

Animal to Human Organ Transplants – Xenotransplantation

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Editorial

The transfer of live cells, tissues, or organs from one species to another is known as xenotransplantation or heterologous transplantation. Xenografts or xenotransplants are cells, tissues, or organs that have been taken from someone else. It is distinguished from allotransplantation (grafts transplanted between two genetically identical individuals of the same species), syngeneic transplantation or isograft transplantation (grafts transplanted between two genetically identical individuals of the same species) and autotransplantation (grafts transplanted between two genetically identical individuals of the same species) (from one part of the body to another in the same person). Xenotransplantation of human tumour cells into immunocompromised mice is a common pre-clinical cancer research procedure.

The grafting of cells, tissues, or organs from non-human animal species into humans is now defined as xenotransplantation (although technically it can be the other way round or between any two species). It's clear that this is a topic that has piqued people's interest for a long time, since examples of this type of organ grafting can be found in the mythology of many religions. Perhaps the most well-known is the grafting of an elephant's head onto the body of a little boy who later became Ganesha, the famed Hindu deity. The excitement appears to have reached a fever pitch, with enormous stakes for all parties involved, including patients, scientists, the biotechnology sector and infectious disease specialists. We appear to be on the verge of clinical success, but supporters on opposing sides of the debate disagree on whether or not large-scale clinical trials of vascularized complete organs are ready. In

this talk, I'll try to convey the key aspects that have led us to this point, where we have a divide between "those who want it done correctly" and "those who want it done immediately."

In 1905, the first major attempts at xenotransplantation (then known as heterotransplantation) were published in the scientific literature, when rabbit kidney slices were transplanted into a youngster with chronic kidney disease. Several further attempts to employ organs from lambs, pigs and primates were documented in the first two decades of the twentieth century. Any procedure that involves the transplantation, implantation, or infusion into a human recipient of either live nonhuman animal cells, tissues, or organs, or human body fluids, cells, tissues, or organs that have had ex vivo contact with live nonhuman animal cells, tissues, or organs, is referred to as xenotransplantation. The demand for human organs for clinical transplantation significantly outnumbers the availability, which has fueled the development of xenotransplantation.

Currently, 10 individuals perish every day in the United States while waiting for life-saving organ transplants. Furthermore, recent research suggests that cell and tissue transplantation may be beneficial for specific conditions, such as neurodegenerative disorders and diabetes, where human resources are typically unavailable. Despite the potential benefits, the use of xenotransplantation raises concerns about the potential infection of recipients with both identified and unknown infectious pathogens, as well as probable transmission to close contacts and the wider human population. Cross-species infection by retroviruses, which can stay latent and cause illness years after infection, is a public health problem. Furthermore, novel infectious pathogens may be difficult to detect using present methods.

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