**Embryology**

**Twins**

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**Twins** are two offspring produced by the same pregnancy. Twins can either

be monozygotic ("identical"), meaning that they can develop from just

one zygote that will then split and form two embryos, or dizygotic ("fraternal"), meaning that they can develop from two different eggs, each are fertilized by separate sperm cells. In contrast, a fetus which develops alone in the womb is called a singleton, and the general term for one offspring of a multiple birth is multiple.

Multiple pregnancies are much less likely to carry to fulIterm than single births, with twin pregnancies lasting only 37 weeks (3 weeks less than full term) on average.

Women who have a family history of fraternal twins have a higher chance of producing fratemal twins themselves, as there is a genetically linked tendency to hyper-ovulate. There is no known genetic link for identical twinning. Other factors that increase the odds of having fratemal twins include maternal age, fertility drugs and other fertility treatments, nutrition, and prior births.

**Zygosity**

Is the degree of identity in the genome of twins. There are five common Zygosity

variations of twinning, and one rare variation.

The three most common variations are all dirygotic (fraternal):

Male-female twins are the most cofirmon result, 50 percent of dizygotic twins and the most common grouping of twins.

Female-female dizlgotic twins (sometimes called "sororal twins").

Male-male dizygotic twins.

The other two variations are monozygotic ("identical") twins:

Female-female monozygotic twins.

Male-male monozygotic twins

Male-female monozy gotietwins (without chromosomal abnormalities) (Very rare, only few cases known).

Among non-twin births, male singletons are slightly (about five percent) more common than female singletons. The rates for singletons vary slightly by country. However, males are also more susceptible than females to die in utero'and since the death rate in utero is higher for twins, it reads to female twins being more common than male twins'

**Dirygotic (fraternal) twins**

Dirygotic (DZ)or fraternal twins (also referred to as "non-identical twins"'

,,dissimilar twins", "biovular twins", and, informally in the case of females''sororal twins") usually occur when two fertilized eggs are implanted in the uterus wall at the same time. When two eggs are independently fertilized by two different sperm cells, fraternal twins result. The two ggse, form two zygotes, hence the terms dizygotic andbiovular'Ftatemal twins are'essentially, two ordinary siblings who happen to be born at the same time' since they arise from two separate eggs fertilized by two separate sperm' just like ordinary siblings.

Dizygotic twins, like any other siblings, have an extremely small chance of having the same chromosome profile. Even if they happen to have the same chromosome profile, they will always have different genetic material on each chromosome' due to chromosomal crossover during meiosis. Like any other siblings, dizygotic twins may look similar, particularly given that they are the same age' However, dizygotic twins may also look very different from each other.

Dizygotic twins are also more common for older mothers, with twinning rates doubling in mothers over the age of 35. With the advent of technologies and techniques to assist women in getting pregnant, the rate of fraternals has increased markedly. 



**Monozygotic (identical) twins**

Comparison of zygote development in monozygotic and dizygotic twins. In the uterus, a majority of monozygotic twins (60-70%) share the same placenta but have separate amniotic sacs. In 18-30% of monozygotic twins each fetus has a separate placenta and a separate amniotic sac. A small number 1-2%) of monozygotic twins share the same placenta and amniotic sac. Fraternal twins each have their own placenta and own amniotic sac' Monozygotic (MZ) or identical twins occur when a single egg is fertilized to form one zygote (hence, "monozygotic") which then divides into twoseparate embryos.

**Mechanism**

Regarding spontaneous or natural monozygotic twinning, a recent theory

proposes that monozygotic twins are formed after a blastocyst essentially

collapses,splitting the progenitor cells (those that contain the body's fundamental genetic material) in half, leaving the same genetic material divided in two on opposite sides of the embryo. Eventually, two separate fetuses develop.

Spontaneous division of the zygote into two embryos is not considered to be a hereditary trait, but rather a spontaneous or in some cases a random event.

Monozygotic twins may also be created artificially by embryo splitting. It can be used as an expansion of IVF to increase the number of available embryos for embryo transfer.







**Degree of separation**

various types of chorionicity and amniosity (how the baby's sac looks) in

monozygotic twins as a result of when the fertilized egg divides'

The degree of separation of the twins in utero depends on if and when they split into two zygotes. Dizygotic twins were always two zygotes' Monozygotic twins split into two zygotes at some time very early in the pregnancy' The timing of this separation determines the chorionicity (the number of placentae) and amniocity (the number of sacs) of the pregnancy. Dichorionic twins either never divided (i.e.: were dizygotic) or they divided within the first 4 days. Monoamnionic twins divide after the first week.

In very rare cases, twins become conjoined twins. Furthermore, there can be various degrees of shared environment of twins in the womb, potentially leading to pregnancy complications.

It is a common misconception that two placentas means twins are dizrgotic. But if monozygotic twins separate early enough, the arrangement of sacs and placentas in utero is indistinguishable from dirygotic twins

