

Reproductive Biotechnology:

Lec: 1 , By Alaa. K. Abdulla

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References

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- 3- Comparative Reproductive Biology. By Heide Schatten , Gheorghe M.2008
- 4- Reproductive Technologies in farm animals. By Ian Gordon, 2005

Introduction

Assisted Reproductive Technology (ART):

Assisted reproductive technology (ART) is the technology used to achieve pregnancy in procedures such as fertility medication, in vitro fertilization and surrogacy. It is reproductive technology used primarily for infertility treatments, and is also known as fertility treatment

The biotechnologies allow more offspring to be obtained from selected parents to ensure genetic diversity and may reduce the interval between generations.

The application of reproductive biotechnologies for endangered free-living mammals is rarer than for endangered domestic breeds. Progress in ART for non-domestic species will continue at a slow pace due to

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limited resources, but also because the management and conservation of endangered species is biologically quite complex.

The current reproductive biotechnologies are species-specific or inefficient for many endangered animals because of insufficient knowledge on basic reproduction like estrous cycle, seasonality, structural anatomy, gamete physiology and site for semen deposition or embryo transfer of non-domestic species.

This ART describes the use of modern reproductive biotechnologies including :-

- 1- Artificial insemination.(AI)
- 2- Embryo transfer (ET)
- 3- In vitro fertilization. (IVF)
- 4- Semen sexing.
- 5- Somatic cell nuclear transfer (cloning) in conservation programs for endangered mammalian species.

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1- Artificial Insemination (AI)/ Intrauterine Insemination (IUI)

The Artificial insemination (AI) is the deliberate introduction of sperm into a female's uterus or cervix for the purpose of achieving a pregnancy through in vivo fertilization by means other than sexual intercourse. It is a fertility treatment for humans, and is common practice in animal breeding, including and dairy cattle.

The goal of artificial insemination is to increase the number of sperm that reach the fallopian tubes and subsequently increase the chance of fertilization, and provides the sperm an advantage by giving it a head start, but still requires a sperm to reach and fertilize the egg on its own. It is a less invasive and less expensive option compared to in vitro fertilization.

The AI used to treatment for any of the following conditions as well:

- 1- Unexplained infertility
- 2- A hostile cervical condition, including cervical mucus problems
- 3- Cervical scar tissue from past procedures which may hinder the sperms' ability to enter the uterus
- 4- Ejaculation dysfunction

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The AI is not recommended for the following patients:

- 1- Women who have severe disease of the fallopian tubes
- 2- Women with a history of pelvic infections
- 3- Women with moderate to severe endometriosis

Success of AI

The success of AI depends on several factors, if a couple has the AI procedure performed each month. Success rates may reach as high as 20% per cycle depending on variables such as female age, the reason for infertility, and fertility drugs were used, among other variables.

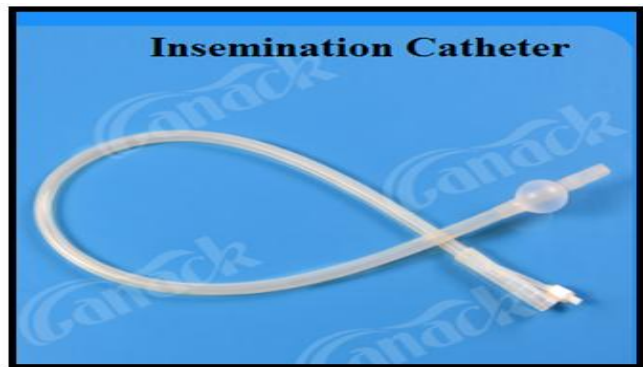
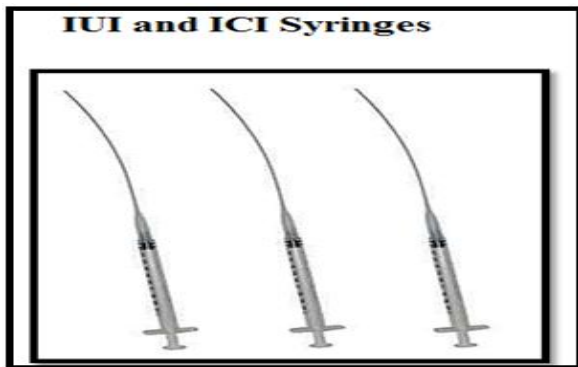
There are two different artificial insemination procedures:

A. Intrauterine insemination (IUI).

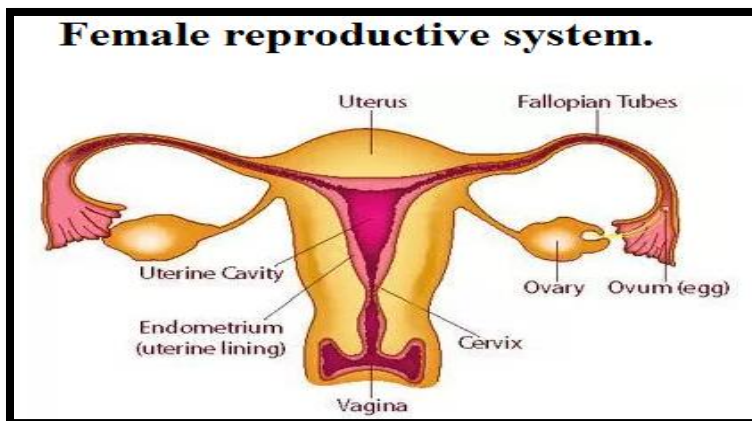
Which is most common today, is the placing of sperm into a woman's uterus when she is ovulating. This is achieved with a thin flexible tube (catheter) that is passed into the vagina, through the cervix, and into the uterus. IUI is often combined with superovulation medicine to increase the number of available eggs.

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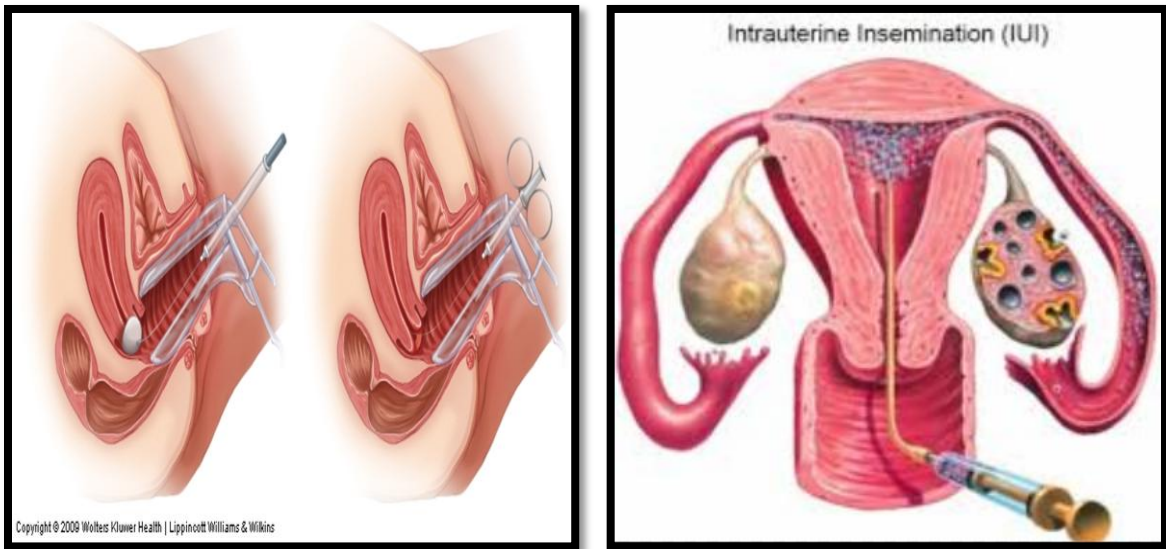


Intrauterine Insemination (IUI)



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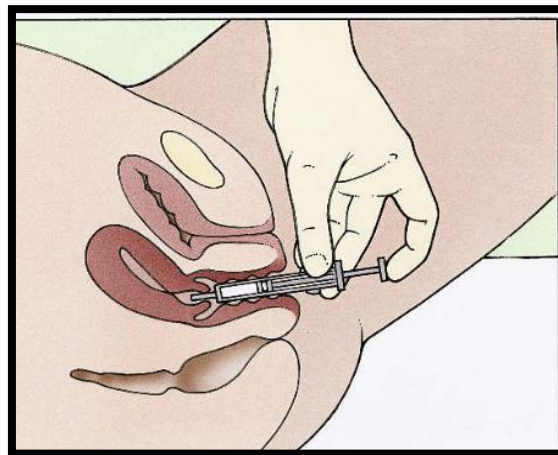
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B. Intracervical insemination (ICI) or intravaginal insemination

when she is ovulating. The sperm then travel into the fallopian tubes, where they can fertilize the woman's egg or eggs. it can be combined with superovulation.

Intracervical insemination (ICI)



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LET'S REVIEW THE STEPS TO A SUCCESSFUL ARTIFICIAL INSEMINATION PROCEDURE.

Step 1: The physical exam

Complete physical examination, including blood testing, sperm analysis by obtaining a sperm sample from male.

Step 2: Fertility drugs and monitoring

Prescribe fertility drugs like CLOMID® or gonadotropins (GnRH) /injectables before the artificial insemination procedure. The Combining hormone treatments with IUI seem to give infertile couples a better chance at pregnancy. The sperm should then be done within 24-36 hours after this injection.



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Step 3: Preparing the sperm

After a semen sample is obtained, the sperm are washed and concentrated down (A semen sample will be washed by the lab to separate the semen from the seminal fluid) to maximize the chances of conception. During this washing and processing phase, potentially toxic chemicals are removed, along with a seminal plasma shell that surrounds each sperm cell. It may prevent from having a possible allergic response to the sperm, and may help to minimize any uterine cramping.

Step 4: Insertion of the sperm

A speculum will be inserted and the sperm sample will be prepared for insertion. The sperm is placed all the way into the uterine cavity with a thin catheter and syringe. For those using ICI, the sperm will be placed into the vagina and deposited into the cervix with a soft catheter.

Step 5: Rest

After the IUI procedure, a cervical or sponge cap is placed in the vagina to keep the sperm near the cervix. These sponge or cover can be removed several hours after the operation is finished, may be advised to lie down for 15-20 minutes with sponge inside the vagina.