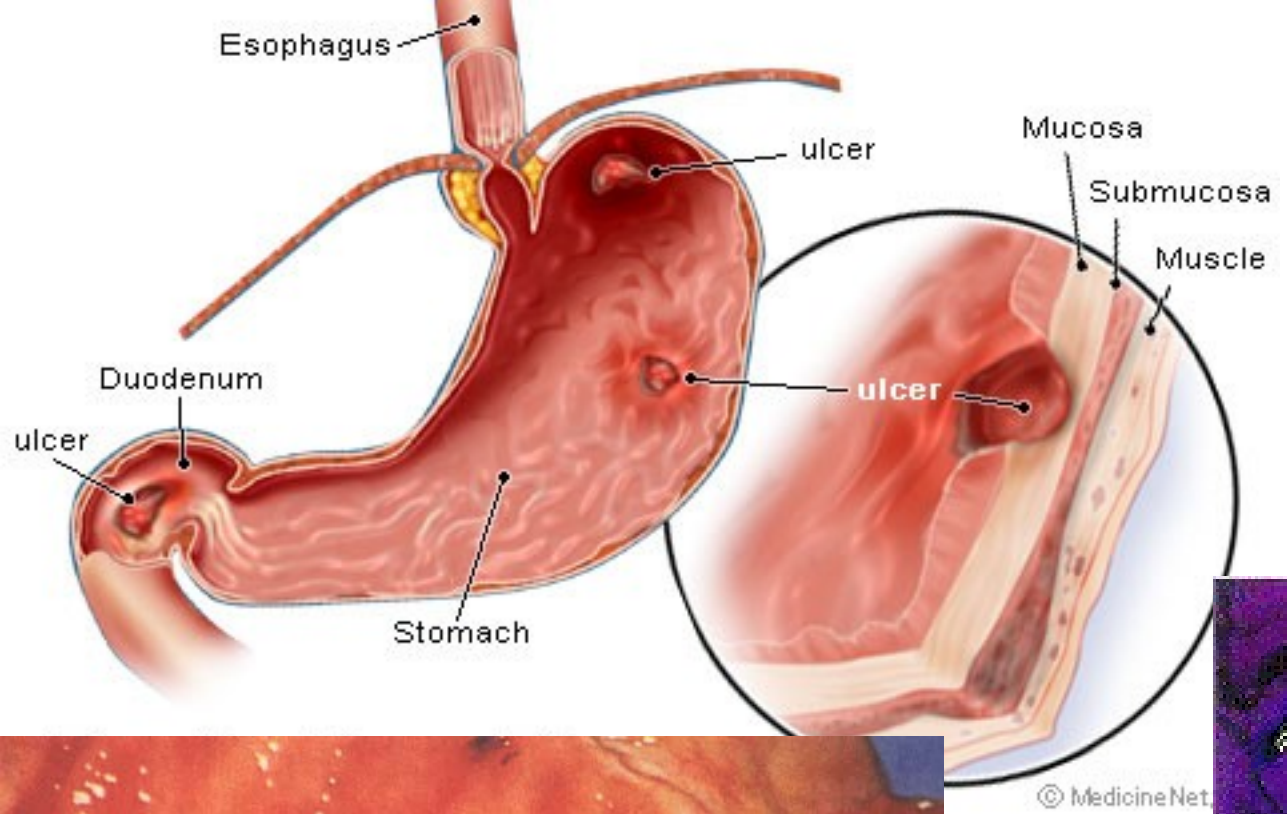
Dr. Barry Marshall



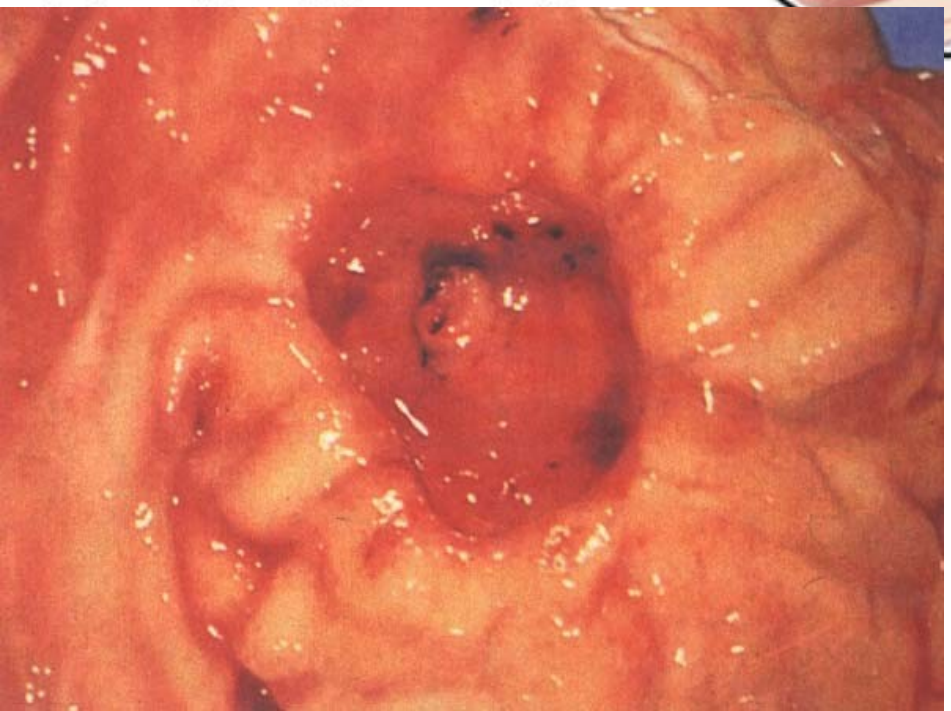


the bacteria
H. pylori





H. pylori is the cause of 80% of peptic ulcers



The obvious or accepted answer was not the correct answer...

How was Dr. Marshall able to get a correct answer?

What parts of Strong Inference did he use?

The obvious or accepted answer was not the correct answer...

Without alternative ideas, the answer would not have been found.

Without alternative ideas, the answer would not have been found.

Propose multiple hypotheses.

Now what?...

Strong Inference

Knowledge is gained by eliminating incorrect ideas.

Disproof is more reliable than proof.

Where does the matter come from for plants to grow?

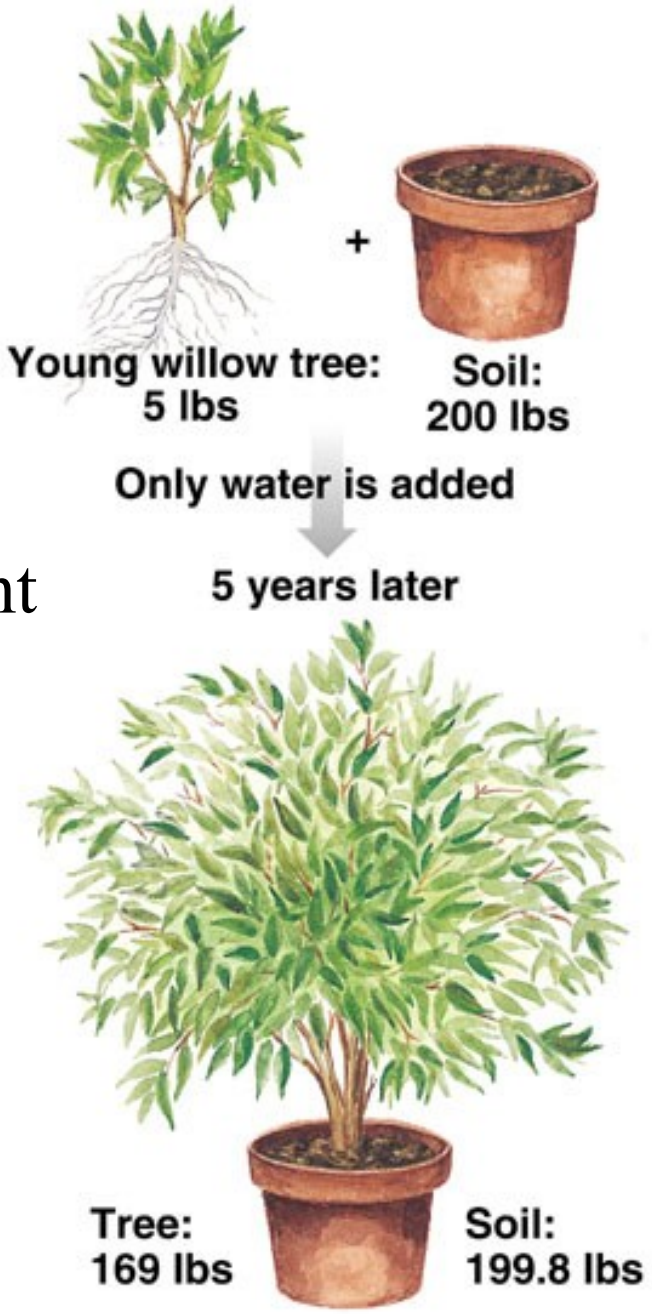
Matter can not normally be created or destroyed, only moved from one place to another.

Aristotle (~2,300 y.a.):
Plants gain mass by taking it from the soil.

Supporting Evidence:

- Plants need soil to grow.
- If roots are removed, plants die.
- After several years of cultivation, soil loses its ability to support plant growth.

Johann Baptista van Helmont did a simple experiment in the early 1600's



What is the major difference between these two approaches to science?

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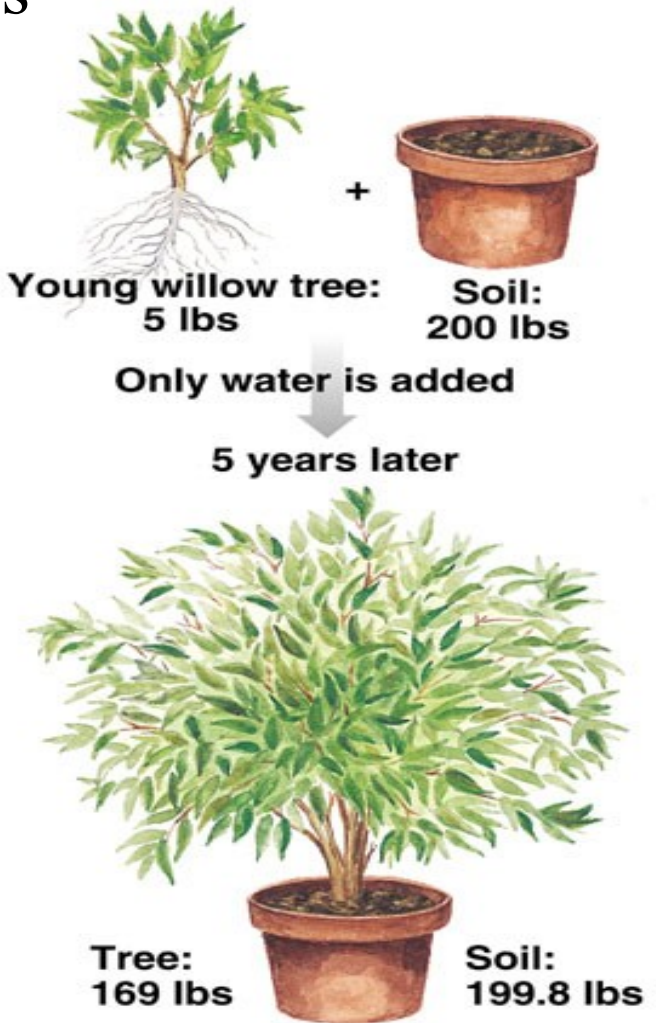

The Rules of Strong Inference:

Strong Inference is a method for looking at scientific problems by trying to disprove hypotheses and accepting the hypotheses that can not be disproved. Using Strong Inference entails following these rules (from an article by John Platt, 1964):

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3. Carry out the experiments to get reliable results.

What experimental errors might have been made?

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The Questions:

- **Can your hypothesis be disproved?**
- **What experiment(s) can disprove your hypothesis?**

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