Researchers take a step forward in transplanting pig cells to regenerate human cartilage

February 22 2012

Researchers from the Bellvitge Biomedical Research Institute (IDIBELL) have studied for the first time the response of human NK cells (Natural Killer) against porcine chondrocytes (cartilage cells).

The results of the research, published in The *Journal of Immunology*, indicate that these cells, characteristic of the innate immune system, play an important role in the rejection of xenotransplantation (transplantation from another species) of porcine chondrocytes.

NK cells

Together with neutrophils and macrophages, NK cells are part of the first line of cellular defence and they are involved in not-acquired immune response, that is the innate response. NK cells are responsible for identifying specific cell types (tumour, infection or foreign to the body) and destroying them by toxicity.

The number of NK cells is a minority, but their importance is increasing in the field of transplantation, according to the study's lead author, Cristina Costa, "we see that innate immunity plays an important role in regulating acquired immunity, which is critical for the rejection of transplanted organs".

Xenotransplantation

The Costa team's goal is achieving porcine chondrocytes transplantation in humans to repair cartilage injuries. The group have studied "in vitro" the response of human NK cells in the presence of pig cells. They noted that under conditions of transplant, high presence of antibodies and cytokines, human NK cells make a cytotoxic response and they lyse (destroy) foreign cells, in this case the chondrocytes.

"In this work we have characterized several molecules involved in the processes of adhesion and cytotoxicity of NK cells," explained the researcher, who believes that this work opens the way on how to continue the investigation "on one hand we have to fight the deposition of antibodies that is a critical factor in increasing the toxicity and on the other we must work to reduce cell adhesion by modifying any of the molecules we have involved."

The next step for clinical application of cartilage xenotransplantation proposed by Costa would be "the genetic modification of porcine chondrocytes, so that human NK cells don't recognize them as foreigners, thus avoiding rejection."

Transplantation of cartilage

Cartilage transplantation between humans is not been widely applied in the clinic but it has been successful in the regeneration of this tissue in traumatic injuries, especially in athletes. Autologous transplants are performed with cells from the same person and allogenic ones, with cells from another person.

"In both cases," says Costa, "the limitation is the amount of cells available. If we can get cartilage xenotransplantation it would increase the amount and quality of the cells available for transplantation." In the future, according to the researcher, "maybe we could apply the

xenotransplantation of pig chondrocytes on osteoarthritis patients or even with rheumatoid arthritis" but, warns Costa, "in these cases there are other combined inflammatory and immune processes hindering the outcome of the transplantation."

Provided by IDIBELL-Bellvitge Biomedical Research Institute