Comparative development of embryos and placenta in mammals: how to choose the right biomedical model

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BRIDGING THE GAP BETWEEN BASIC AND CLINICAL RESEARCH

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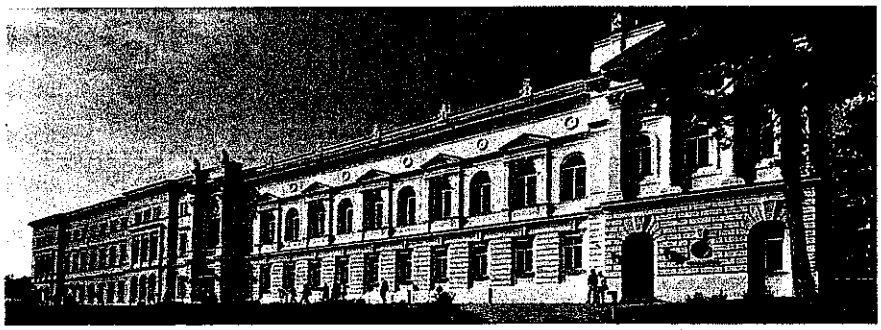

PROGRAMME AND ABSTRACTS

Comparative development of embryos and placenta in mammals: how to choose the right biomedical model

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Most research on embryo development and subsequent pregnancy is performed in rodent models. There is considerable evidence, however, that the mice is not always appropriate to mimic human development. For example, the major embryonic genome activation takes place at the 2 cell stage (about 30-32 hours post-conception) in mice whereas it takes place later and after several cell cycles in humans and domestic species. Major differences in embryo metabolism and the apposition of epigenetic marks have also been demonstrated. In terms of placental development, the inverted yolk sack placenta of the mice, that is present in the first half of pregnancy, is unique to mammalians. In humans, the placenta remains hypoxic in early development until the opening of the vascular plugs of the spiral arteries allow the onset of placental perfusion at the end of the first trimester. Perturbations of this phenomenon induce the human specific pregnancy diseases, pre-eclampsia and vascular induced intra-uterine growth retardation. Finally, the timing of organ development varies between species. Thus, the choice of an appropriate model for the study of healthy and sick pregnancy in humans remains a conundrum, but the use of alternate animal models such as rabbits, pigs or ruminants may provide useful alternatives to rodents.