

Allogeneic component to overcome rejection in interspecific pregnancy

Mikael Häggström¹

Introduction

Interspecific pregnancy is a pregnancy involving an embryo or fetus belonging to another species than the carrier. The embryo or fetus is called *xenogeneic* (the prefix *xeno-* denotes something from another species), and would be equivalent to a *xenograft* rather than an *allograft*, putting a higher demand on *gestational immune tolerance* in order to avoid an immune reaction toward the fetus. Methods to overcome rejection of the xenogeneic embryo or fetus include the following two:

- Intercurrently inserting an allogeneic (*allo-* denotes something from the same species) embryo into the uterus in addition to the xenogeneic one. For example, embryos of the species *Spanish Ibex* are aborted when inserted alone into the womb of a *goat*, but when introduced together with a *goat* embryo, they may develop to term.^[1]
- Covering the outer layer of a xenogeneic embryo with allogeneic cells. Such envelopment can be created by first isolating the *inner cells mass* of blastocysts of the species to be reproduced by *immunosurgery*, wherein the blastocyst is exposed to antibodies toward that species. Because only the outer layer, that is, the trophoblastic cells, are exposed to the antibodies, only these cells will be destroyed by subsequent exposure to *complement*. The remaining inner cell mass can be injected into a *blastocoele* of the recipient species to acquire its trophoblastic cells.^[2] As an example of this method, embryos of *Ryuku Mouse* (*Mus caroli*) will survive to term inside the uterus of a *house mouse* (*Mus musculus*) only if enveloped in *Mus musculus* trophoblast cells.^[3]

Both of these methods involve a xenogeneic pregnancy in addition to an allogeneic component, that is, either a separate allogeneic embryo or an allogeneic trophoblast. A general hypothesis of overcoming rejection in interspecific pregnancy is that the allogeneic component stimulates gestational immune tolerance, and that

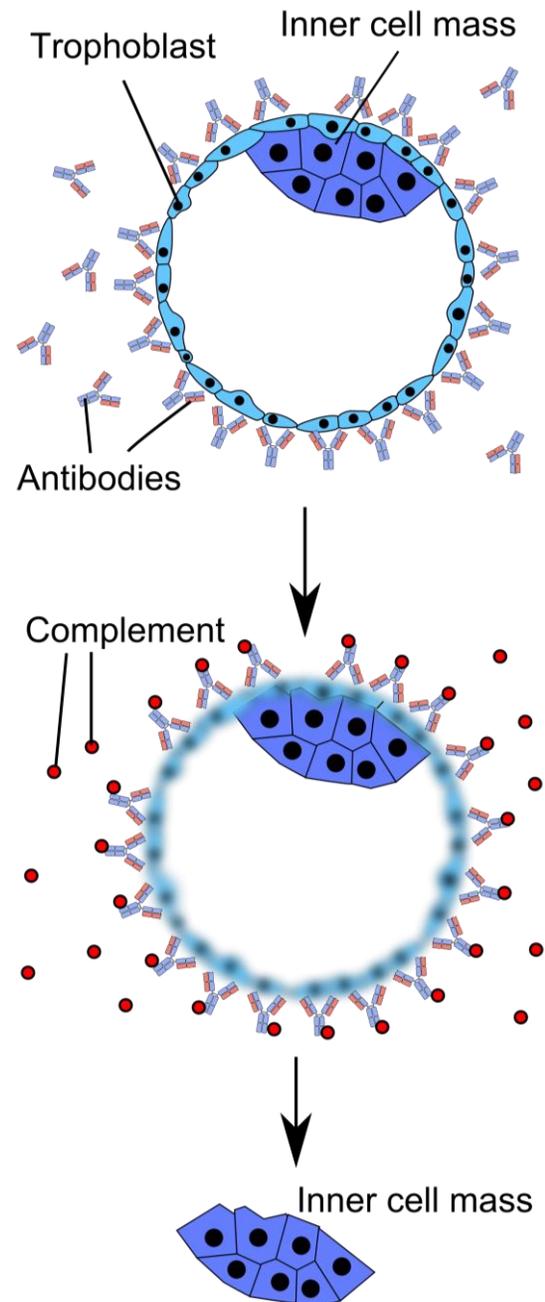


Figure 1 | Immunosurgery of a blastocyst. Antibodies are added that attach to the outermost layer of cells, in this case the trophoblast. After removing any unbound antibodies and adding complement, the trophoblast cells are destroyed, leaving only the inner cell mass.

Sundsvall Regional Hospital, Sweden

* Corresponding author: [by online form](#)

ORCID: [0000-0002-2732-7631](#)

Licensed under: [CC-0](#)

Received 26-March-2014; accepted 26-March-2014.



this stimulation confers decreased risk of rejection of the xenogeneic embryo or fetus as well. In addition, a directly physical protective effect of an allogeneic trophoblast is also likely. Still, more mechanisms may be involved, and different mechanisms may predominate in different species.

Acknowledgements

Conflict of Interest: none declared.

References

1. Fernández-Arias, A.; Alabart, J. L.; Folch, J.; Beckers, J. F. (1999). "Interspecies pregnancy of Spanish ibex (*Capra pyrenaica*) fetus in domestic goat (*Capra hircus*) recipients induces abnormally high plasmatic levels of pregnancy-associated glycoprotein". *Theriogenology* 51 (8): 1419–1430. doi:10.1016/S0093-691X(99)00086-2. PMID 10729070.
2. Zheng, Y.; Jiang, M.; Ouyang, Y.; Sun, Q.; Chen, D. (2005). "Production of mouse by inter-strain inner cell mass replacement". *Zygote* (Cambridge, England) 13 (1): 73–77. doi:10.1017/S0967199405003035. PMID 15984165.
3. Clark DA, Croy BA, Rossant J, Chaouat G (July 1986). "Immune presensitization and local intrauterine defenses as determinants of success or failure of murine interspecies pregnancies". *J. Reprod. Fertil.* 77 (2): 633–43. doi:10.1530/jrf.0.0770633. PMID 3488398.