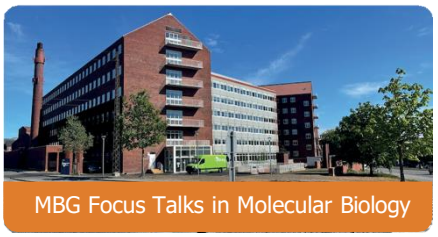
MBG FOCUS TALK

Hosted by Tinna V. Stevnsner



Tuesday 17 September 2024 @ 09:00-09:45
Faculty Club (1870-816)

Vera van der Weijden

Max Planck Institute for Molecular Genetics

Berlin, DE

Embryonic diapause: the reproductive secret to paused pluripotency

Embryonic diapause is a reproductive strategy employed by over 130 mammalian species. During embryonic diapause, the preimplantation blastocyst pauses reversibly. The European roe deer is a diapausing species with pregnancy rates as high as 92%. To dissect the maternally dictated uterine cell-type specific regulation of developmental pace, I used laser capture microdissection and combined this with embryonic transcriptional changes, and proteomics and amino acid quantifications in the uterine fluid. The absence of mTOR activating amino acids in the uterine fluid controls developmental pace, highlighting a contribution of mTOR to reproductive success. Developmental pausing can also be induced in vitro in embryonic stem cells and mouse embryos through chemical inhibition of the growth regulator mTOR. The embryo shows cell-type specific adaptations to the dormant state and embryos in diapause are maintained by using lipids as primary energy source. Supplementing in vitro paused embryos with the metabolite L-carnitine, balances lipid consumption, puts the embryos in deeper dormancy and boosts embryo longevity. Through meta-analyses of dormant cell signatures, I identified FOXO1 as an essential regulator of the energy balance in dormant embryos and propose that it may be a common regulator of dormancy across adult tissues. Embryonic diapause thus holds great potential to improve our understanding of fertility and adult stem cell dormancy.

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