

## Concluding Remarks

By *Kerstin Olsson*

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The present symposium has underlined that xenotransplantation is a true interdisciplinary subject. It involves disciplines such as basic and applied molecular biology, immunology, physiology, virology and surgery as well as ethics and human and animal welfare. During the symposium xenotransplantation was also put into perspective in relation to allotransplantation as well as stem cell technology. The speakers at this symposium gave us an excellent update on all these fields.

What did we learn? It is important to realize that xenotransplantation is already here. Foetal porcine cells, for example, have been implanted into human beings in some clinical trials. Experimental organ transplantation from one animal species to another is presently ongoing. The results show that xenotransplantation may be possible, but that there are many hurdles to overcome.

We understand from genomic research that animals share almost the same gene sequences. Yet, we know from long experience that it is impossible to get fertile offspring after crossing the species barriers. Why are the species barriers so strong? This fact deserves due consideration. It is probably not only immunological barriers that are difficult to overcome, but also physiological and other differences have to be dealt with. Several speakers pointed this out.

A further important aspect enlightened by the speakers was the psychological consequences. Part of the psychological problems, which may occur, is the thought of carrying animal cells, tissues or organs within one's own body, or that

such cells are active within the body of another human being. In this aspect it is fortunate that the whole matter of bringing xenotransplantation into the clinic will take time. We need time to get used to this idea, if we at all should get used to it. Another psychological issue is the danger of spreading diseases to our fellow man, and this also involves the greatest biological problem. Both the recipients of animal tissue and their next of kin may acquire a partly unknown susceptibility to pig retroviruses and other diseases normally affecting pigs only.

The problem of keeping a high standard of animal welfare is not easy considering that the animal's immune system, and possibly also the physiological systems, have to be "humanized". What will such genetic modifications mean for the welfare of the pig? Furthermore, the risk of spreading diseases means that preventive measures have to be enforced, which imply severe restrictions on "natural living conditions" for the source animals.

Both speakers and listeners interacted actively and productively across the disciplinary borders making this a very successful symposium. Taken all aspects together, I feel that participants of the meeting agreed that increasing people's willingness to donate their organs after death has the highest priority. Secondly, great hope was given to development of the stem cell technology as an alternative to xenotransplantation. However, continued research on both xenotransplantation and stem cell technology was highly recommended.

The goal to increase the access of cells, tissues

and organs for patients in need is highly relevant and desirable. However, if the goal is not reached all the knowledge and experiences learnt on the way may certainly be worth the efforts, as so well put by the Swedish poet Karin Boye:

*Nog finns det mål och mening i vår färd –  
men det är vägen, som är mödan värd.  
(Cited from the poem "I rörelse" in  
"Härdarna", Albert Bonniers förlag,  
Stockholm, 1927).*

Freely translated she says: There are destinations and goals to reach on our journey, however, it is the road we choose along the way, which makes it worth the effort.

On behalf of all the participants it is my pleasure to thank professor Wenche Farstad and her team at NKVet for a most successfully accomplished meeting.