

## Using Animals to Develop Assisted Human Reproduction

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### ABSTRACT

**Background:** There is no denying the importance of animal experimentation in the development of biological sciences, the importance due to the extraordinary benefits for human and animal health. Without the use of laboratory animals in experiments, it would be impossible to achieve the knowledge gained in the last two centuries. Hippocrates (450 BC) has related the appearance of ill human organs patients with those of animals, with clear didactic purpose. It was also through the use of animals that human reproduction has advanced in scientific terms in recent decades.

**Review:** Bioassays with mouse embryos have been used as a means of controlling water quality, culture media, solutions, materials and standardization of techniques and training in assisted reproduction techniques. Most of these bioassays use embryos in early stages of development and evaluate development to the blastocyst stage. Changes in substrate utilization follow similar patterns in mice and humans. This similarity in metabolic parameters between the two species has facilitated the use of mice as a model for studying the formulation of culture media for use in different stages of preimplantation period, from fertilization to the blastocyst stage. There are aspects of the physiology of both species that still require more studies, such as the requirement of inorganic phosphate in the culture medium, the specific requirement of amino acids for optimal development before and after compaction, and the importance of including EDTA in the culture medium. The evaluation of chemically defined media for the generation of viable cleaved embryos is of fundamental importance. Several cryopreservation studies have been performed with gametes and embryos from cattle and pigs, because such species have greater difficulty in survival after cryopreservation compared to the same cell types in the mouse and in humans, due to the increased amount of lipids they have in their constitution. That is, if the cryopreservation protocol under test meets the requirements for cryopreservation of bovine and swine oocytes and embryos, it will bring great benefits to the cryopreservation of such cells in humans. More than 50 years ago, Parrot (1960) showed that frozen ovarian fragments can restore fertility in mice when re-implanted. Such study was later extended to other species: rats (Aubard *et al.*), rabbits and sheep (Gosden *et al.*, Baird, Almodin *et al.*). The latter model is more relevant to human physiology because sheep, as well as women, are single ovulators. In addition, ovaries from sheep ovaries resemble humans in terms of size and tissue composition. Thus, cryopreservation of ovarian tissue was consolidated after experiments in sheep.

**Conclusion:** Presently not only are animals used in experimentation on human reproduction, but are also used as quality control in human IVF laboratories. Quality control is no longer just a necessity to minimize possible flaws in the process, but a requirement. However, it is very important to stress that it should only be carried out under absolutely defined conditions, with complete safety, ethical rigor and respect for the animals used. Moreover, it is scientifically proven that the genetic quality, the standard of health and the environment affect the animal's behavior, thus modifying experimental results. It is therefore important to outline the "big picture" of animal experimentation, in terms of objectives, types of procedures and numbers of animals and procedures involved.

**Keywords:** assisted reproduction, bioassays, human IVF, animal experimentation, fertility.

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