Stem and progenitor cells in preterm infants : role in the pathogenesis and potential for therapy

Valorisation: Biosafety of umbilical cord-derived mesenchymal stromal cells (MSCs)

The study reported in chapter 5 concerns the biosafety of stem cells, specifically MSCs isolated from the umbilical cord, to be used in cell therapy in the setting of neonatal medicine.

RELEVANCE. The umbilical cord is a promising source of MSCs, but studies on the genetic stability of umbilical cord-derived MSCs were lacking. In a historical moment in which stem cells occupy a substantial part of the medical news in the media, it seems important to accurately study the potential risks associated with a specific cell therapy.

TARGET GROUPS. MSCs are polyvalent cells with different behaviors in different environments, and could be suitable for treating a series of diseases affecting all ages, from the neonatal age to adulthood, ranging from graft versus host disease in bone marrow transplant recipients, to inflammatory bowel diseases, neuroinflammatory diseases, and diseases of the preterm infant. All the people (patients) that could benefit from therapies with MSCs may be interested in our results.

ACTIVITIES/PRODUCTS. In the context of cell factories, specialized laboratories dedicated to the production of cell products destined to clinical use, the identification of genomic imbalances through array-comparative genomic hybridization should become a routine procedure for every lot of MSCs, in order to exclude from clinical use the lots with cells carrying imbalances.

INNOVATION. Similar studies had been carried out for other stem/progenitor cell populations, but not for umbilical cord-derived MSCs. Our study adds this important information regarding a cell population isolated from the umbilical cord, a promising source given its availability and the few ethical issues related to its collection.

SCHEDULE/IMPLEMENTATION. In the setting of neonatal medicine, one experimental work suggests that umbilical cord-derived MSCs may mitigate the phe-

notype of experimental BPD. If these results will be confirmed and umbilical cord-derived MSCs will be object of a clinical trial in preterm newborn infants, routine screening for genomic imbalances of the lots to be used in trials will be performed before the cell products are administered to the patients.