



An outline of In vitro fertilization (IVF) on animals

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Abstract

Considerable researches and experiments of IVF on animals are performed which achieve effectively success in acquiring all the advantages of IVF. The technology is very advantageous and unique because this technique is performed on animals having low reproductive rate, sterility, and also to obtain young ones of endangered animal species. There are many benefits of IVF and also some disadvantages like cost effective for equipment's availability, to maintain proper environmental conditions and good infrastructure, and some other also. In this information a concept of IVF technique, its utilities, procedure on animals are explained, and its benefits and disadvantages are discussed.

Keywords: - IVF, OVULATION, FERTILISATION, OPU PROCESS, OOCYTE, EMBRYO.

Introduction

In vitro fertilization (IVF) technology is very beneficial and useful because this technique is performed on animals having low reproductive rate, sterility, and also to obtain young ones of endangered animal species, moreover by these practices various mechanisms of fertilization can be studied, gaining knowledge in this aspect. Most of the time IVF is practiced on mice in the lab.

IVF is performed on different animals in laboratory by sperm and oocytes co-culturing. Ovulation rate is increased to super state of female animals by induction of hormonal injections. After this the collected oocytes are fused or fertilized by co-culturing with sperm in vitro under suitable conditions. Next the offsprings are obtained by embryo transfer into the genital tracts of pregnant female animals after embryo culture for developing them into later developmental stages. Embryo transfer is the last part of IVF technique. Fertility medications used for stimulation for releasing eggs.

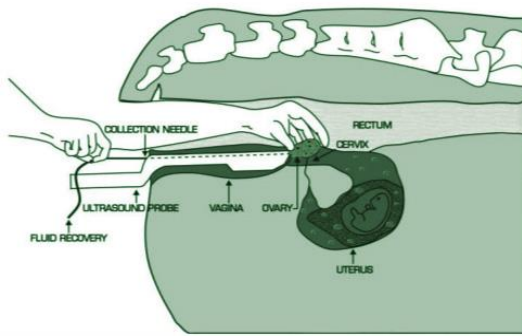
Some instances such as scientists are successful in creating two embryos of extinct Rhino species for saving the species, from then the scientists used to follow common IVF technique which is called as intracytoplasmic sperm injection, or ICSI to fertilize the eggs. For the first time by IVF technology puppies has been born from where a report is made that it has application not only in veterinary medicine but also for genetic researches in human. At Cornell university, New York Scientists transferred 19 embryos to a female 'host' resulting into seven live births. An emergence

of IVF in animals and humans incorporate an extraordinary change in the environment where the rise of new organism occurs. In the mammal's fertilization occurs in the maternal oviduct where there are some unique considerations for guaranteeing the gametes encounter and the first stages of embryo development.

How IVF is performed?

For most of the IVF programs, the donor female doesn't always needed treatments of superovulation nor synchronize their ovulation. By OPU or ovum pick up process the oocytes are collected by experienced veterinarian. During this process veterinarian uses a vacuum pressured needle, which is passed transvaginal, for puncturing anal follicles which is present on the ovary. The follicular fluid and oocyte will then be extracted by the needle which is then delivered to holding vial. After finishing of OPU process the oocytes are kept for incubation and then transferred it to the laboratory. Within 30–40-day interval up to 3 OPU per female can be performed. This means that more number of embryos may be collected from female and enables them for calving every 12 months. In the laboratory the oocytes will be matured by a process called 'in vitro maturation' or IVM. After maturation with the breeder's preference the oocytes are fertilized with semen. Then the oocytes are cultured for more 6 days, for which they can reach the development to a proper embryo stage that will be favorable for transfer into the recipients. The embryos are marked with gradation so that only the favorable better-quality embryos are transformed into recipients. For synchronizing of ovulation, the recipient cows are generally treated previously for assuring that they are present at correct stage in their cycle for receiving the embryos. Embryo possibly can be preserved by freezing, pregnancy rates may be low variably in frozen state or may be low in IVF embryos.

Transvaginal Oocyte Recovery



Benefits of IVF in animals

- Use of IVF for offspring production from elite animals those who are sterile or non-productive in traditional methods. The reasons may be abnormal or damaged reproductive tracts, poor response to stimulation or idiopathic reasons.
- Elite animals can be used repeatedly as egg donors and the produced embryos are transferred into less valuable species of animals, which produce offspring having favorable genetics. In case of unexpected date of valuable animal, there eggs can be survived and rescued from their ovaries and the resultant embryos may be delivered into the recipients.
- Typically, the oocytes of the donor can be extended on a two-week cycle whereas most of the embryo transfer or ET programs are operated on 60 days of cycle. This permits for premium livestock propagation.
- From wide donor varieties eggs can be extended, like pre-pubertal and juvenile heifers transferred to the recipients. The pregnant animals which are on upto 100 days of gestation can also be utilized as donors with outstanding success rates and forming no harm to the calf which is on developing phase.
- When fertilization occurs in microscopic environment, less no. of semen then will be required for fertilizing the same number of eggs. This is highly advantageous when a rare, expensive semen sample is applied.
- Increasing more evidences that supporting moves away from administering expensive super-ovulatory drugs, as maturation successfully be practiced in vitro. Therefore, donor animals are not released to any hazardous side effects for these hormones.

Disadvantages of IVF in animals

Along with benefits there are some disadvantages of IVF among which the leading one is this method is much cost effective. The IVF process requires skilled knowledgeable labor's, a we controlled environment of laboratory and expensive apparatus or equipment's. Pregnancy and fertilization rates are not much high as natural process or artificial insemination. The embryos which are frozen have even lowered chance of survival, poor oocytes recovery per ovary is

another major thing in IVF procedures, fertilization rate is also low which appears to be the cause of sperm inability to penetrate the zona pellucida invitro, as the rate of fertilization are greatly developed by partial deletion of zona pellucida.

Conclusion

IVF technology is much better than traditional method of embryo transfer. The more improvement in IVF for its ability to achieve union of gametes in laboratory followed by embryo transfer in domestic animals. But some conditions of some processes must have to be developed to some extent like maturation of oocyte, embryo culture of some species for obtaining embryos that can be transferred for enhancing efficiency of reproduction in the laboratory, terrestrial and domestic animals.

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