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Biotechnology of reproduction in the canine species: where do we go?

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ABSTRACT

***Background*:** In most species significant advancement in biotechnology of reproduction have occurred over the last 30 to 40 years. Bovine reproduction has known a development similar or significantly larger than human reproduction with nowadays the routine use of semen or embryos in vitro technologies including IVF, IVM, ICSI as well as transgenesis, cloning, or the most advanced proteomic and genomic developments. In the canine although semen technologies have known a similar development as in other species, only a few significant progresses have been published in terms of oocytes and embryos. A basic, in other species, technology like embryo transfer, is still unfortunately not yet available.

***Review*:** If the dog is nowadays considered as a significant model for human diseases , environmental toxicology including endocrine disruptors, or genetic evaluation, the funding of research to allow a better understanding of its reproductive biology as well as improvement of the in vitro efficiency have been limited. Oocytes and embryo developments are essentially limited to in vivo while in vitro technologies have up to now failed to provide the resources needed to allow for a significant commercial development of artificial reproduction and all the associated benefits for the canine species or as a comparative model. Besides the recent successes related to dog cloning, unfortunately limited by exclusive rights and licensing agreement limiting the overall extension of NT in the species, only one aborted pregnancy using in vitro fertilized oocytes has up to now been presented almost 10 years ago. The limiting factors to the penetration of these technologies in dogs are among others limited knowledge of basic physiology, poor availabilities of tissues (oocytes or ovaries) , specific biology of oocytes maturation, ovulation and development, limited treatment and therapeutic approaches, costs of the procedures and limited fund's availability while fighting against the lobby of animal protectionism and spay and neuter campaigns developed to control the pet overpopulation problem present worldwide. However, despite all these constraints and limiting factors, on a limited scientific basis or with commercial objectives, progresses are made and presented every year associated with hope and expectative: genetic identification of diseases, sexing technologies or stem cells initiatives are encouraging.

***Conclusions*:** The specificities of dog reproductive anatomy, physiology and biology require numerous adaptations to the other species worldwide developed technologies. Most techniques are either poorly efficient or rendered unavailable by commercial regulations and licensing restrictions preventing their development to occur. However, the significant interest for the dog as companion animals as well as the advantages associated with this large animal model for human diseases or as a model for the protection of endangered species of carnivores should be associated during the coming 5 or 10 years with a marked development of the most advanced procedures like in human or bovine and lead to significant progress in canine reproductive biotechnologies.

Keywords: canine, assisted reproduction, biotechnology, biology, development, embryos, ET, cloning.

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