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PhD Research Activities

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Bioartificial kidney
Preclinical safety evaluation

WP2

My PhD project is part of Work Package 2 of the BIOART project which concerns the development of a bioartificial kidney device for more efficient removal of uremic toxins in patients affected by end-stage renal disease (ESRD). To this end, conditionally immortalized proximal tubule epithelial cells (ciPTEC) are going to be used in combination with the membrane that will be able to support the cells.

Main goal

The main goal of my project is to **assess the safety aspects of the device, especially regarding the cellular component**. So, the immune response, that is the allogeneic response to the cells used in the device, as well as transmission of oncogenes are tasks of high importance. Since MHC molecules are highly variable and represent the most important alloantigens (able to induce both cell-mediated and humoral immune response), it is crucial to check their expression in ciPTEC cells.

Research carried out so far and upcoming experiments

First of all, the four ciPTEC cell lines (obtained from kidney tissue and urine) were genotyped for HLA, because HLA matching is very important for allogeneic transplantation.

Beside that, I have been also assessing the cell surface expression of HLA-I in ciPTEC in normal conditions and in the presence of HLA-I inducers (IFN-γ, LPS) and some uremic toxins.

The obtained results show that cells can respond with increased expression of HLA-I, also in the presence of uremic toxins, which suggest that they can exert an immune accessory role. Therefore, it is necessary to continue assessing the expression of HLA-I in different conditions, as well as HLA release to understand better the immunogenicity of ciPTEC cells.

Impact of my work

Hopefully with further work we will get there and obtain the device that will be functional and safe as much as possible, that will considerably improve currently available treatments for ESRD and most importantly improve the life quality of the patients.