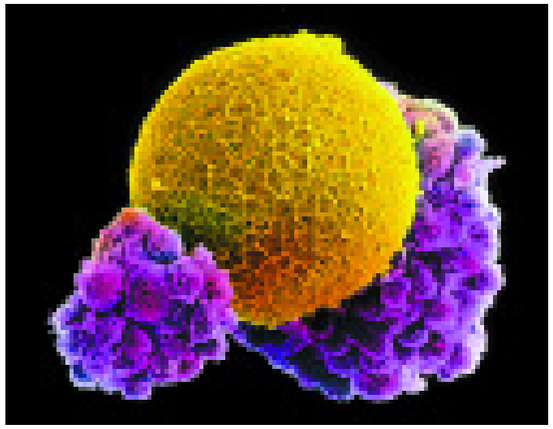
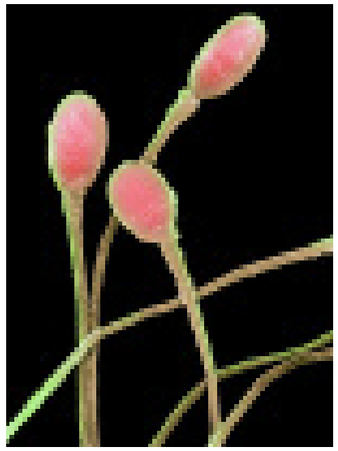
FERTILISATION – When human life begins

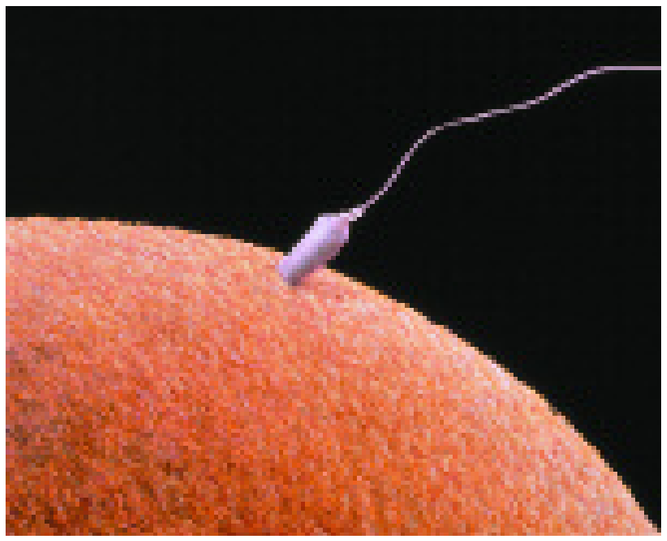


Human egg with corona radiata cells / Science Photo Library

This is how your life began. Fertilisation involves the fusing of the cell nucleus from the father's sperm with the cell nucleus from the mother's egg. The male and female cell nuclei contain genetic material from the mother and the father, but the newly fertilised egg combines this genetic material in a unique way. A new human life has begun and is brought into being by the combination of the sperm and the egg produced by his or her parents. The combined genetic material is different from that of the father or mother and this new human's sex, skin, hair and eye colour are determined at this point. The way in which the genetic material from the sperm and egg combine, will also influence many factors later in life e.g. height, intelligence.



Human Sperm / Science Photo Library



Sperm fertilising egg / Science Photo Library

Placenta – not always a lifeline?

Life Issues Institute

We've seen that the placenta is a vital organ for the growing baby. It allows the transfer of food and oxygen from the mother's bloodstream and removes waste products e.g. carbon dioxide from the unborn child's.

However, as well as providing the route for nutrients into the unborn child's body, the placenta also provides a path for some harmful agents to enter the body of the developing child. Here are a few examples:

Rubella virus – The virus that causes the relatively minor condition known as Rubella or German measles in children and adults is much more damaging to the unborn child. If a woman catches rubella during pregnancy, she will display the same relatively mild symptoms as a woman who is not pregnant. However, the virus crosses the placenta into the body of the developing child. If this occurs when the unborn child's organs are still developing (i.e. in the first 3 months) then a condition known as Congenital Rubella Syndrome usually results which often leads to miscarriage and stillbirths or to birth defects including congenital heart diseases, cataracts, deafness, and mental retardation. This was why, in the past, girls in secondary school received rubella vaccination while boys did not. Now rubella vaccination is routinely offered to both boys and girls as young babies/toddlers.

Alcohol – The damage that alcohol can cause to unborn children has only been recognised in the past 30 years. There is still a lot that is not understood but mothers who drink heavily during pregnancy risk their child suffering from reduced physical growth and learning disabilities throughout life. The condition is known as fetal alcohol syndrome. The most recent advice issued in May 2007 is that mothers should not drink alcohol at all during pregnancy.

Tobacco – When someone smokes a cigarette, a poisonous gas called carbon monoxide gets into your bloodstream and cuts down the oxygen reaching the unborn child. Mothers who smoke during pregnancy risk giving birth to a baby with a lower birth weight than average and a higher chance of cot death. The baby may also develop breathing problems and asthma as they grow older.

Task:

Design a poster for display in doctors' surgeries warning about the dangers of drinking alcohol while pregnant. You might want to carry out an internet search engine request on fetal alcohol syndrome to help you find additional information.

Right To Life Charitable Trust – From Conception to Natural Death

www.righttolifetrust.org.uk/education

REPRODUCTION

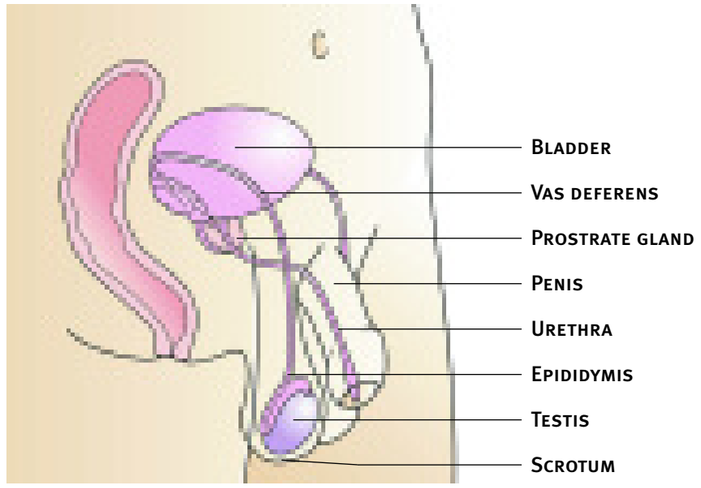
How human life begins • How humans grow before birth and how damage can occur • Birth

Cover: 14 week old embryo / Life Issues Institute

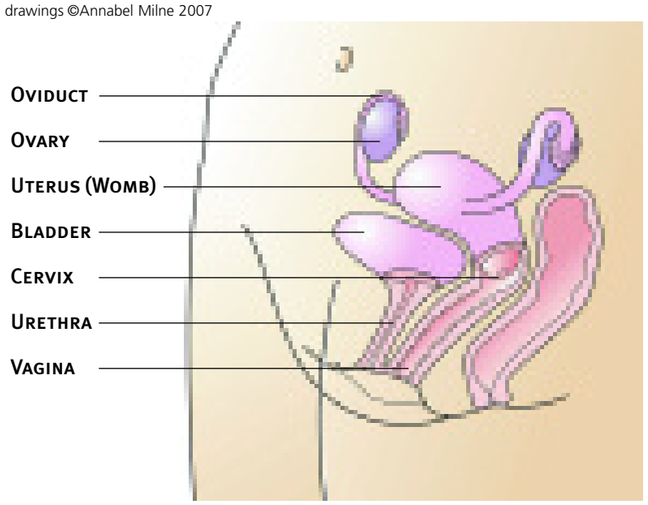
Life begins at fertilisation

Life begins for each human being at fertilisation when one of the father's sperm penetrates or enters the mother's egg. The human male and female reproductive systems are shown below. The testes produce millions of sperm but the ovaries almost always release only a single egg each month. After its release from the ovary the egg enters the oviduct.

Sperm enter the vagina during sexual intercourse and begin their upward journey through the female reproductive tract. A small number of sperm eventually reach the oviduct where fertilisation occurs.



Anatomical drawings ©Annabel Milne 2007



Questions:

Look at the photograph of the sperm and egg.
Why do you think sperm have tails?
The woman's egg is a large cell with a big food reserve.
Why do you think this is?
In humans, like all mammals, fertilisation is internal, that is it takes place inside the body. Compare this with other animals e.g. frogs where fertilisation is external i.e. outside the body.
Why do you think frogs fertilise hundreds of eggs?
Why do you think the human ovary releases only one egg each month?

Days 6-12 Implantation: Following fertilisation the single cell divides rapidly time and time again into first, 2, then 4 then 8 cells and so on. This starts the process of differentiation, where the cells organise themselves according to their different functions. The journey along the oviduct to the uterus takes about 4 or 5 days by which time the lining of the uterus has become soft and spongy in preparation for implantation. Having reached the uterus the embryo comes into contact with the uterine lining and over the course of the next six days burrows into it and by day 12 is completely buried within it.

Science Photo Library

Day 28: This baby girl's body is beginning to develop. The head and trunk appear and the heart is already beating. This began on day 21 and will continue until death perhaps 90 or more years in the future.

Life Issues Institute

The amniotic sac - baby's own capsule: The developing embryo (in this photo 8 weeks after fertilisation), now completely embedded within the lining of her mother's uterus, lies within a fluid filled cavity the amniotic sac, which is formed (or enclosed) by the amnion, an embryonic membrane. The implanted embryo, in contact with the deepest portion of the uterine lining, forms the placenta, a vital organ for the growing baby. The embryo is attached to the placenta by the developing umbilical cord, which encloses the embryo's major blood vessels. The mother's blood flows through the placenta and is separated from the blood of the unborn infant by a thin membrane, which provides a large surface area for the transfer of nutrients and gaseous exchange. The mother's blood delivers oxygen and nutrients to the unborn girl's blood and removes carbon dioxide and waste products from her.

State of Ohio

Questions:

What function do you think the amniotic sac and fluid have?
How is this linked to the fact that fertilisation is internal and usually results in the birth of only one infant?

Photos 1–4 Life Issues Institute

Second month: The embryo grows 8-fold in just 4 weeks (from 5mm at 4 weeks to 40mm at 8 weeks)! At the end of the sixth week the embryo has the body form of a human infant. By the end of the eighth week fingers and toes are clearly visible as are the eyes and external ears. This little girl has her own fingerprints, unique to her and destined to be used to identify her once she is born. The brain develops rapidly during this period and electrical activity can be recorded.

Third month: During this period the developing baby girl reacts to stimuli with observable responses: smiling, wrinkling her forehead and bending her fingers around an object in the palm of her hand. Reactions to painful stimuli suggest that at this stage the infant actually feels pain.

Fourth and fifth months: During this period the ear is sufficiently well developed for the infant to respond to a wide variety of sounds. This unborn girl in the womb is able to recognise her mother's voice.

Fifth month to birth: In the final months of pregnancy the infant continues to grow and gain weight, will wake and sleep in parallel with her mother and be sensitive to her moods and emotions.

Birth: Birth is a major event for this newborn girl. Her environment changes and she will no longer use her placenta, as she now receives oxygen through her lungs and food through her mouth. Although a significant event, birth is simply a stage in the child's life, which began at fertilisation.

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