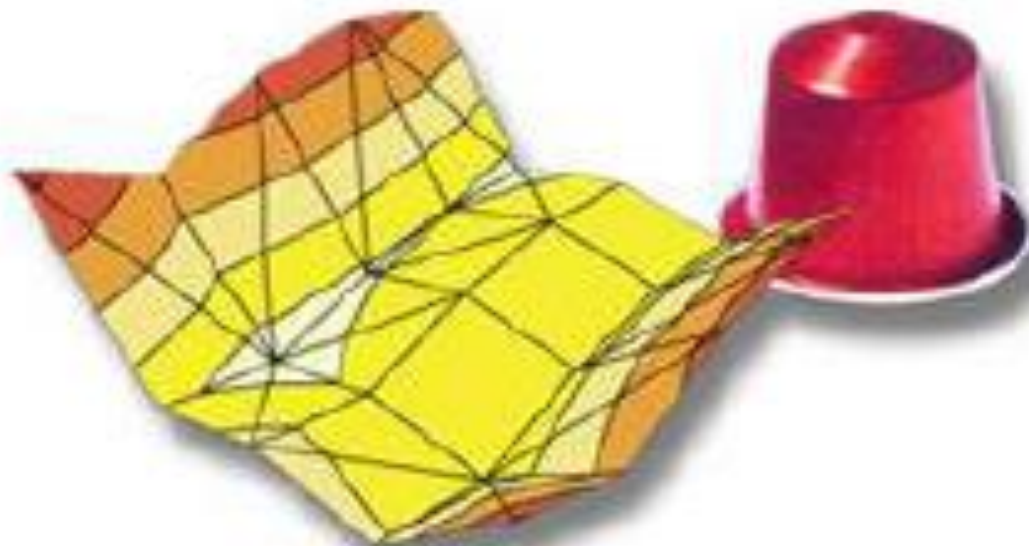


# Aroma landscape



# A bug, ulcer & Ticket to Stockholm

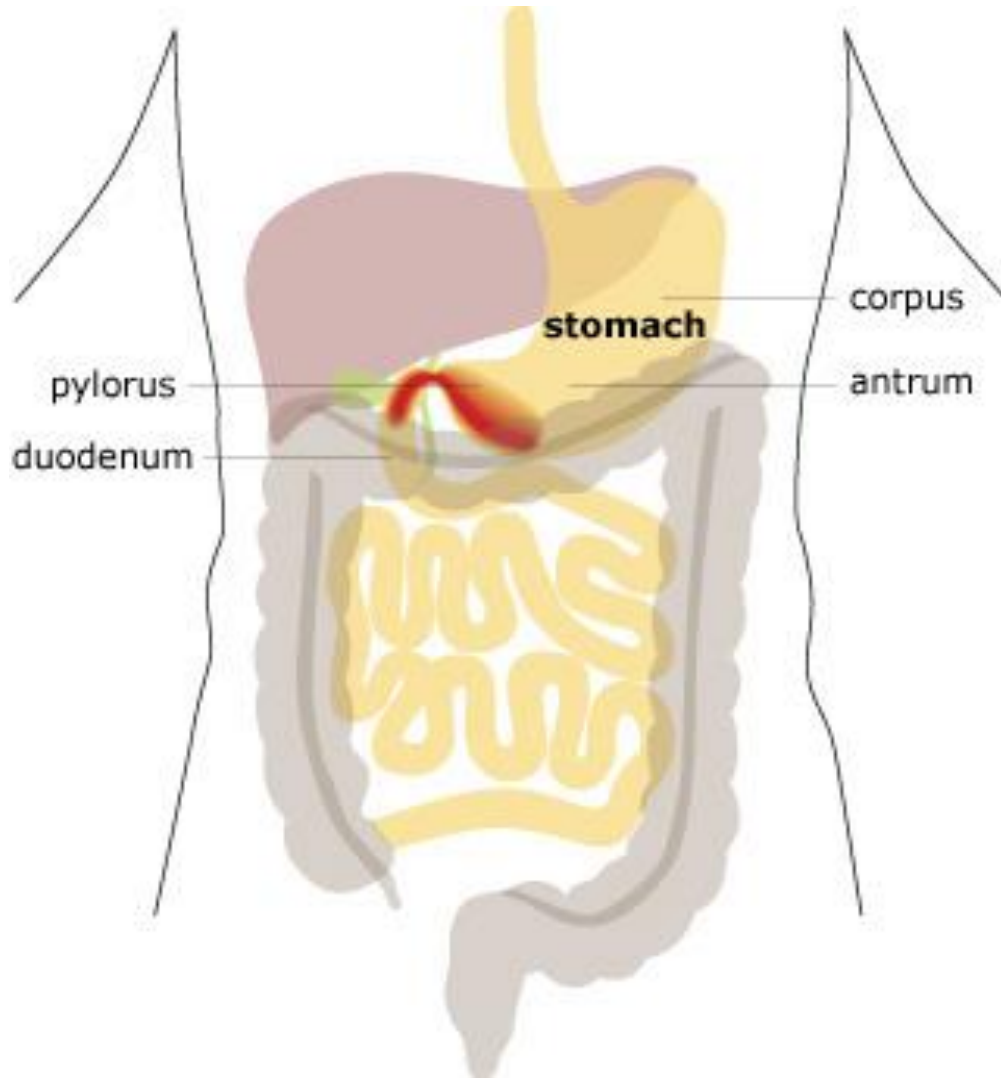


# *Chemical Senses of the Gut*



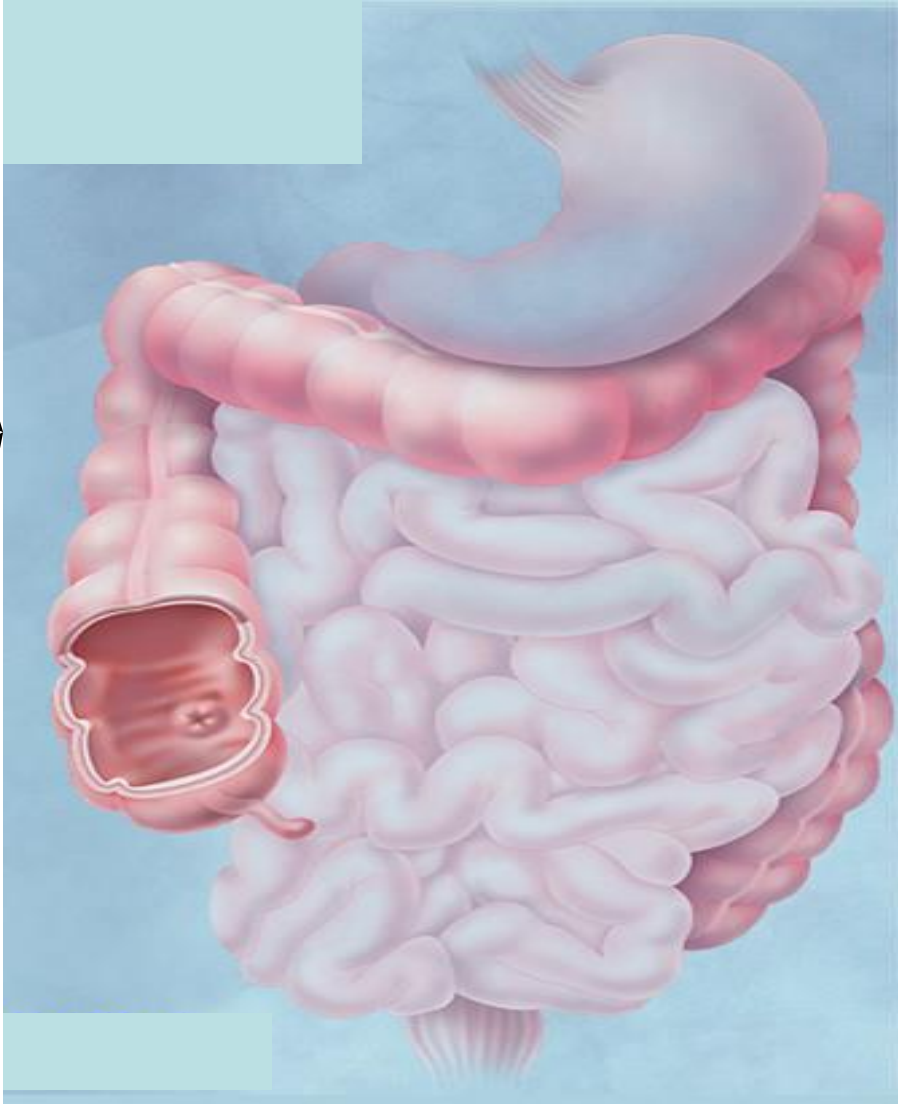
*Arun Chaudhury*

# Know thy gut





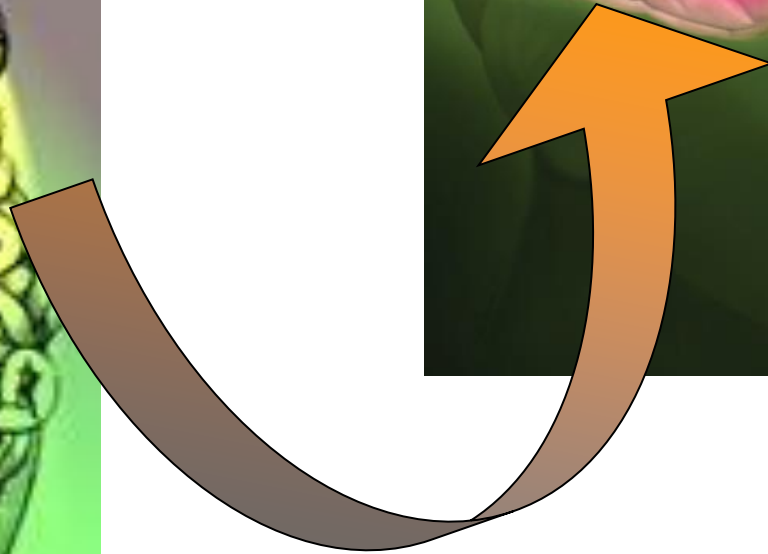
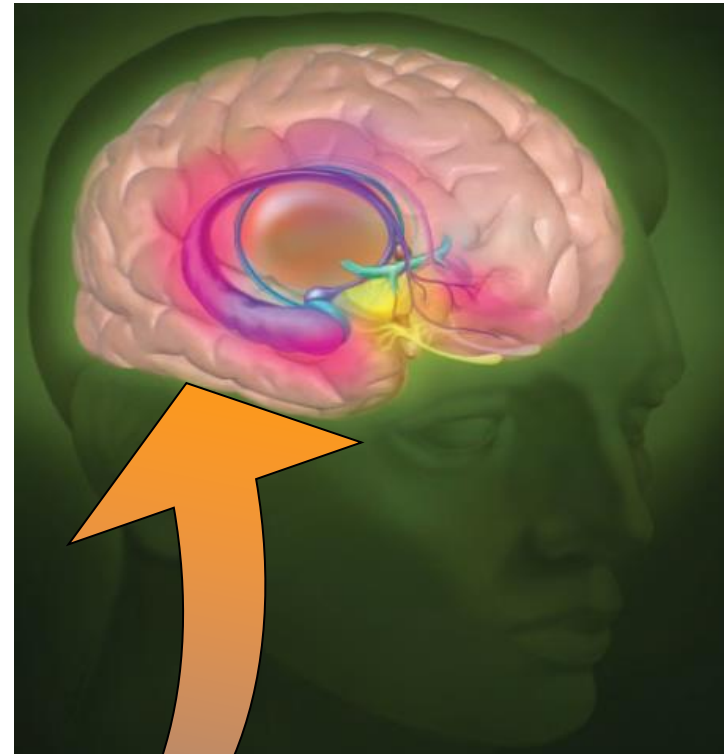
# Gastrointestinal tract: Interface of *milieu interne* with external world



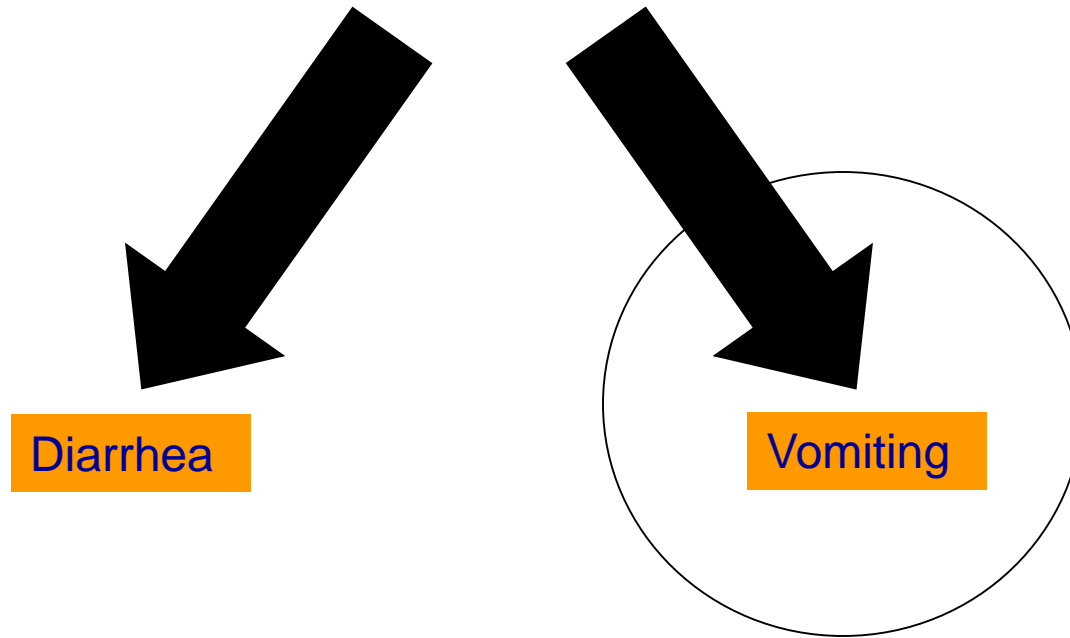
# Tepid taste & Chemical irritation: You find it all in the intestine



# Constant dialogue between GI tract & brain



# Gut responses to poisons & toxins

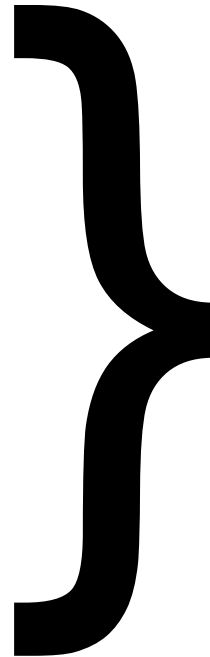


**How can we study vomiting & nausea in lab?**



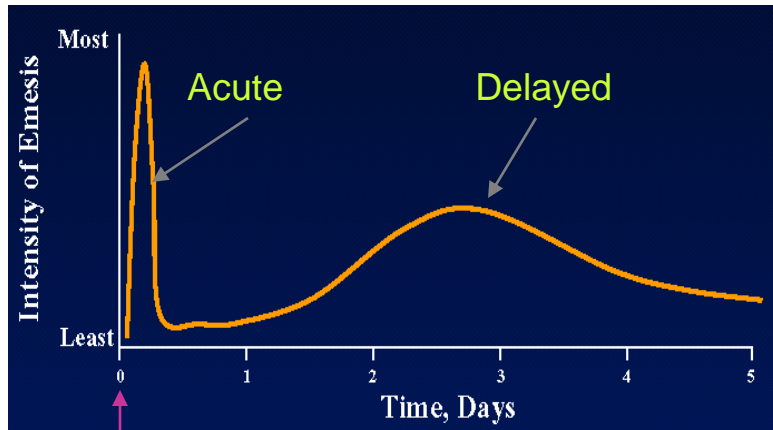
# Cancer therapy

- Surgery
- Radiotherapy
- Biologicals
- Chemotherapy

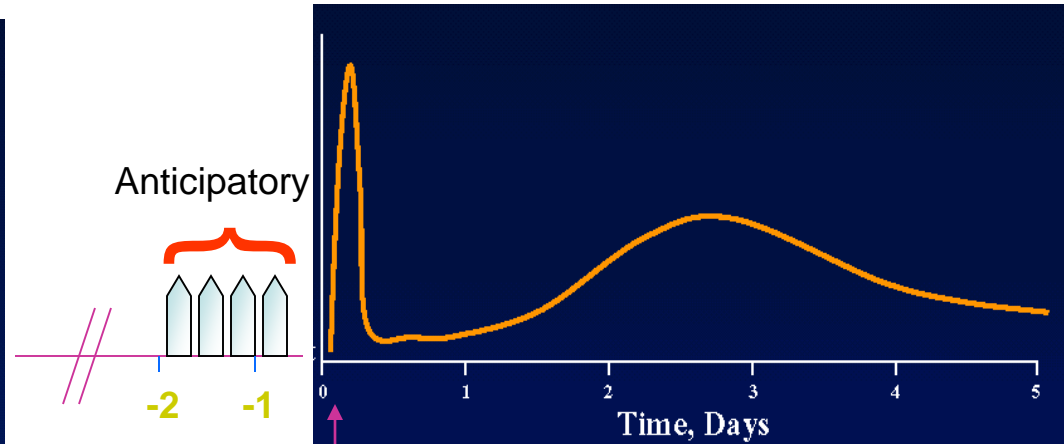


Unfortunately,  
causes intense  
nausea/vomiting

# Patterns of emesis after chemotherapy



Course 1



Course X

*Adapted from Andrews PL & Davis CJ*

# Models for studying drug-induced sickness

- House Musk Shrew
- Ferret
- Mice
- Rat

## Read-outs for visceral sickness

*Andrews & Horn 2006 Auton Neurosci. 2006 125(1-2):100-15*

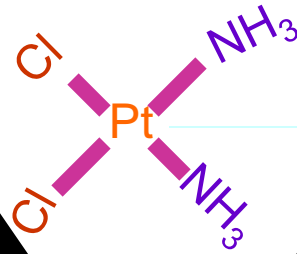
# Measuring pica in rats



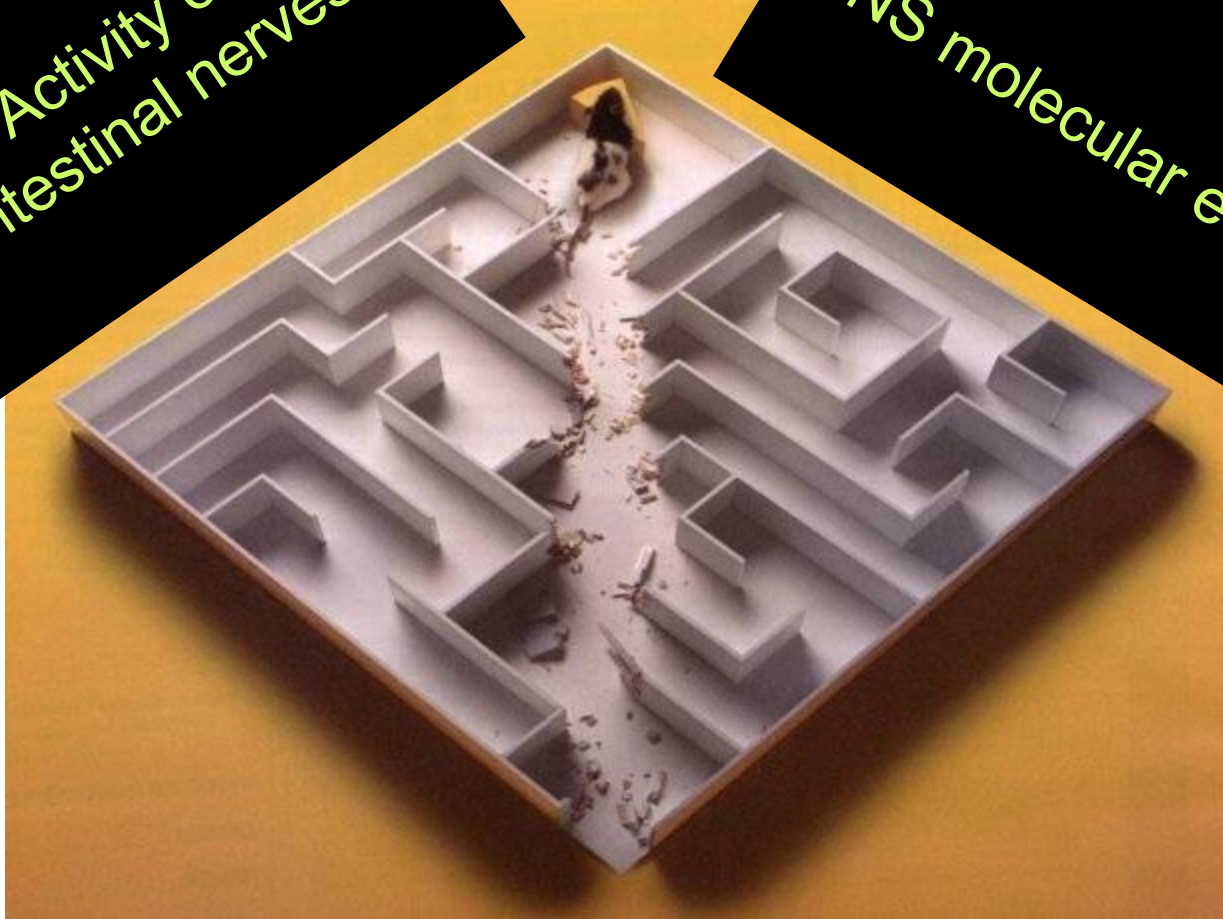


# Strategies for evaluating visceral sickness

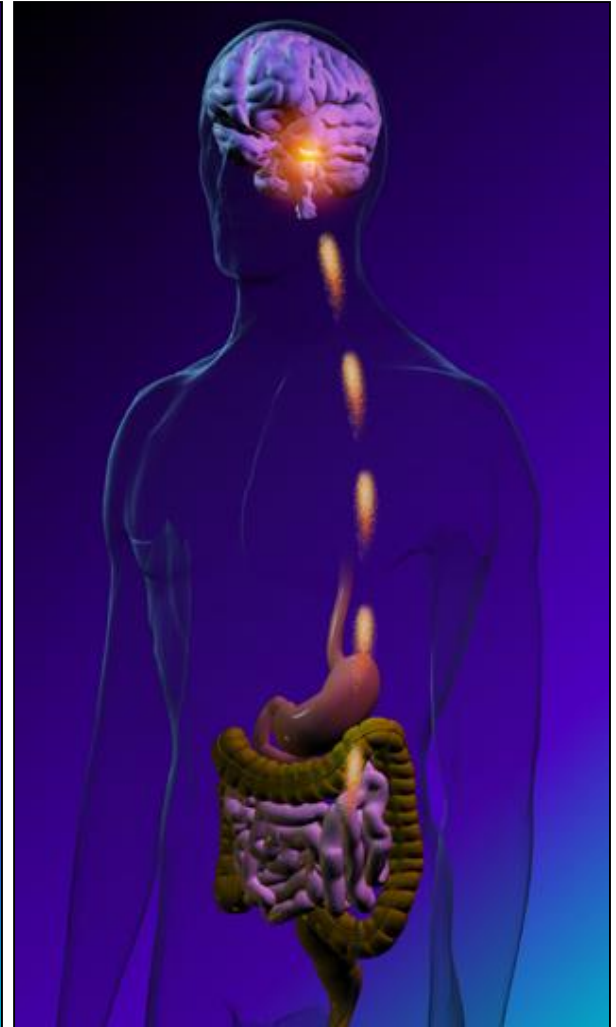
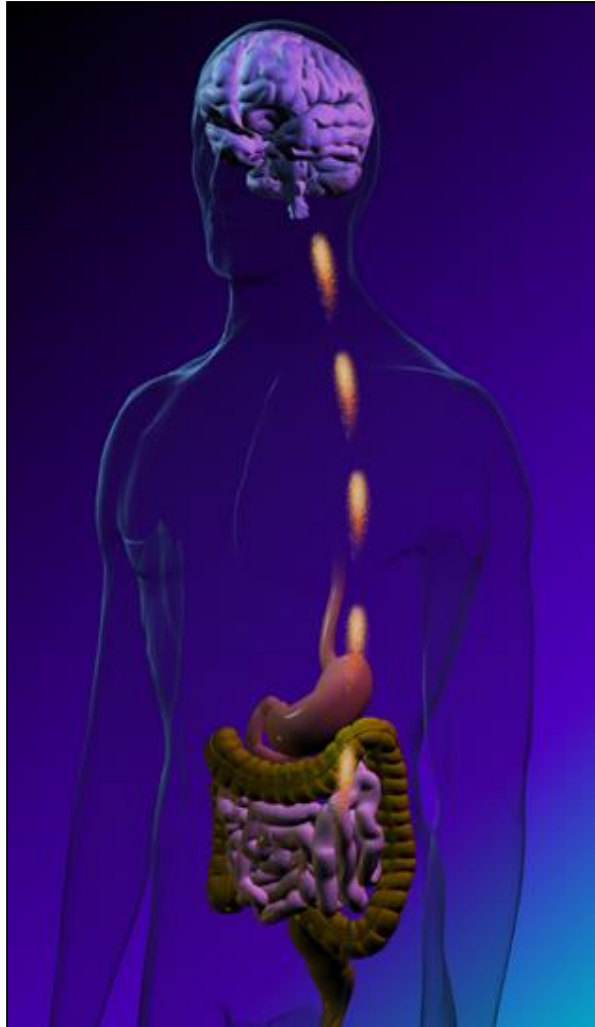
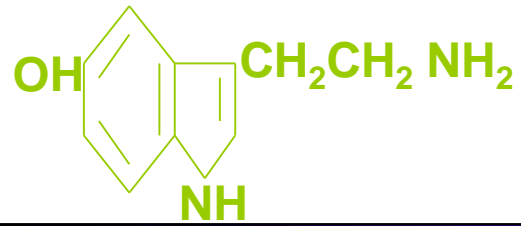
Activity of  
Intestinal nerves



CNS molecular events

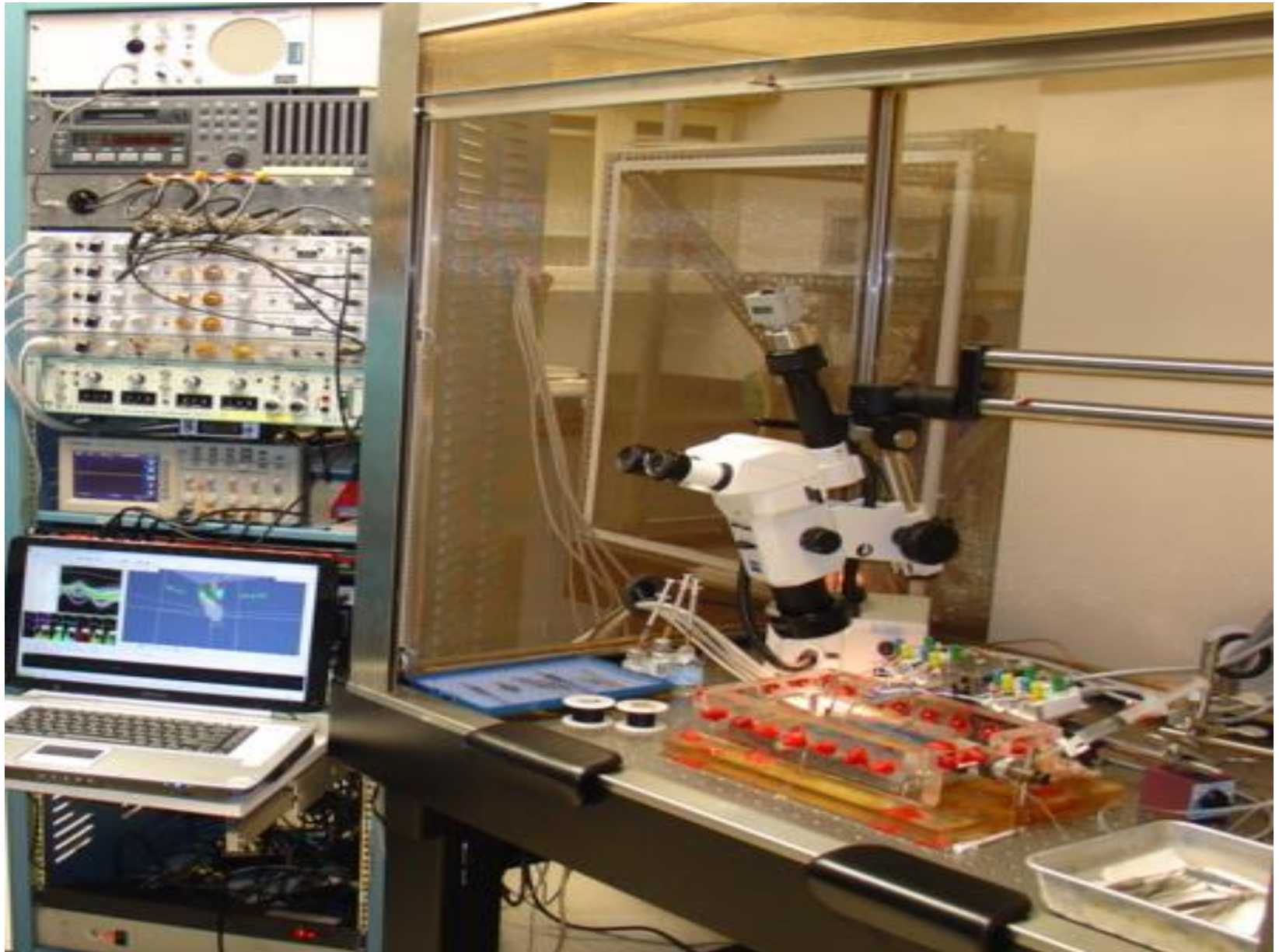


# Gut-Brain communication



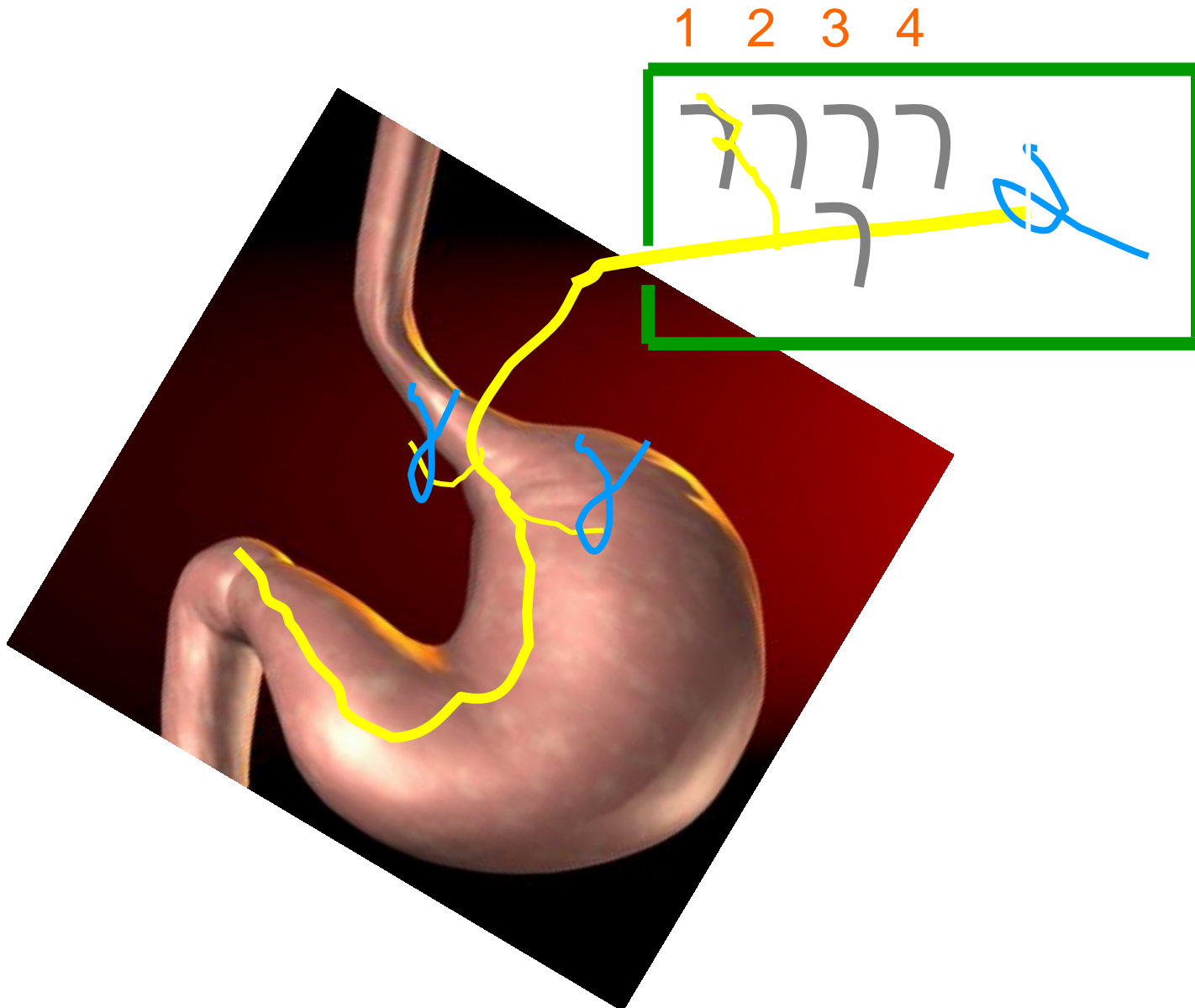
# Study 1: Afferent gastric vagal signaling in response to cisplatin

# Electrophysiology Apparatus

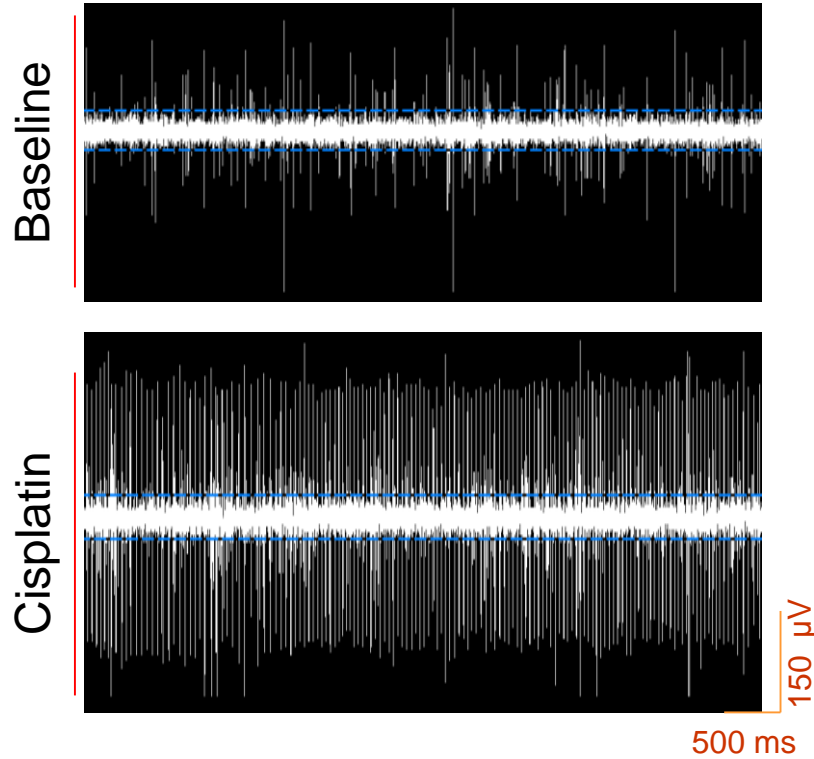
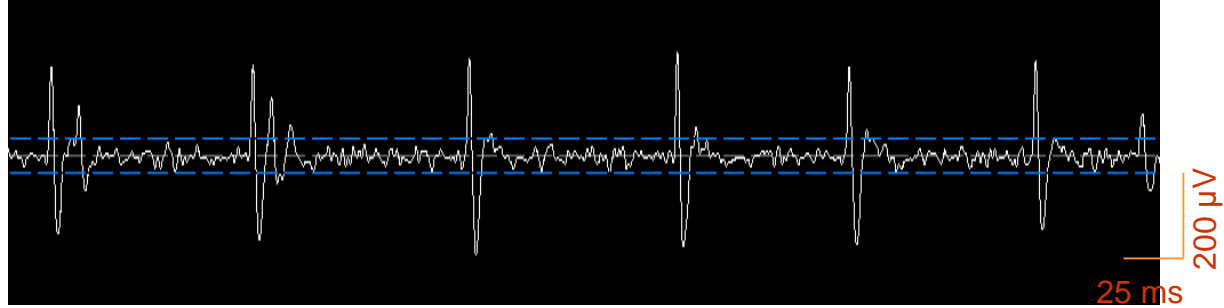




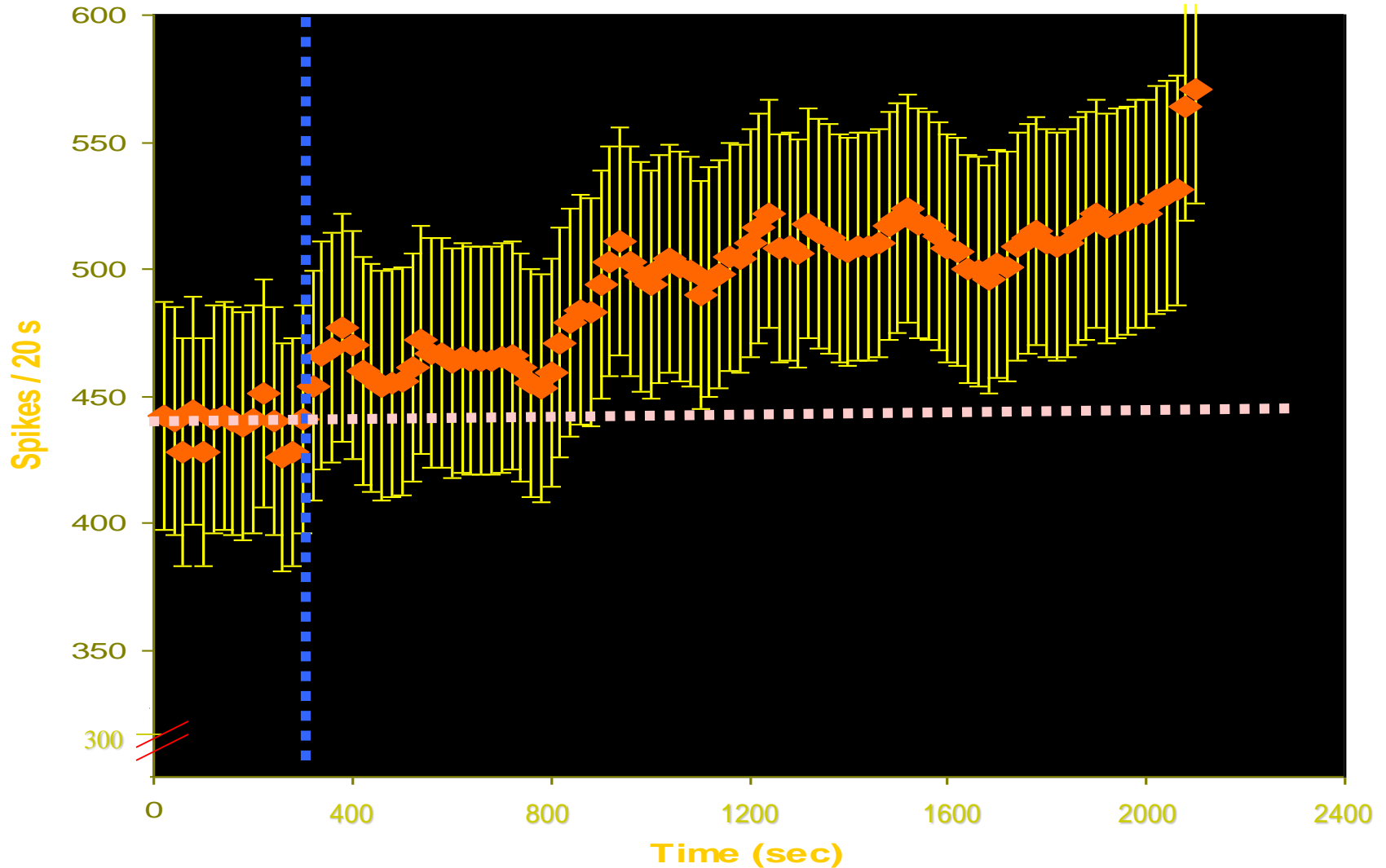
# Recording from gastric vagus



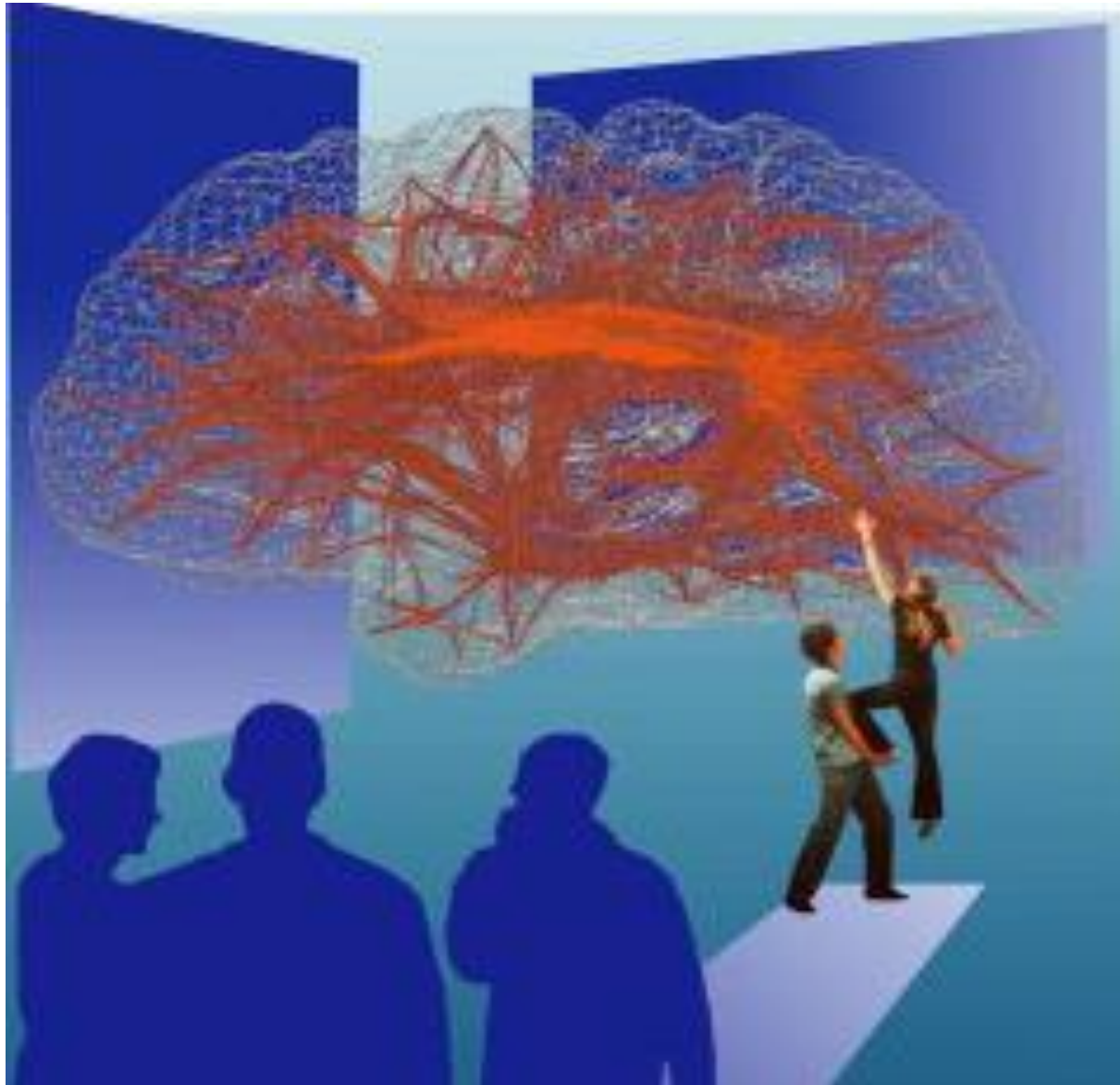
# Gastric vagal recordings



# Effect of cisplatin on gastric vagal activity



What's going on upstairs?

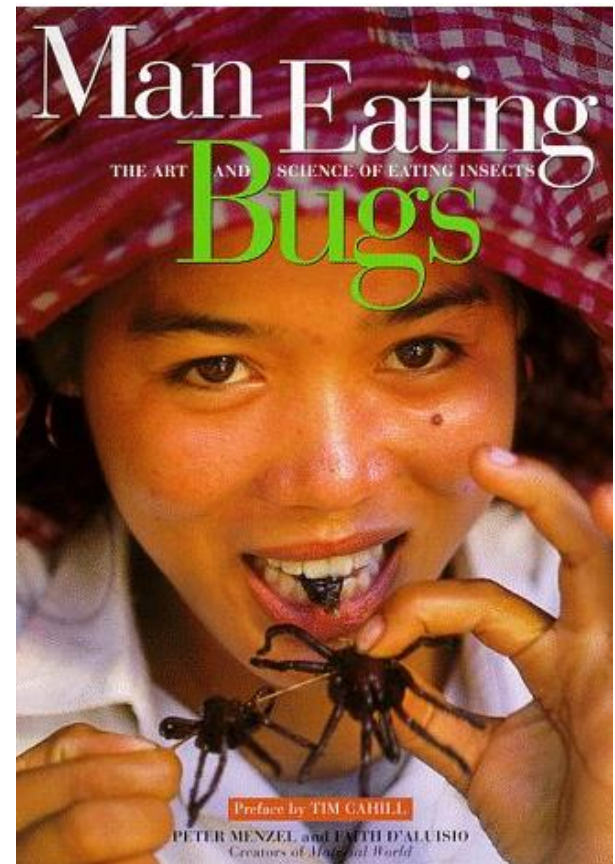




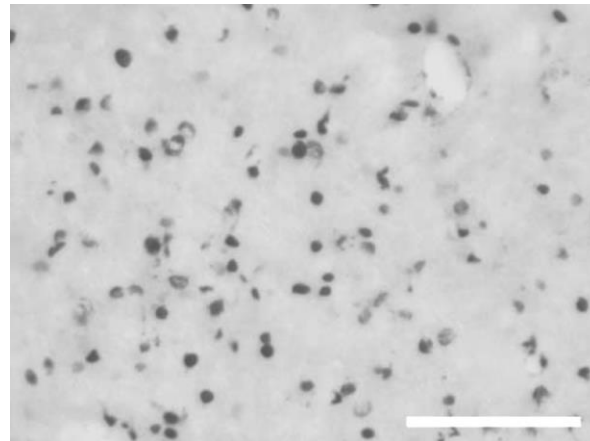
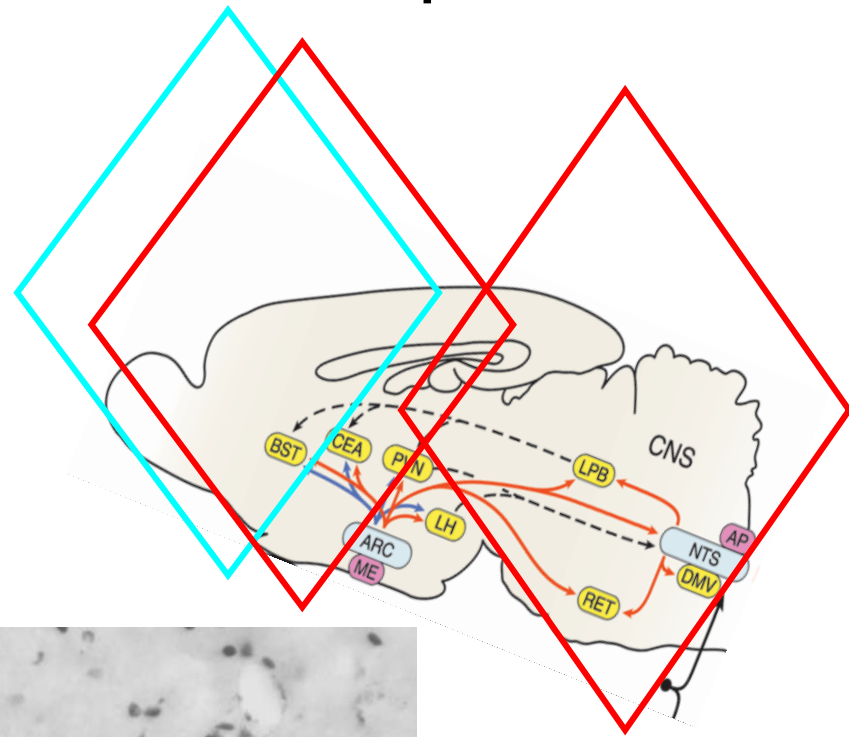
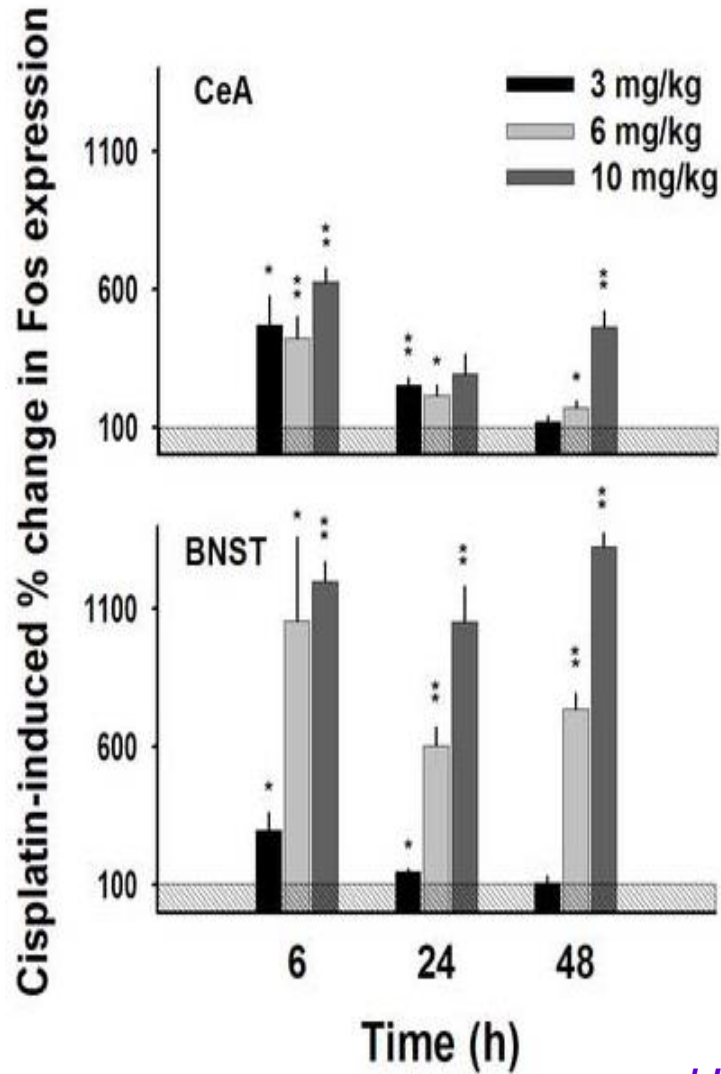
Homunculus: where is the representation of nausea in brain?



# Impact of unpleasant odor & taste on nausea



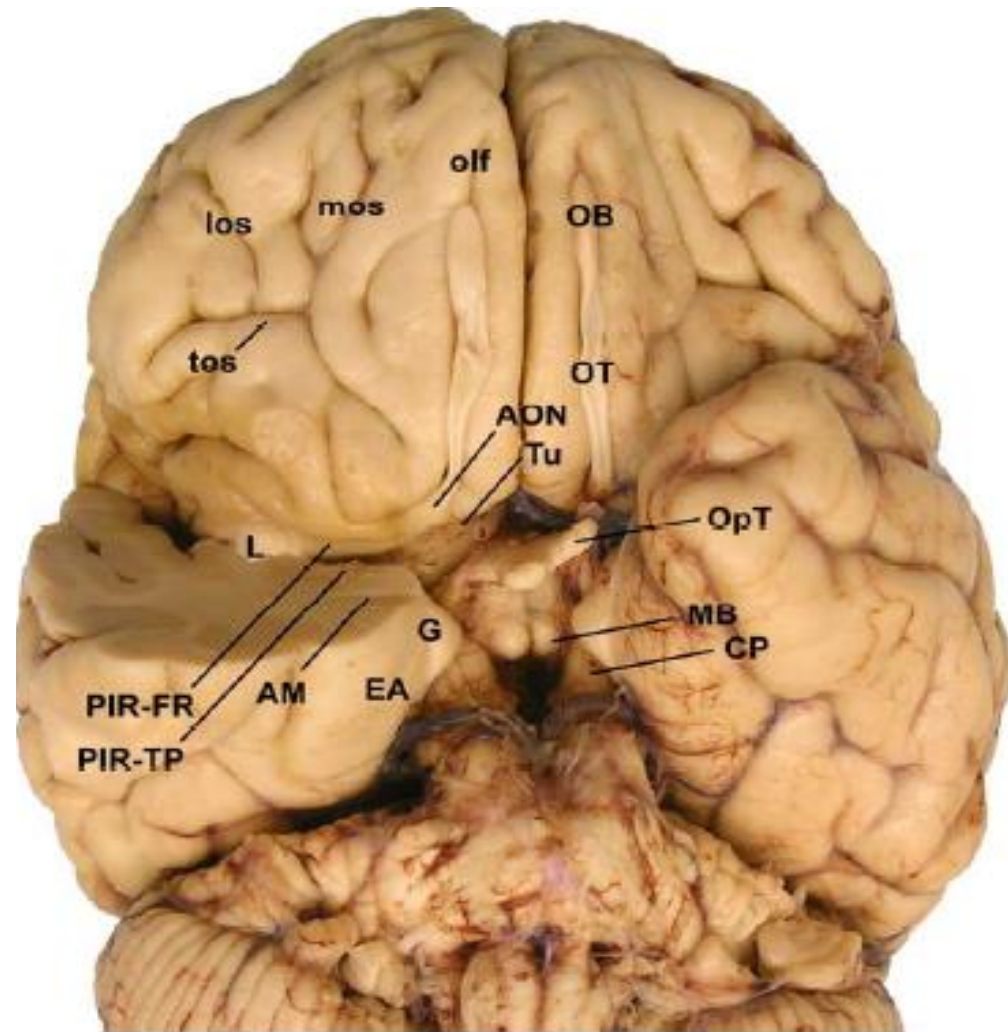
# Cisplatin induced amygdalar Fos expression



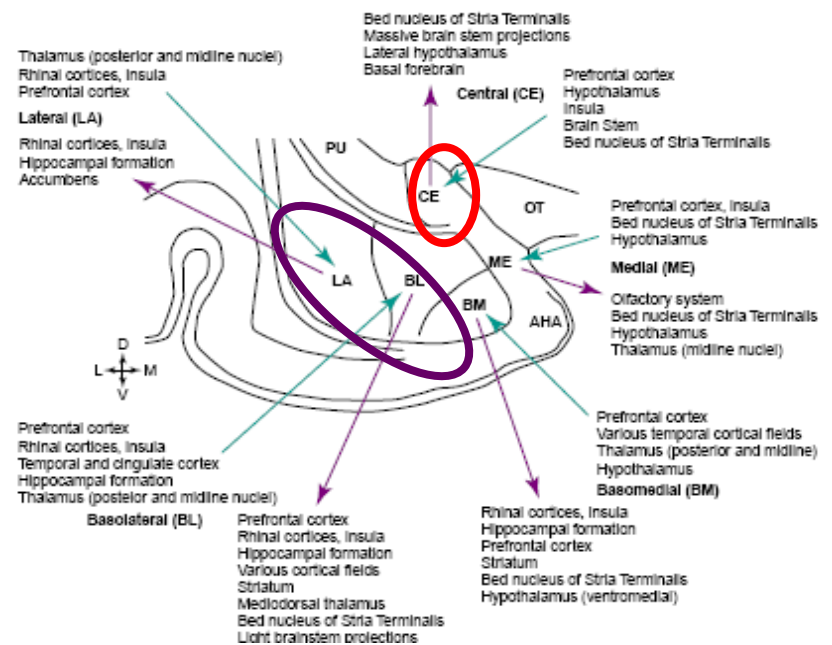
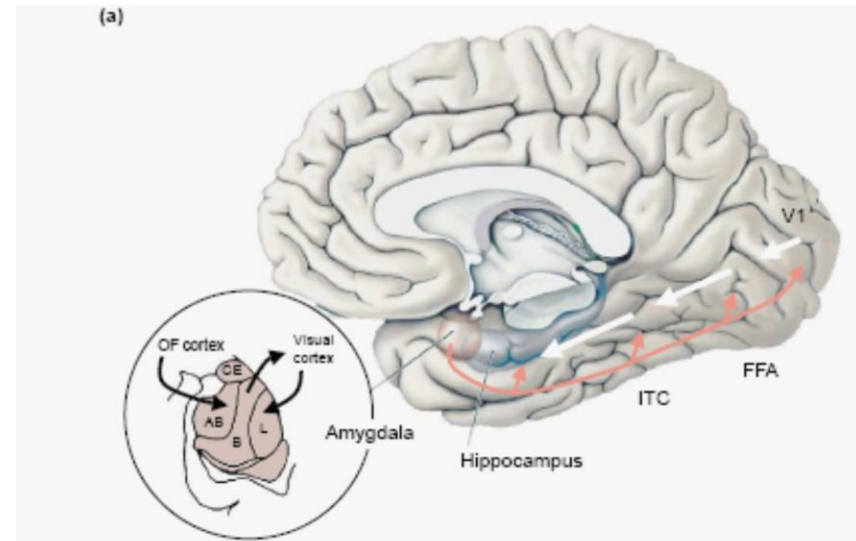
*Horn, Ciucci & Chaudhury Submitted, July 2006.*



# Where is the amygdala?

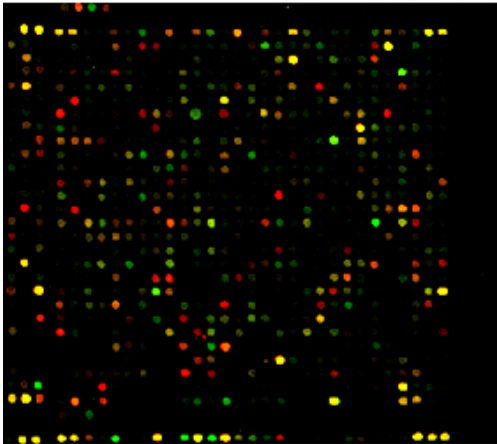
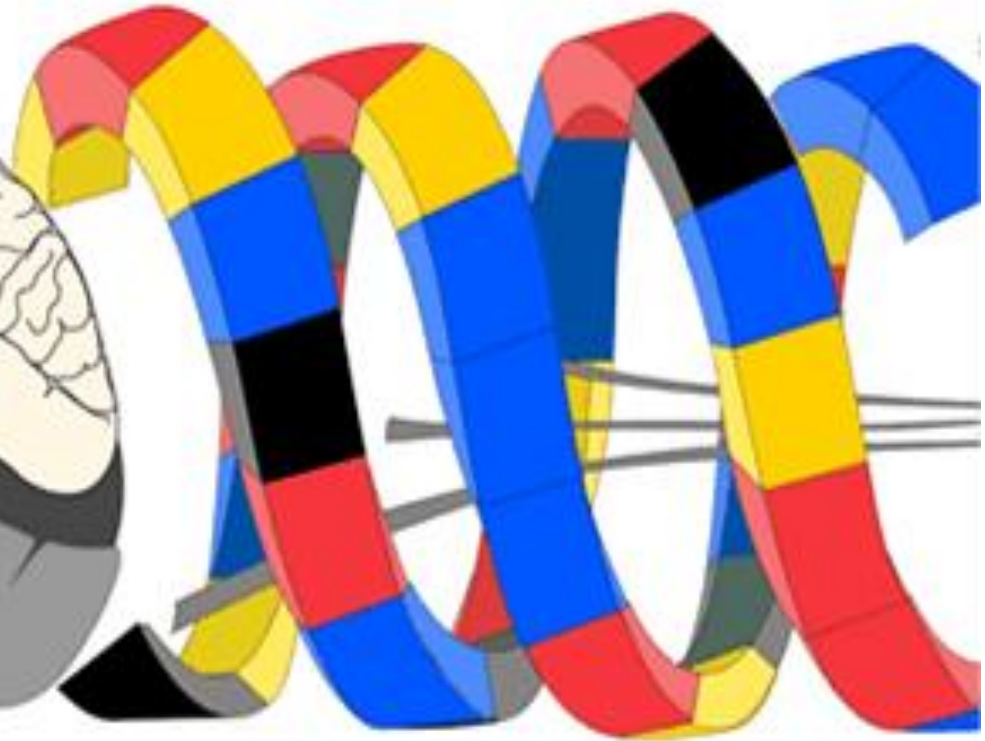
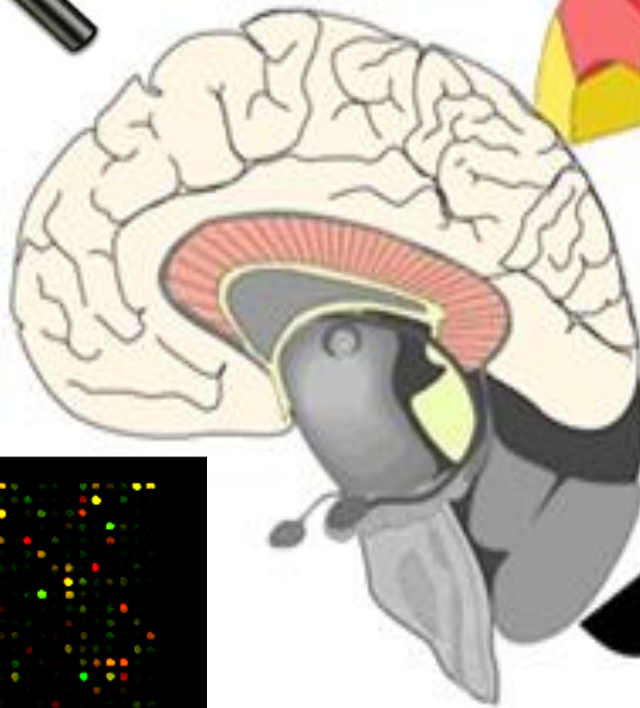


*Vuilleumier, TICS, 9: 585, 2005*





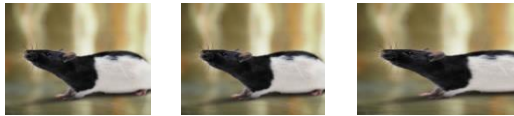
# Global gene expression patterns in brain in response to nauseating drugs



# Experimental design for gene expression analysis in amygdala

Cisplatin ip

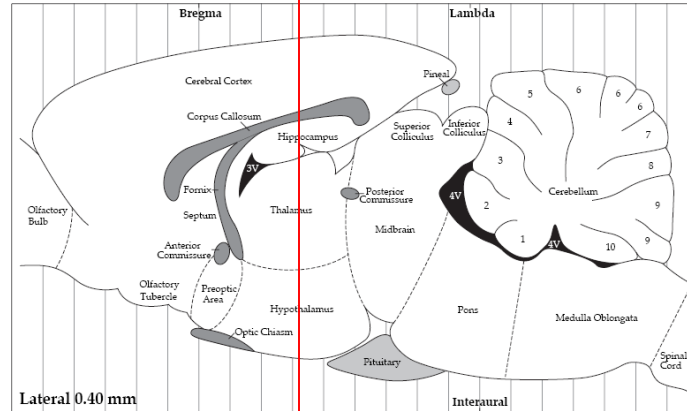
10 mg/kg/ml



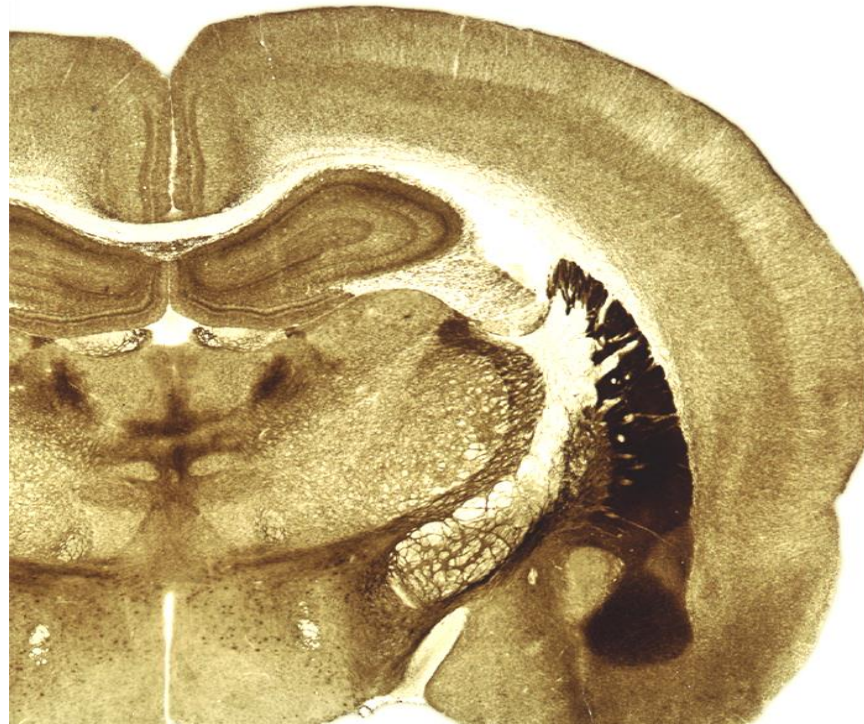
24 hrs



Saline ip

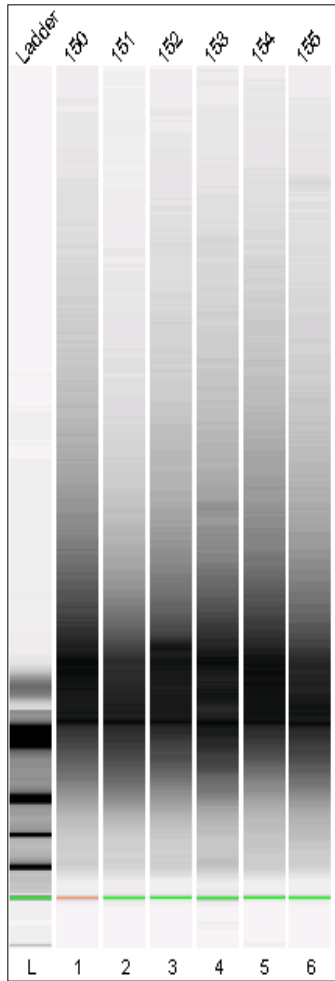


*Adapted from  
Paxinos & Watson*



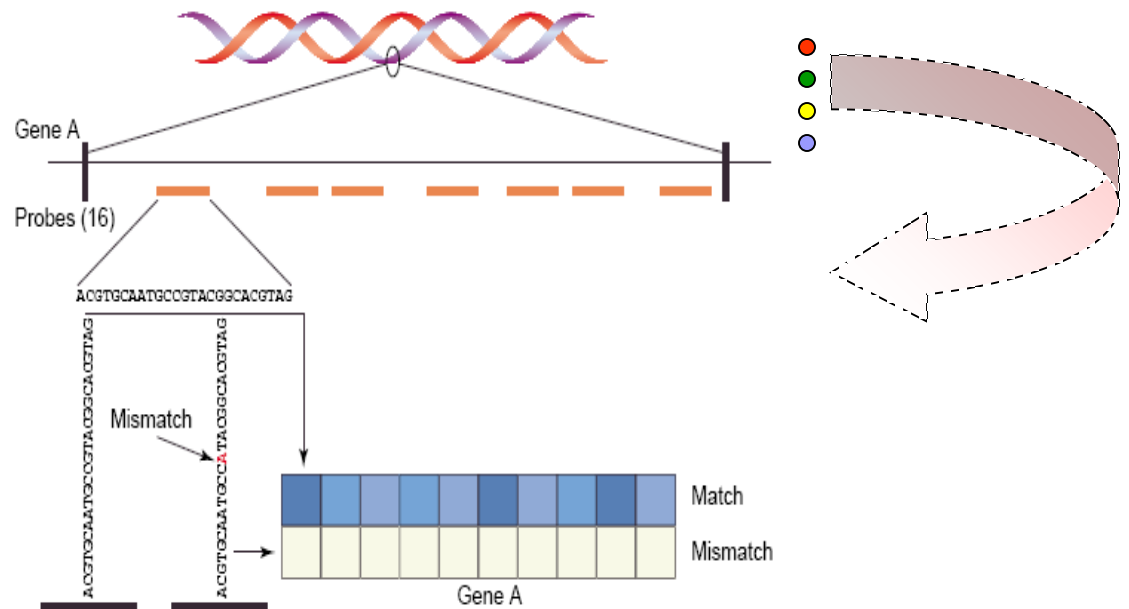
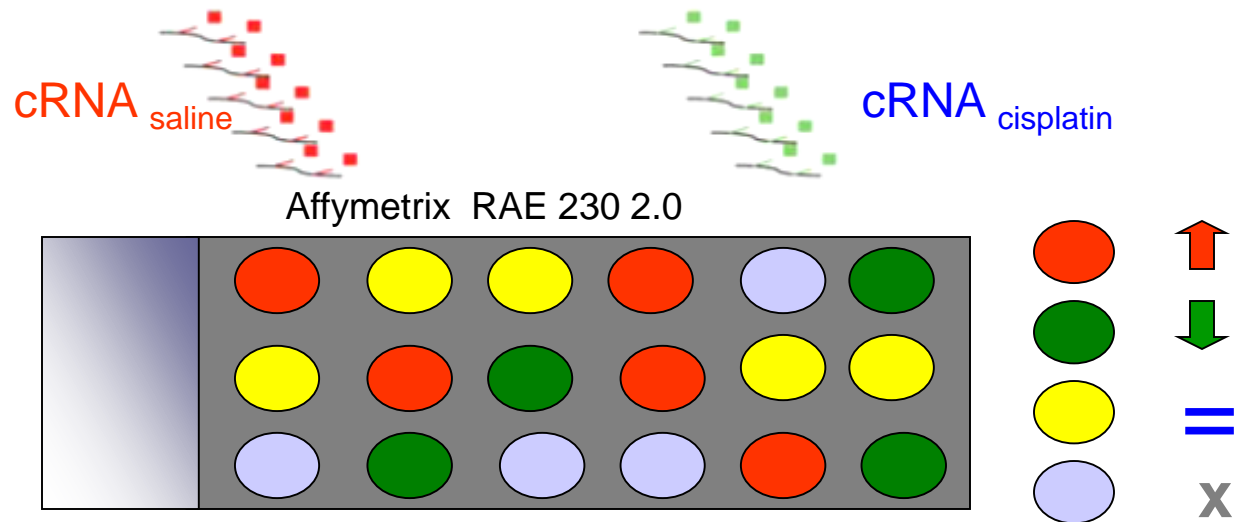
# Basics of MicroArray steps

## mRNA Nanoassay



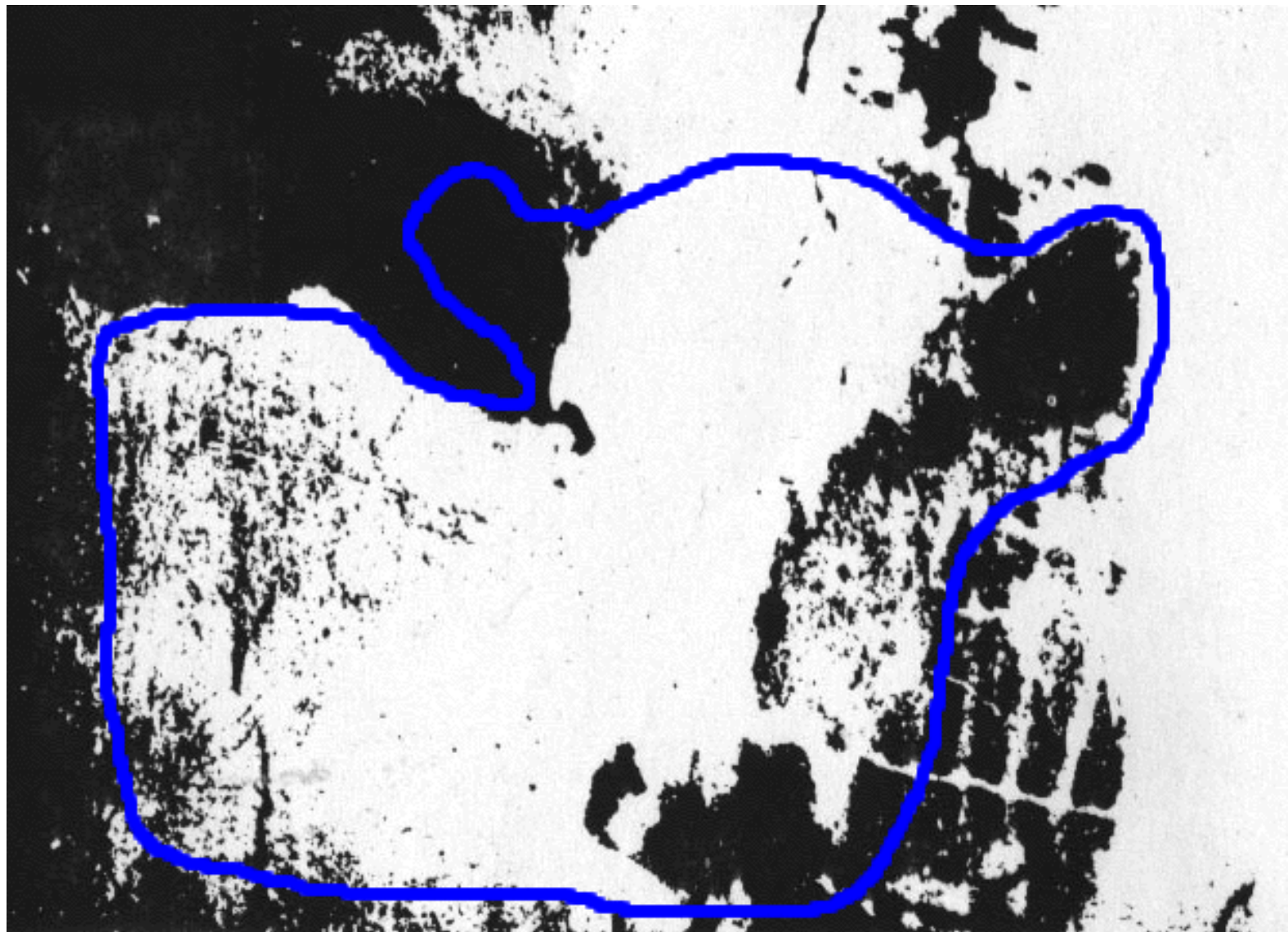
$$OD_{260/280} > 1.9$$

*Penn MicroArray Core*



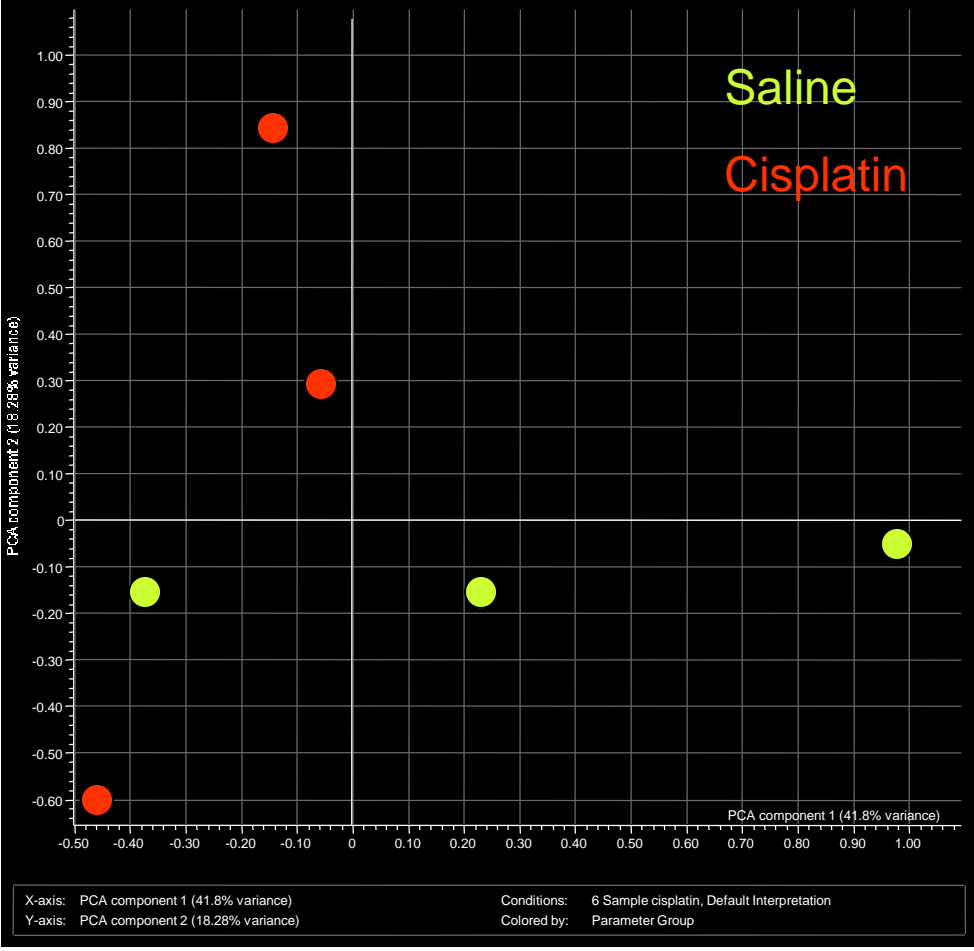
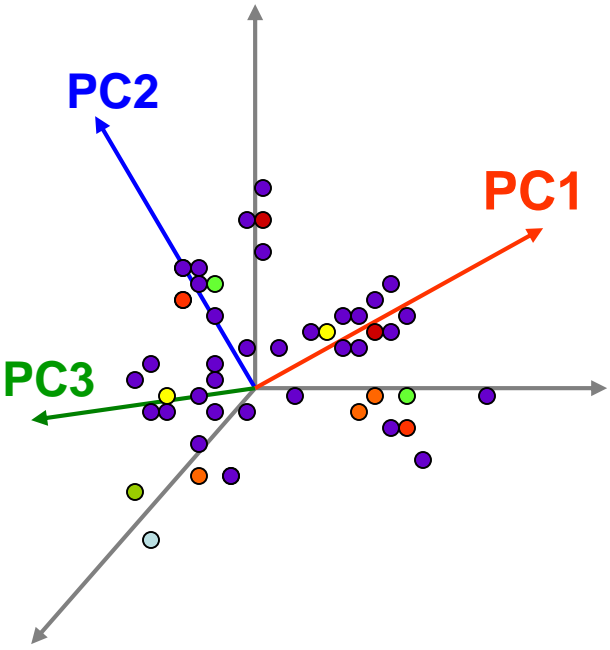




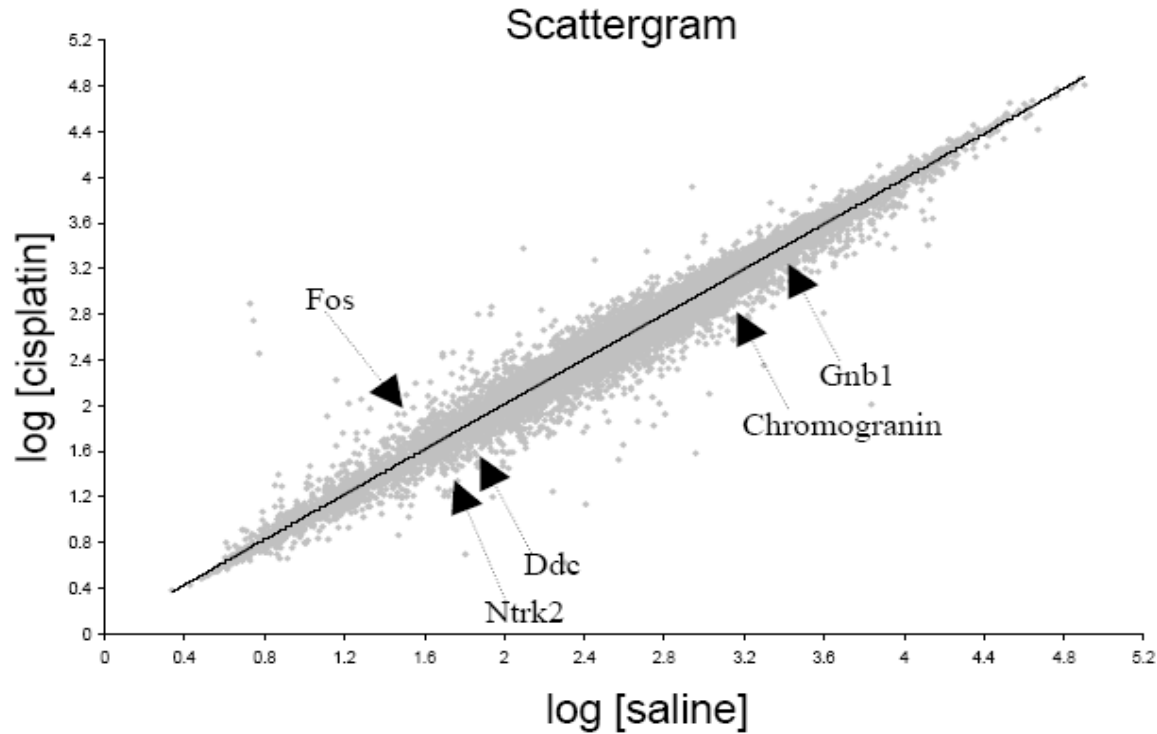




# Examining gene expression patterns using principal component analysis

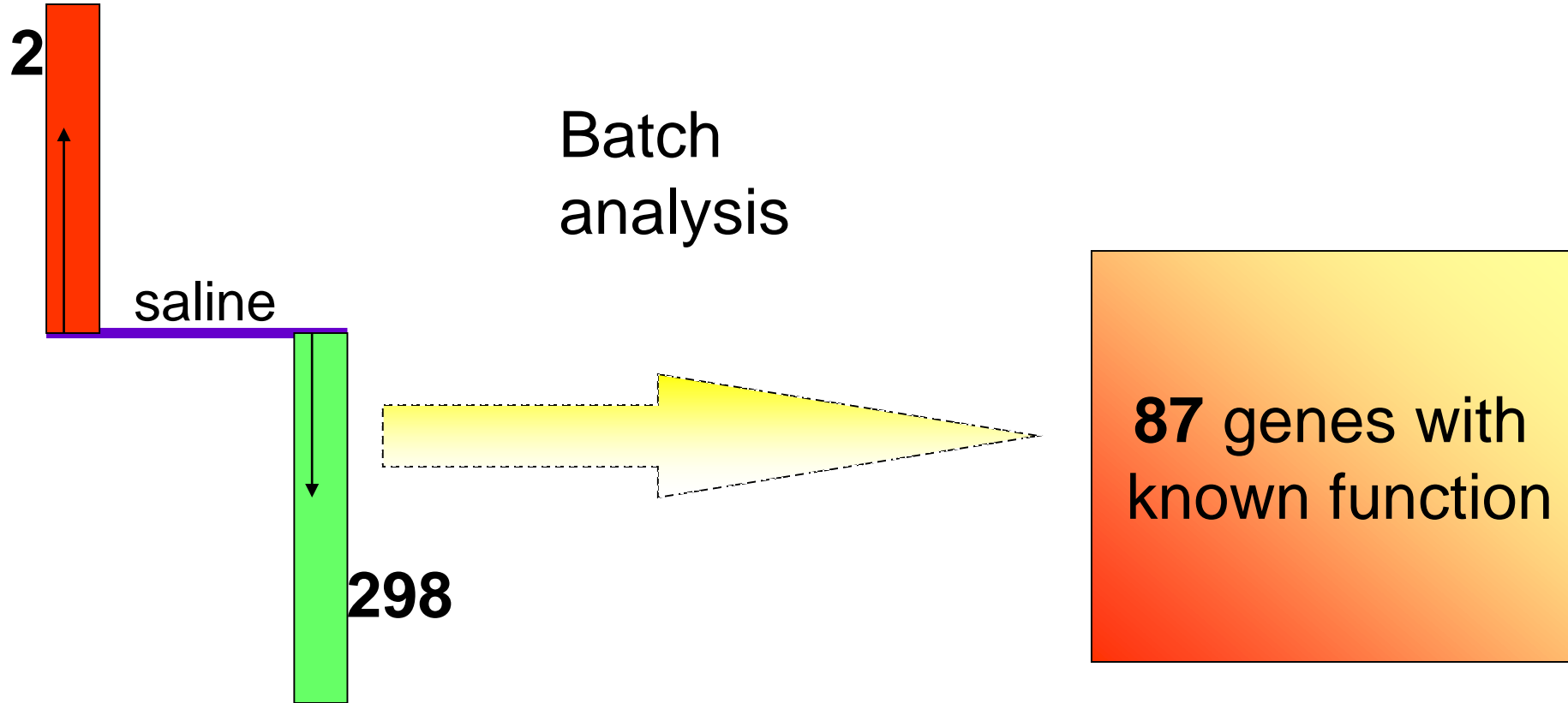


# Scattergram of genes affected by cisplatin

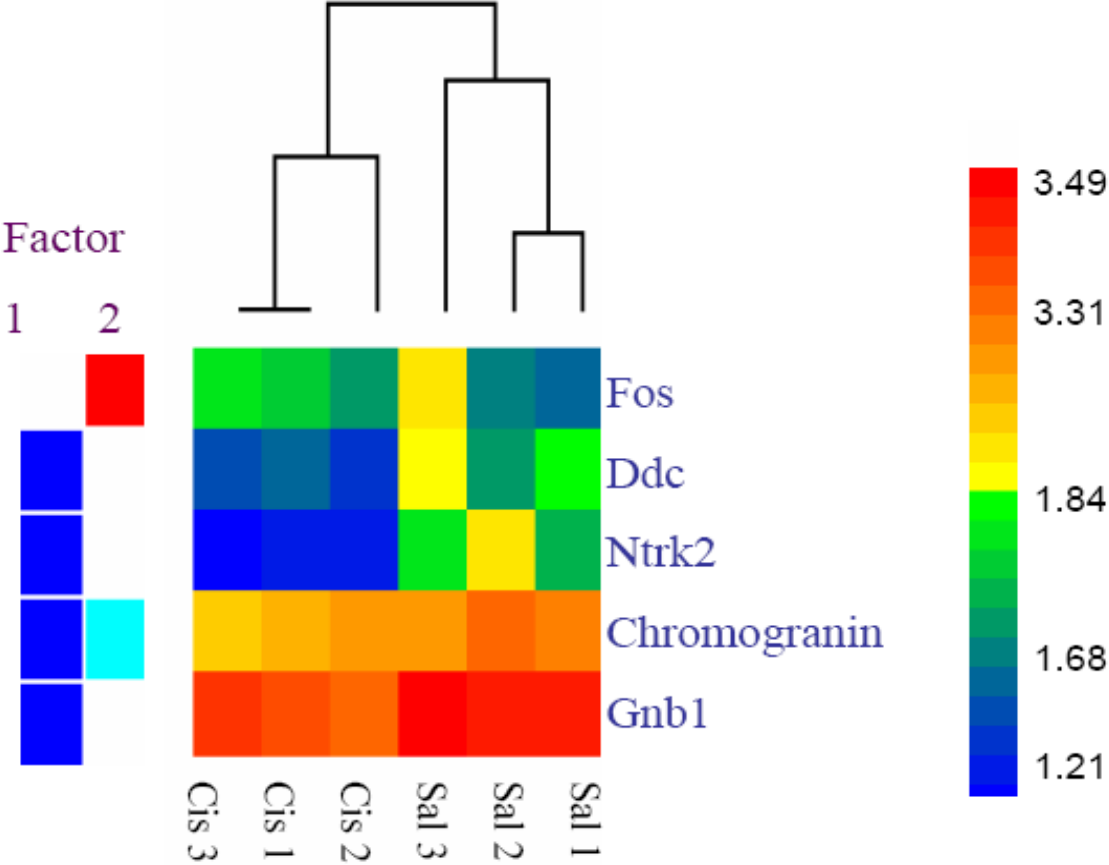


*Chaudhury & Horn, Submitted, July 2006.*

# List of amygdalar genes affected by cisplatin

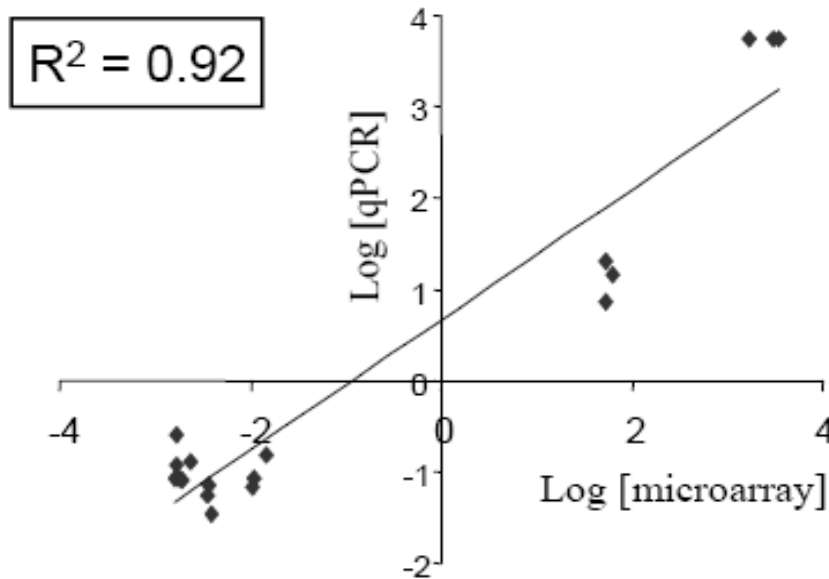


# Heatmap showing differences in gene expression



# Correlogram of microarray & qPCR changes

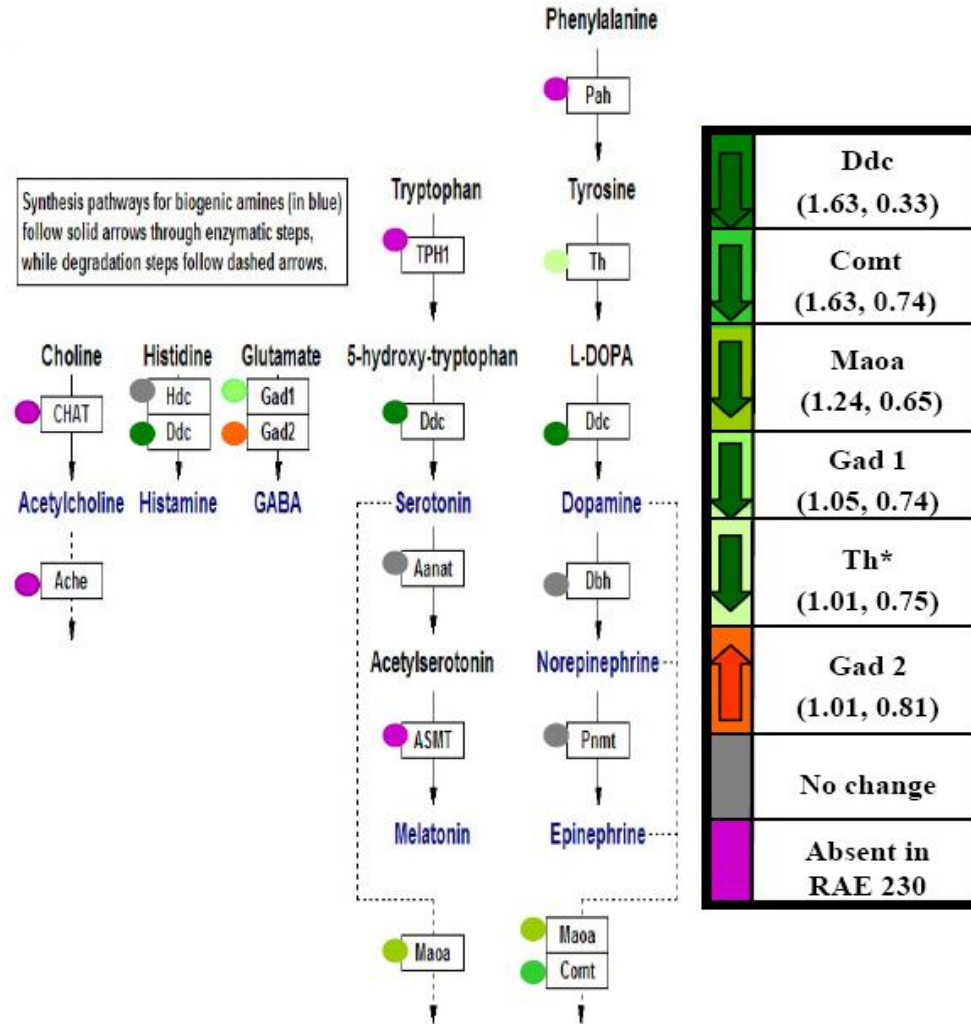
## Cisplatin-treated



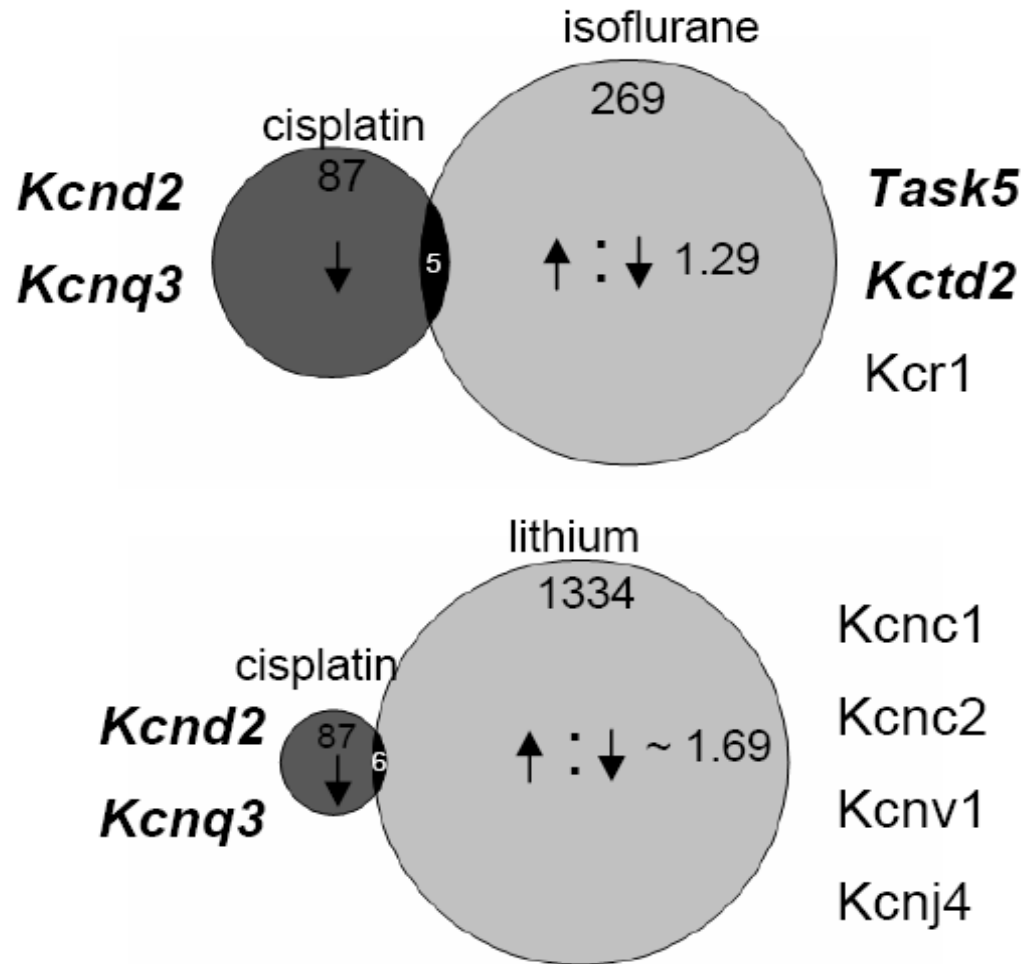
Gene	R <sup>2</sup>
Fos*	0.57
Ddc	0.98
Gnb 1	0.88
Snx 27	0.54
Ntrk 2	0.0012



# Alterations in amine biosynthesis

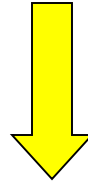


# Comparison of microarray dataset with parallel studies



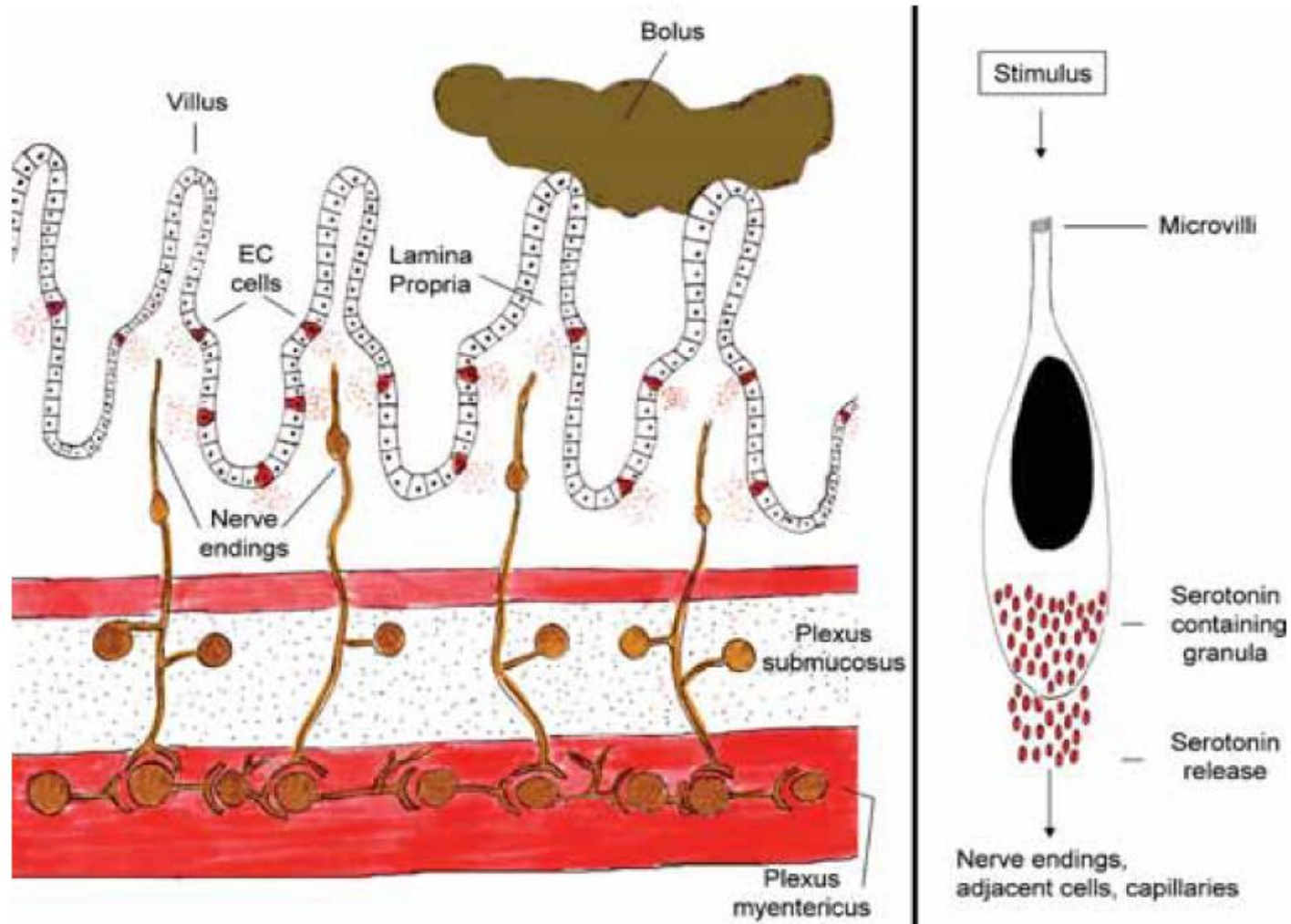
# Clues for visceral sickness: Gut-Brain integration

Cisplatin



- Activation of afferent gastric vagal signaling
- Fos expression in amygdala
- Diminished gene expression of “amine biosynthetic pathway” enzymes in amygdala

# “Leaky gut” as the primary event in poison detection?



# *My Alma mater*



*Medical College Bengal, Kolkata 700 073*

*MBBS*



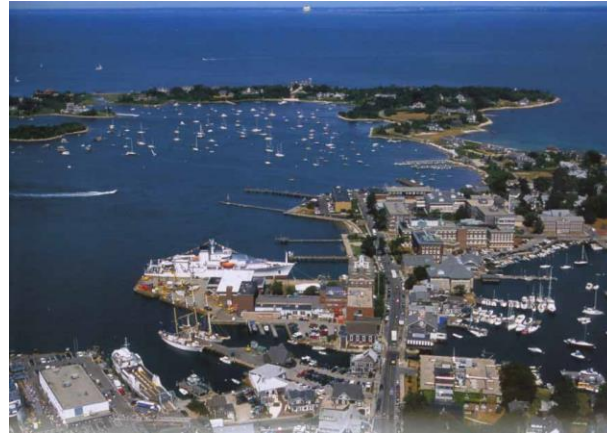
*All India Institute of Medical Sciences  
(AIIMS), New Delhi 110029*

*Residency in Anatomy*



# *My Summers.....*

*Eel Pond,  
Woods  
Hole,  
2003*



*AQLM  
Course,  
MBL,  
Woods  
Hole*

*Oporto,  
2003*



*IBRO  
School on  
Peripheral  
Nervous  
System,  
Ofir, 2003*

*Lubeck,  
2003*



*Baltic Summer  
School,  
Neurodegenerative  
Diseases,  
Kiel, 2003*

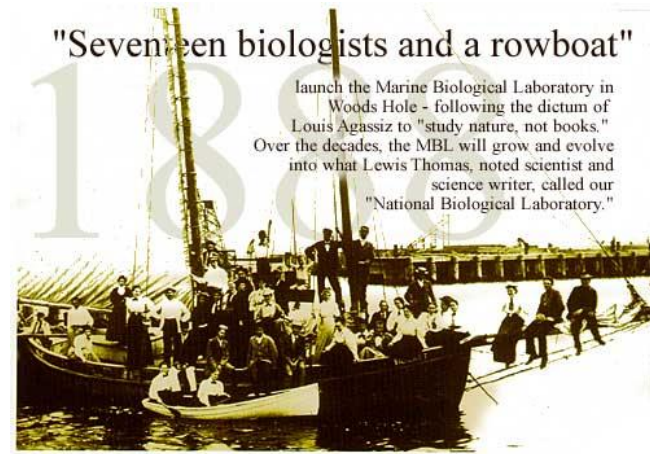


# Summers you may try.....



## *Neurogastroenterology Summer School*

Contact: Dr. Michael Schemann, Technische Universitat, Munich



## *Marine Biological Lab, Woods Hole*





# The Team

- 
- Dr. Charles Horn, my Postdoctoral Mentor
  - Marc Ciucci
  - Gelsey Torres
  - Dr. Kathakali Addya

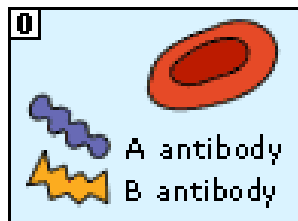
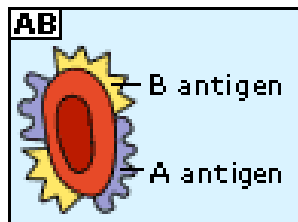
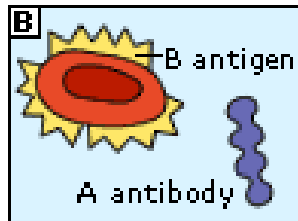
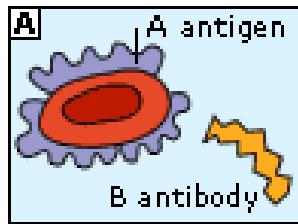


*Lot of space left for exploring the chemical space of  
intestine....*

*“Discovery consists of seeing what everybody  
has seen and thinking what nobody has  
thought.”*

*Albert Szent-Gyorgyi*

# *Food for thought.....*



**How a person with  
“A” blood group has  
“anti-B” antibody in  
plasma?**