

## The Development of a foetus

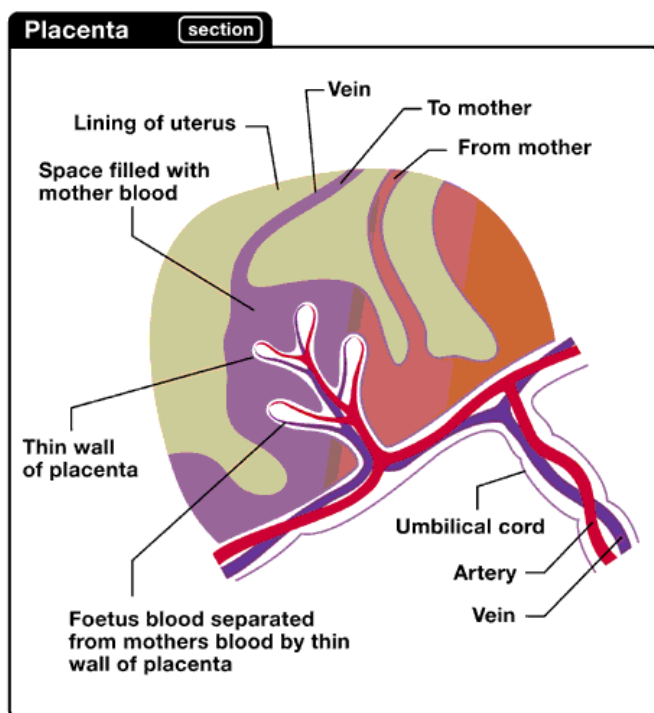
Following fertilisation of the egg, its development into a baby is divided into three main phases that are described as **Germinal**, **Embryonic** and **Foetal**.

**The Germinal phase** is the first two weeks after fertilisation. When the fertilised egg (a zygote) attaches itself to the thick spongy lining of the uterus, this process is called implantation. Following fertilisation, the zygote begins to divide rapidly (a process called mitosis), and by the time it meets the uterine wall, 4 to 5 days later, it is a hollow mass of 64 to 128 cells.

Already the cells are separating out into different types (a process called differentiation). The outer layer of cells, called the trophoblast, attaches itself to the uterine wall and goes on to become the various life support systems - the **placenta**, **amniotic sac** and **umbilical cord** for the developing baby.

### The development of the Placenta

The placenta begins to form and grow during the first 4 weeks, due to the tissue of the embryo invading the wall of the uterus. The placenta is soft and has capillaries filled with the embryo's blood. The wall of the uterus has large spaces filled with the mother's blood. The wall of the placenta is very thin which brings the mother's blood supply alongside the foetus to allow the exchange of food and oxygen to the foetus, and for the foetal waste and carbon dioxide to transfer to the mother. The blood of the mother and foetus do not mix, but substances are exchanged through the placenta by diffusion. The developing foetus does not breathe within the uterus, but instead it uses the placenta to get what it needs to develop and survive.



### The umbilical cord

Oxygen and food materials in the mother's blood diffuse across the placenta into the embryo's blood and then carried along the umbilical cord to the embryo. Carbon dioxide and waste diffuse the other way and are carried away in the mother's blood. The umbilical cord connects the baby to the mother's placenta. The cord contains an **artery**, which carries waste products from the developing baby to the placenta, and a **vein**, which carries the food and oxygen to the foetus from the mother.

### The amnion

A strong membrane called the amnion, which makes a fluid called amniotic fluid, protects the developing baby. This helps to protect the foetus from being damaged by the mother during her normal activities over the nine months of development

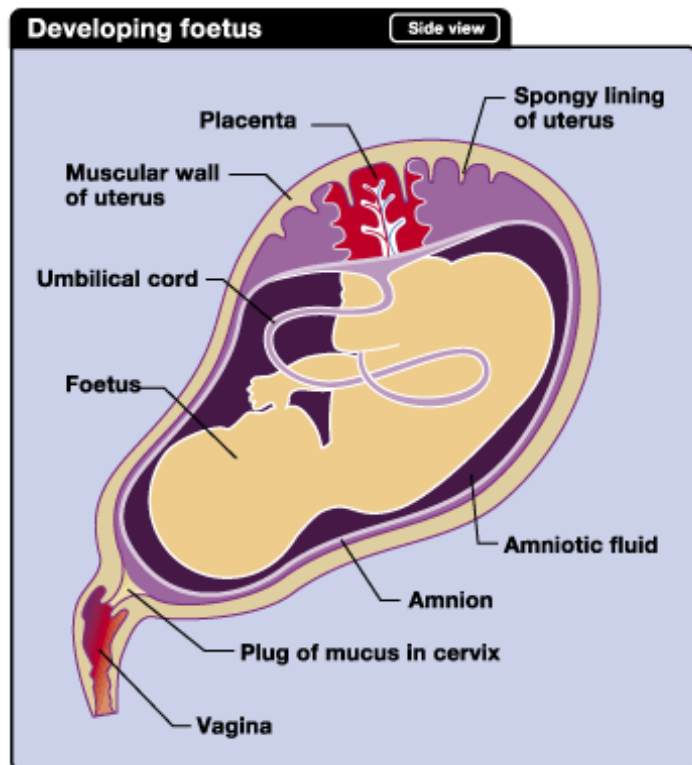
### How the foetus continues to develop

The inner layer of cells, called the blastocyst, develops into the embryo itself. On rare occasions, two eggs (ova) may be released and fertilised, resulting in fraternal twins, or the single fertilised egg (ovum) may start to divide into separate cells which then continue to develop independently resulting in identical twins.

**The Embryonic phase** begins 2 – 8 weeks after fertilisation. The blastocyst begins to form two layers made up of an inner layer called the **endoderm** and an outer layer which is divided into two parts- the **ectoderm**, the outer layer of cells and the **mesoderm**, the middle layer of the ectoderm.

The endoderm eventually develops to form the baby's digestive and respiratory systems (stomach, gut and lungs). The ectoderm develops into the nervous system, ears, nose, nails and hair, while the mesoderm will become the bones, muscles, kidneys, heart and reproductive organs.

As these layers of the embryo form, so too does its life support system developed out of the trophoblast. The next stage of development from month 2 until birth is the foetal phase of development.



**The foetal phase** begins from month two until birth. Development continues as cells multiply, move, and differentiate. The embryo is now called a foetus and is approximately 2.5cm/1 inch long and recognisably human, with eyelids and small fingers and toes.

The foetus floats in amniotic fluid inside the amniotic sac, which cushions it against jolts to the mother's body. Its oxygen and nourishment comes from the mother's blood via the placenta. This adheres to the inner lining of the uterus and is connected to the umbilical cord. The cord attaches at the embryo's navel at one end and the mother's uterus at the other. The umbilical arteries in the cord carry blood from the foetus to the placenta, and the umbilical vein returns blood from the placenta to the foetus.

## Birth

After about 40 weeks, the baby is ready to be born. Birth is much easier if the head presents itself first into the vagina. There are muscles in the uterus that contract gently to start with and then get very hard in order to push the baby out of the mother's body. The walls of the uterus contract because they are stimulated by the pituitary hormone oxytocin. The early contractions cause the cervix to relax, or dilate, to approximately 10 centimetres and can take many hours. The muscles eventually start to push the baby down through the cervix and the vagina. The baby is still attached to the uterus by the umbilical cord and the placenta.

Once the baby is in the open air, it is able to breath for its self. The placenta is not needed now and is also passed through the vagina. This is called the **afterbirth**. The umbilical cord is cut and clamped and as there are no nerves in the cord, it is painless. The mark left is of course, the belly button.