

## Lab. 8

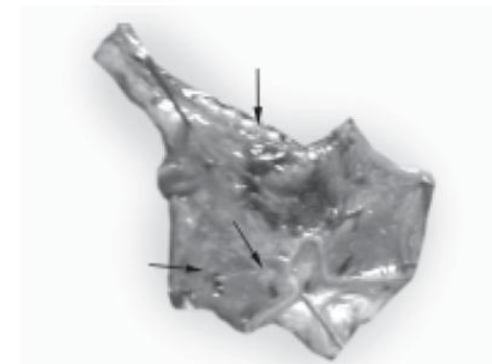


**To demonstrate gastric ulcer induction/formation  
by different methods**

**Presented by:**

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## Aim

- To demonstrate gastric ulcer induction/formation by different methods

## Background

### 1. Pylorus ligation method (SHAY method):

- Animal is anesthetized and a midline abdominal incision is made.
- The stomach is identified and the pylorus is ligated operatively.
- Then, leave the animal in the individual cages for 19-24 hr.
- The test compounds are given either orally (gavage) or injected subcutaneously 30 min before ligation.

- At specified time, animal is sacrificed under euthanasia.
- The abdomen is opened and a first ligature is placed around the esophagus close to the diaphragm to stop the contents in the stomach. Then, the stomach is removed, and the contents are drained in a centrifuge tube.
- (Volume of the gastric content is measured and then, after, centrifugation, acidity is determined by titration with 0.1N NaOH).

## **2. Indomethacin induced ulcer:**

- The test drugs are administered orally dissolved in 0.1% Tween 80 solution 10 min prior to oral administration of indomethacin in a dose of 20 mg/kg, dissolved in 0.1% Tween 80 solution.
- Six hours later, the rats are sacrificed by CO<sub>2</sub> anesthesia and stomach is removed.

## **3. Ethanol induced ulcer:**

- The animals are administered 1 ml absolute ethanol orally.
- Untreated or vehicle treated animals are included as control.
- One hour after administration of ethanol, the animals are euthanized with CO<sub>2</sub>.

- Stomach is opened along the greater curvature and stretched properly and pinned on a wax plate.
- The number of ulcers is noted and the severity recorded with the following scores:

**0 = no ulcer; 1 = superficial ulcers; 2 = deep ulcers; 3 = perforation**

## **Materials and Methods**

### **Materials**

Animal/species : Rat/ Wistar

Sex/Body weight : Either sex/ 150-250 g

Syringe/needle : 1 ml/ preferably 23 G

Drug : Indomethacin (20 mg/kg, po)

Other agent for ulcer : Aspirin (500 mg/kg, po)



## Methods

### *Step 1*

- Weigh the animals and mark properly
- Divide animals into two groups (n = 6 in each group)

### *Step 2*

- Group 1: Control group (n = 6); rat are given saline at the equivalent dose of drug
- Group 2: Treatment group (n = 6); rat pylorus is ligated for 19-24 hr or indomethacin 20 mg/ kg, po or aspirin 500 mg/kg, po

### *Step 3*

- Sacrifice the animal after 19 hrs in case of pylorus ligation or 6 hrs after indomethacin or 1 hr after ethanol administration

- Observe for score

**Note: Group: 3, may be added in the experimental**

group, if one wants to see the protective effect of the PPI's such as omeprazole, rabeprazole etc. or H-2 blockers such as Ranitidine, cimetidine, etc.

- Test drug is administered 30-60 min prior to induction of gastric ulcer.
- Ulcer is observed by the following score:

0 = no ulcer; 1 = superficial ulcers; 2 = deep ulcers; 3 = perforation.

## Observation and Results

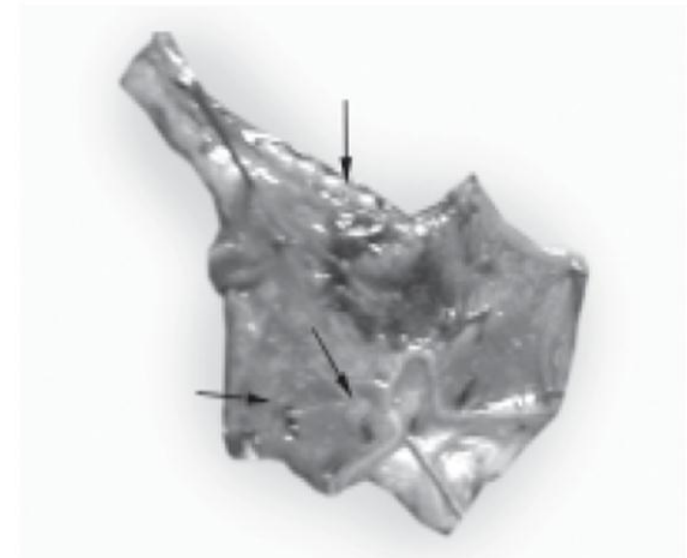
An ulcer index (UI) is calculated:

$$UI = AU + ASS + PU \times 10^{-1}$$

AU = average number of ulcers per animal

ASS = average of severity score

PU = percentage of animals with ulcers



**Fig. 20.1:** Arrows indicate gastric ulcer in rat stomach  
(For color version see Plate 3)



## Observation Table

Sl. no.	Gastric ulcer			
	Group 1		Group 2	
	Score	UI	Score	UI
1.				
2.				
3.				
4.				
5.				
6.				

*Percentage of ulcer protection:* Percentage protection was calculated by using the following formula:

$$\% \text{ Protection} = \frac{UI_{\text{Ulcer control}} - UI_{\text{Treated}}}{UI_{\text{Ulcer control}}} \times 100$$

## Discussion

- There are several ideal models to induce the gastric ulcer which resemble gastric ulcer in humans like analgesics induced gastric ulcer, for example indomethacin, aspirin, alcohol induced, etc. or pylorus ligation method (SHAY method).
- All these methods are based on the mechanism of the excessive retention or production of gastric acid (HCl) prostaglandins, histamine, etc. which leads to oxygen reactive radicals, and other inflammatory mediators, locally at the stomach; can induce severe ulcer.
- Severity of ulcer may worsen due to the presence of ulcer of *H. Pylori* infection which is difficult to treat.