

# Between Basic Research and Clinical Application

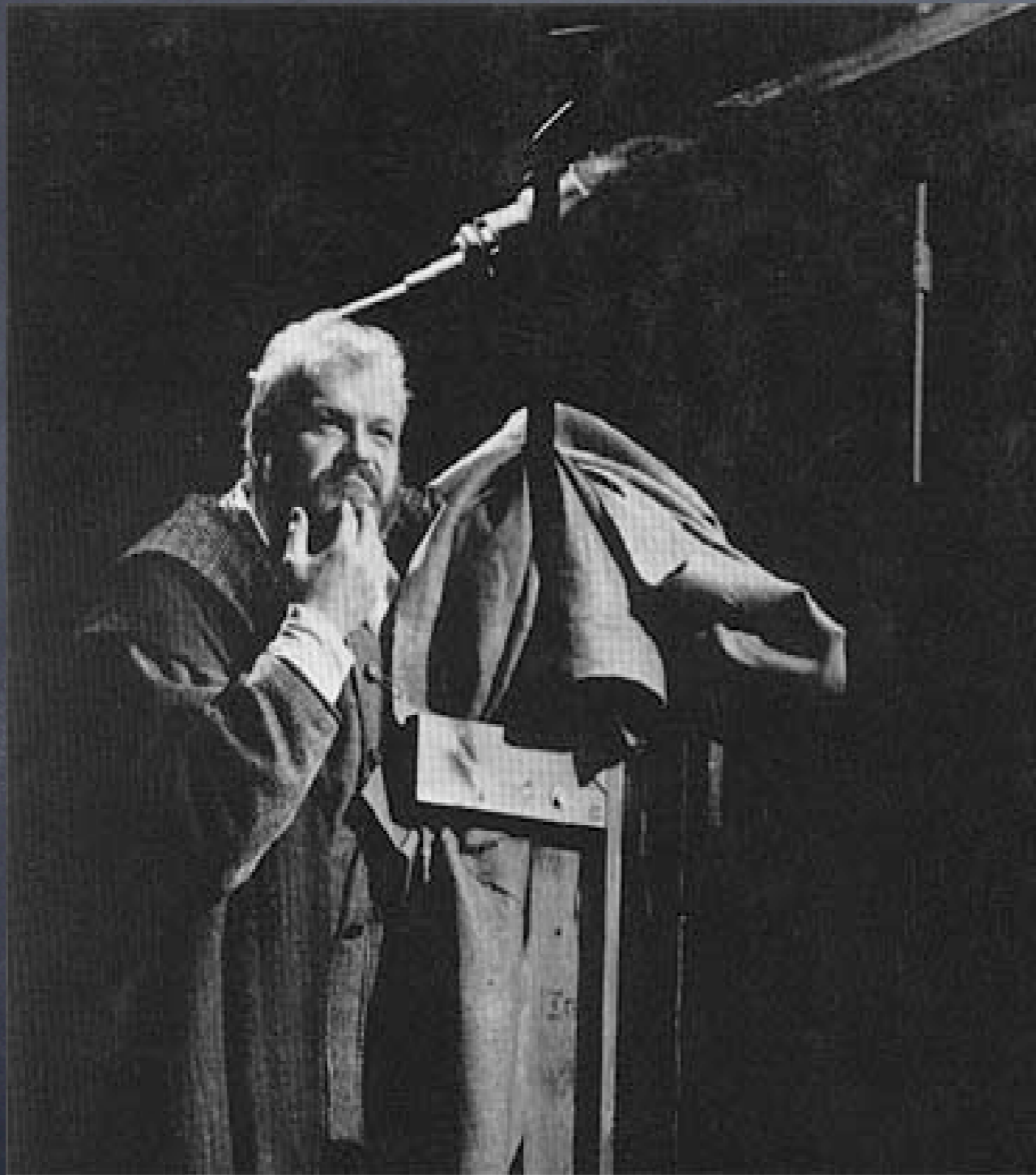
Reflections of a Scientist

Robert Rieben, Department of Clinical Research



Why do we  
need  
science?





"Ich halte dafür, dass das  
einzige Ziel der  
Wissenschaft darin  
besteht, die Mühseligkeit  
der menschlichen Existenz  
zu erleichtern"

Brecht, Leben des Galilei



The position of a PhD in  
a clinical setting



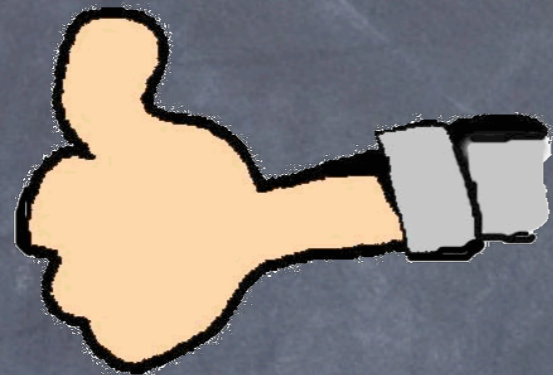


# The position of a PhD in a clinical setting

- A hinge between  
lab and clinics
- A partner of the  
physicians
- Offering science  
as "public service"



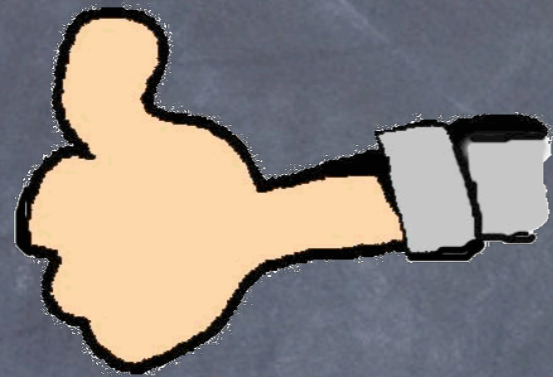
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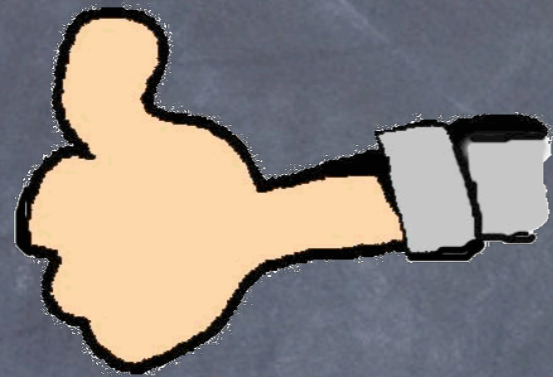
# The position of a PhD in a clinical setting



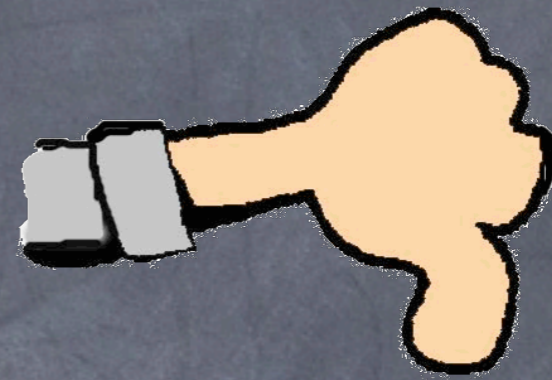
- A hinge between lab and clinics
- A partner of the physicians
- Offering science as "public service"
- The only one who's not really needed
- Short term contracts, soft money



# The position of a PhD in a clinical setting



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- A partner of the physicians
- Offering science as "public service"



- The only one who's not really needed
- Short term contracts, soft money



Career planning:

Top for MD's, Flop for PhD's?



Career planning:

Top for Clinics, Flop for Science?



# Career planning:

Top for Clinics, Flop for Science?

MD or MD-PhD

Clinical Career

- Fully developed curricula for clinical specialization
- Either scientific or clinical Postdoc abroad
- Guaranteed position for returning to CH



# Career planning:

## Top for Clinics, Flop for Science?

### MD or MD-PhD Clinical Career

- Fully developed curricula for clinical specialization
- Either scientific or clinical Postdoc abroad
- Guaranteed position for returning to CH

### PhD or MD-PhD Science Career

- Almost no career development programs
- Postdoc position (still) rather easy to get
- Difficult return to CH after Postdoc abroad
- Very few permanent positions in academic/clinical research



How to link basic research  
and clinical application?



# How to link basic research and clinical application?

■ From bedside to bench?



# How to link basic research and clinical application?

- From bedside to bench?

- From clinical problem to biochemical mechanism



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## ■ From bench to bedside?

- From model to drug



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## ■ From bench to bedside?

- From model to drug
- From gene to treatment



Quite often, clinically oriented  
'basic research' is different

Two different types of research projects:

### Mode 1

- digging deeper and deeper into one subject
- accumulation of new knowledge most important
- 'Publish (whatever) or perish'

### Mode 2

- multidisciplinary, coordinated
- exchange of information most important
- achieve defined objectives

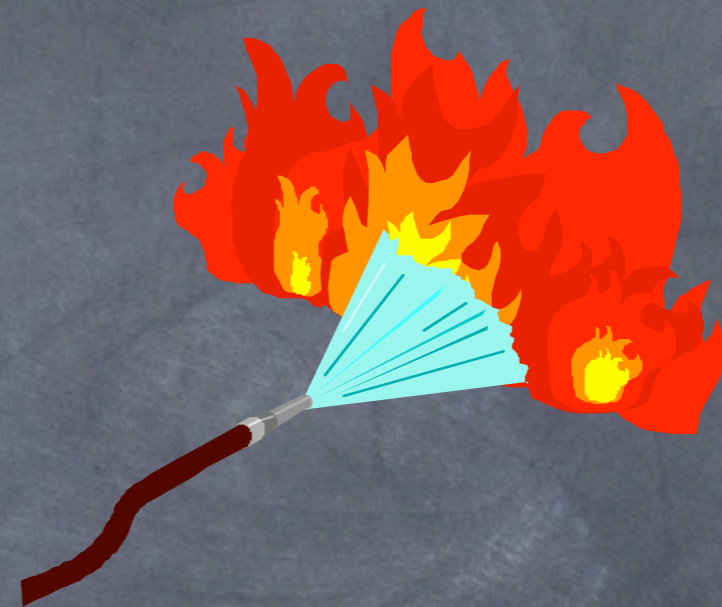


# Mode 1



Freedom of Science

# Mode 2



Science to solve  
burning problems  
of society



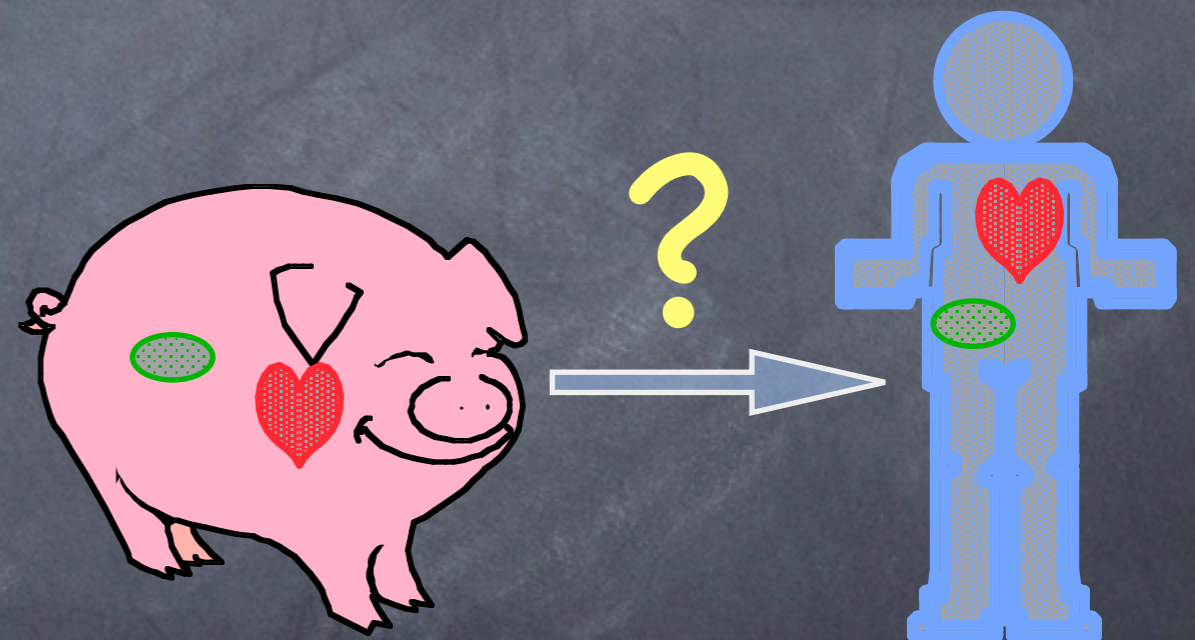
# Research on Xenotransplantation as an example of 'Mode 2'

## ■ Clinical problem:

- Too few donor organs
- Patients die on waiting list

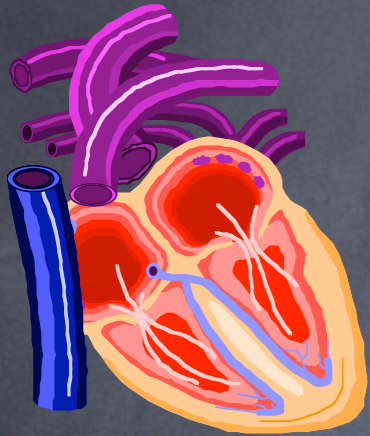
## ■ Possible solution:

- Use of pig organs as replacement parts for human patients





# Different aspects of xenotransplantation research



## Clinical application:

- whole organs
- cells



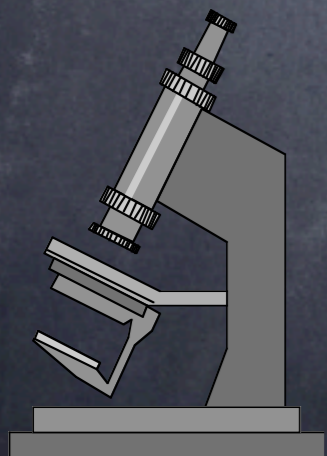
## Safety / ethics / legal aspects:

- disease transmission (retroviruses)
- public acceptance
- regulatory issues
- economical issues

## Model for rejection in allotransplantation

## Basic science:

- oncology
- immunology





# Problems on the way to clinical xenotransplantation

- Physiology:** Will it work?
- Rejection:** Will it hold?
- Safety:** Beneficial for some - dangerous for the rest?
- Acceptance:** How far should we / will they let us go?
- Regulations:** Who will be responsible for what?
- Economy:** Who will pay?



# Xenotransplantation

Strategies for the prevention of carbohydrate related (hyperacute) rejection

EU-Biotechnology Project no. PL962242





# Xenotransplantation

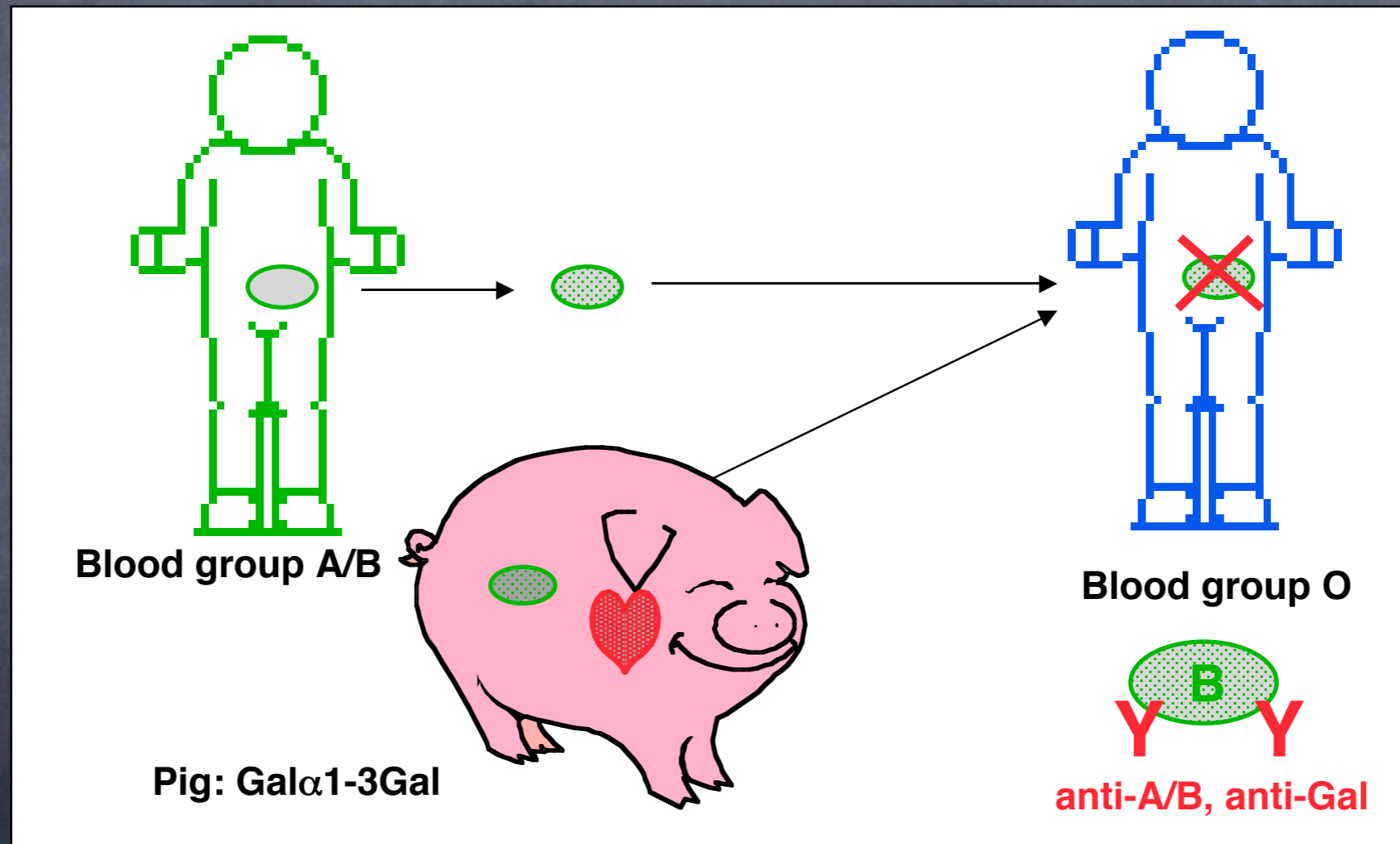
Strategies for the prevention of  
carbohydrate related (hyperacute) rejection

- Göteborg:** Kidney Tx, glycobiology, **ethics**
- Stockholm:** Islet cell Tx, carbohydrate synthesis
- Amsterdam:** Molecular biology of glycosyltransferases
- Leiden:** Complement
- Bern:** anti-CHO antibodies, immunoabsorption
- Moscow:** Carbohydrate chemistry
- Paris:** **Film maker / author**, glycosyltransferases
- Nantes:** Animal models
- Grenoble:** Molecular modeling



# From bedside zu bench...

Development of an immunoabsorption material for removal of pre-formed natural antibodies





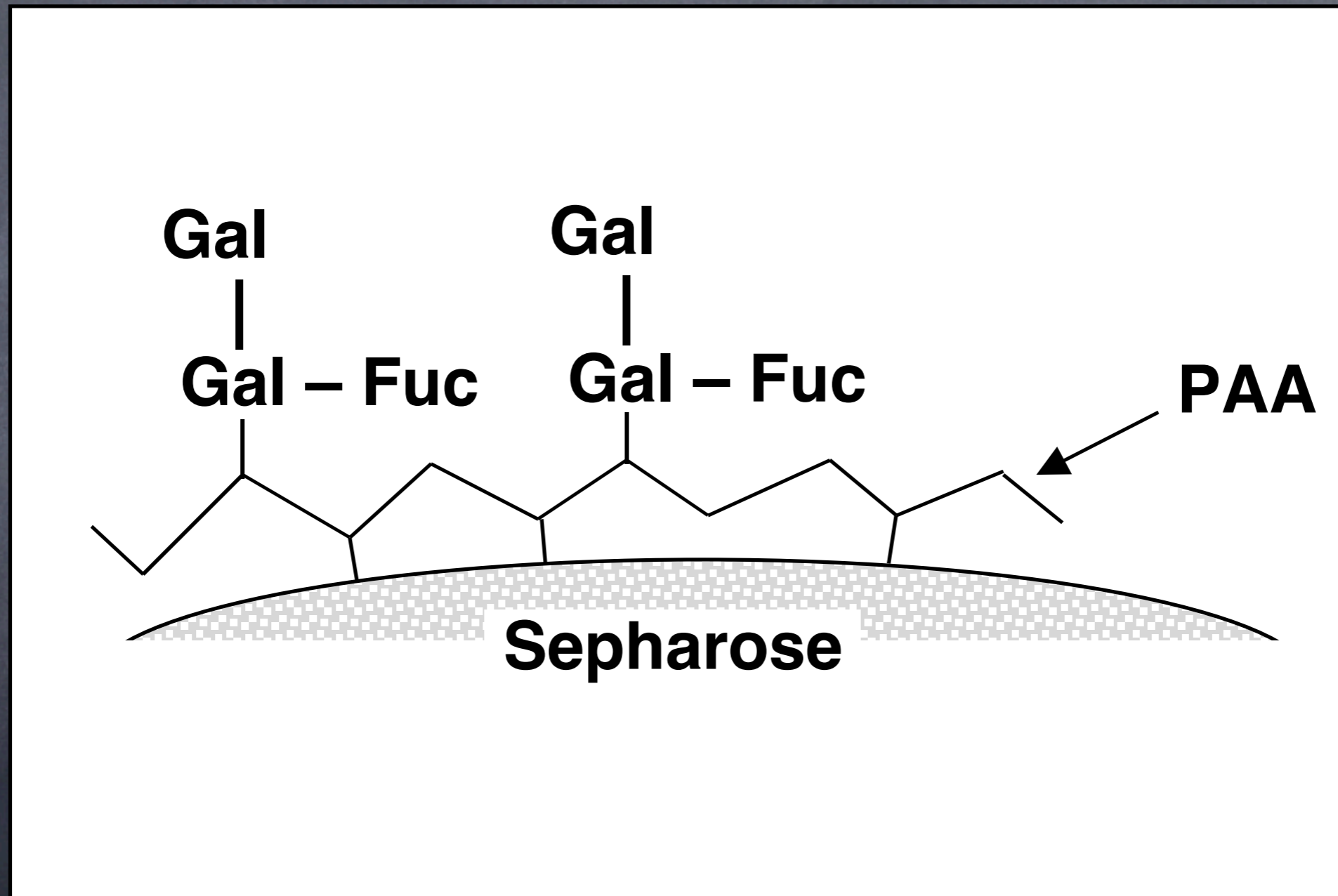
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Development of an immunoabsorption material for removal of pre-formed natural antibodies





...and back from bench to bedside:

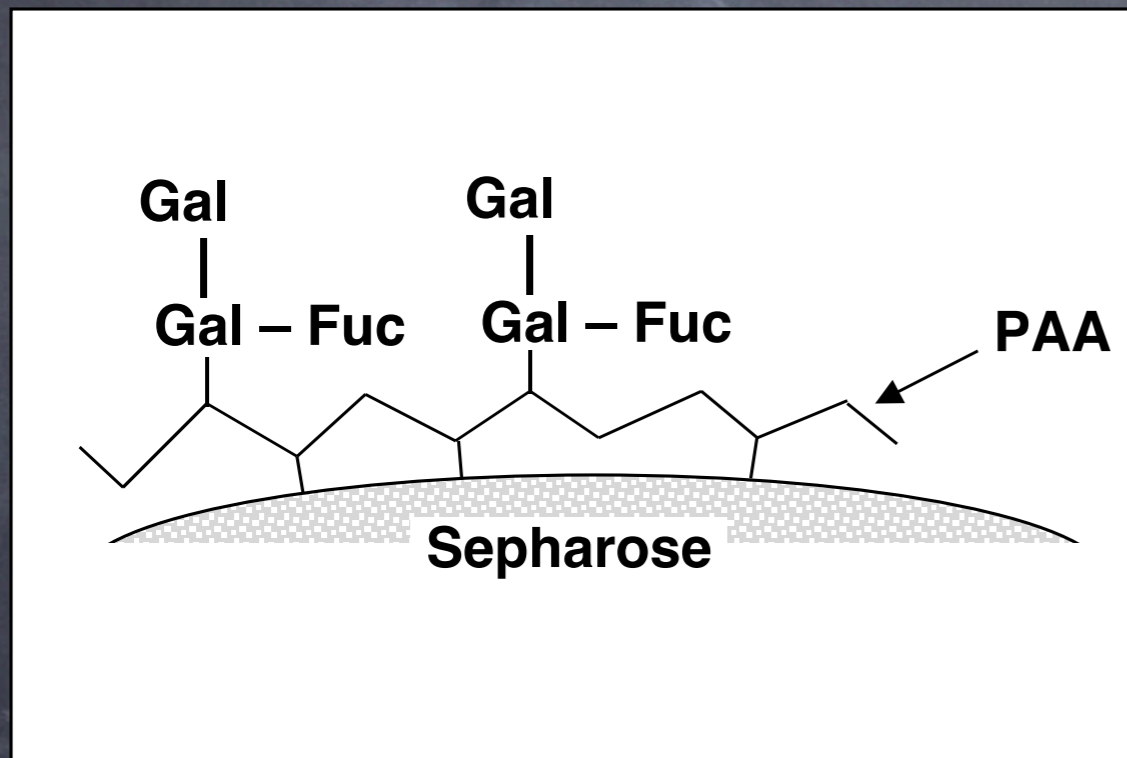
Treatment of patient after accidental B- $\rightarrow$ O heart transplantation





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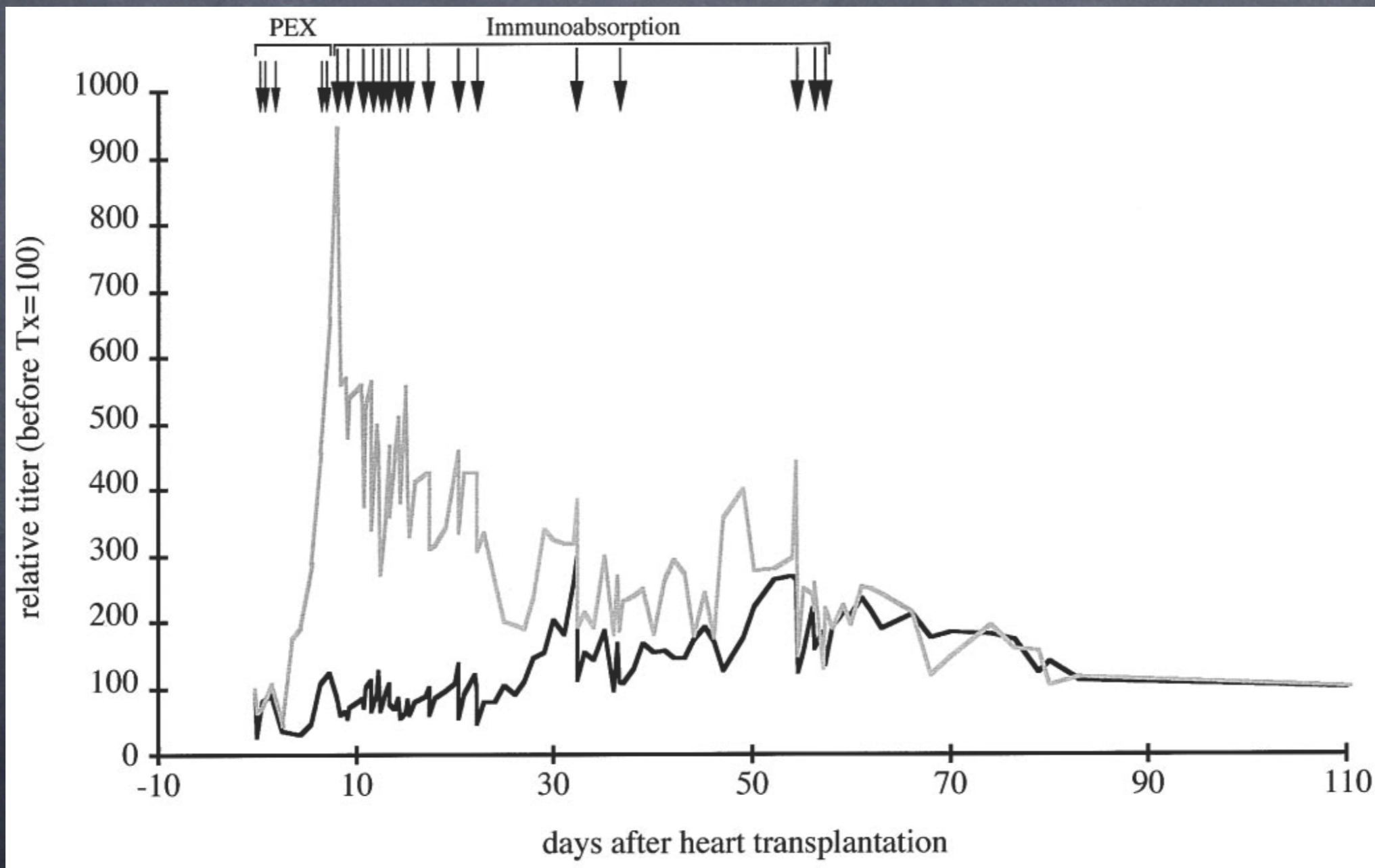
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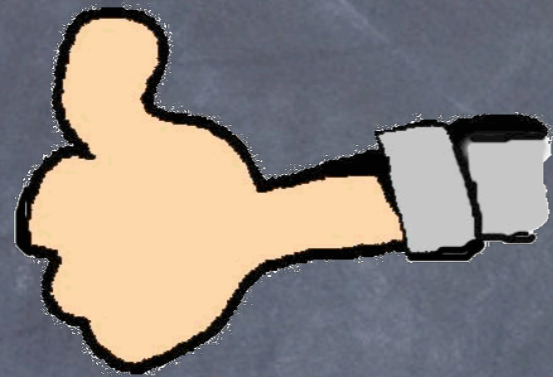
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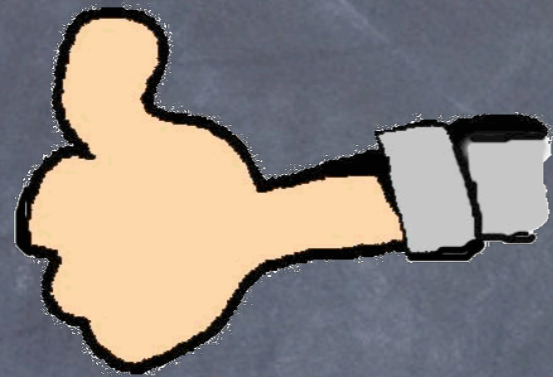
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