Genetically modified pigs for humans xenotransplantation

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OBJECTIVES

- To establish the reasons why the domestic pig is considered the most suitable species for human' xenotransplantation
- To determine the main obstacles and their solutions related with the xenotransplantation among pigs and humans
- To discuss the current xenotransplantation situation

MAIN OBSTACLES

Hyperacute rejection

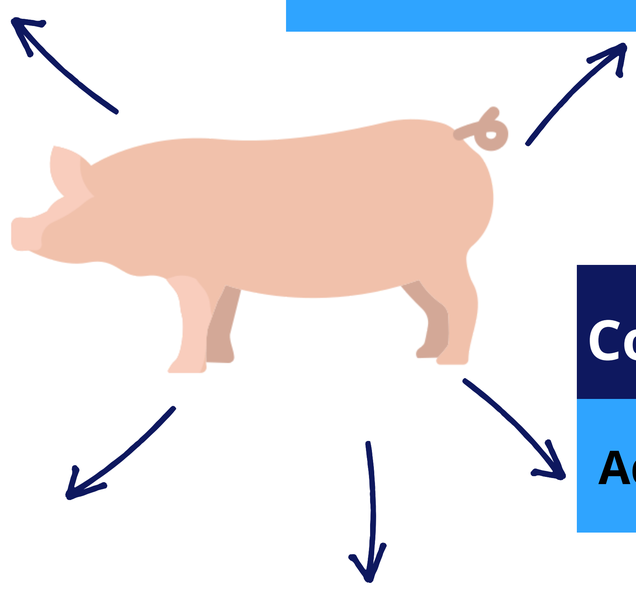
Knock out of the main antigens → αGal, Neu 5Gc, Sd(a)

Less IgG and IgM binding and complement system response

Add human complement system regulatory genes such as CD55, CD46 or CD59

Zoonotic agents

Inactive PERVs from pig genome
Add RSAD gene
House the source-pigs in pathogen-free conditions



Coagulative dysregulation

Add human thrombomodulin

Cellular rejection

Knock out of the SLA class I gene
Add HLA gene
Add human CD47 gene

Ethical, legal and social aspects

Develop xenotransplantation legislation
Educate society about the procedure
Investigate therapeutic alternatives

CONCLUSIONS

- Domestic pigs are currently considered the best species for human xenotransplantation
- The main problems of xenotransplantation are immunological and zoonotic barriers, there are also ethical, legal and social issues
- The main xenotransplantation issues can be solved by genetic engineering, pharmacologic agents or pathogen-free animals selection
- Current investigation is still performed but pig-to-human xenotransplantation will become a routine in the near future