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Vitrification and ultra-rapid laser warming

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Vitrification is now a main route to the cryopreservation of human and animal oocytes and implantation of embryos. It is strongly believed that for success, the cells must be placed in very high concentrations of permeating cryoprotective solutes and must be cooled extremely rapidly. These facts may limit the applications of vitrification to CPA-sensitive cell types. In our research group we have shown that several of these beliefs are incorrect. Our new research suggest that the key to vitrification survival does not rely only in achieving a fast cooling rate but in achieving a fast warming rate that prevents the recrystallization of the vitrified water inside of the cell. Mouse oocytes and embryos survive being cooled slowly even in diluted solutions provided that they are warmed ultra-rapidly by a laser pulse. Research carried out in Mazur's lab stated that not only vitrification is possible without high concentration of solutes; it is possible without permeating solutes because the degree of vitrification success seems to be in the prior dehydration of the cell not in the amount of permeating solute equilibrated, provided that the cells are being warmed at an ultra-rapid rate to avoid recrystallization. This new point of view about vitrification will potentially widespread its use to a wide amount of cells, even those which were very sensitive to the high concentration of solutes used in the past.

Biography

E Paredes holds a degree in Ciencias del Mar (2008) at Universidade de Vigo-Spain with a specialization in Marine environment conservation and marine pollution. She obtained her PhD in 2014 at the Universidade de Vigo with the thesis entitled "Cryopreservation of marine invertebrate early life stages: Applications in marine water quality assessment and aquaculture" work which was awarded by Universidade de Vigo as outstanding Thesis 2014. She spent some time working in several international research centers during her doctoral studies and currently holds a Postdoctoral research associate position in Dr. Peter Mazur's lab at the University of Tennessee-Knoxville working on Vitrification.

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