A CASE STUDY

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Human Chimeras

PRIYANKA P. NAGARE, M.O.LOKHANDE AND **B.A.AGLAVE**
Department of Biotechnology, H.P.T. Arts and R.Y.K. Science College, NASHIK (M.S.) INDIA

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A chimera is an ordinary person or animal except that some of their parts actually came from their twin or from the mother. A chimera may arise either from monozygotic twin fetuses (where it would be impossible to detect), or from dizygotic fetuses, which can be identified by chromosomal comparisons from various parts of the body. The number of cells derived from each fetus can vary from one part of the body to another, and often leads to characteristic mosaicism skin colouration in human chimeras. A chimera may be a hermaphrodite, composed of cells from a male twin and a female twin.

Chimera: In medicine, a person composed of two genetically distinct types of cells. Human chimeras were first discovered with the advent of blood typing when it was found that some people had more than one blood type. Most of them proved to be "blood chimeras" — non-identical twins who shared a blood supply in the uterus. Those who were not twins are thought to have blood cells from a twin that died early in gestation. Twin embryos often share a blood supply in the placenta, allowing blood stem cells to pass from one and settle in the bone marrow of the other. About 8% of non-identical twin pairs are chimeras.

Many more people are microchimeras and carry smaller numbers of foreign blood cells that may have passed from mother across the placenta, or persist from a blood transfusion. In vitro fertilization (IVF) is also contributing to the number of human chimeras. To improve success rates, two or more embryos are placed in the uterus so women who have IVF have more twin pregnancies than usual. More twins mean more chimeras.

Chimera mythology :

In Greek mythology, the Chimera was an awesome fire-breathing monster with the head of a lion, the body of a goat, and the tail of a serpent. The Chimera was killed by the hero Bellerophon mounted, in most versions of the tale, on Pegasus, the winged horse. The Chimera (Greek ×ßìáéñá (Chímaira); Latin *Chimaera*) was a monstrous creature of in Asia Minor, composed of the parts of multiple animals. The Chimera was one of the offspring of Typhon and Echidna and a sibling of such monsters as Cerberus and the Lernaean Hydra.

Tetragametic chimerism:

Tetragametic chimerism is a less common cause of congenital chimerism. It occurs through the fertilization of two ova by two sperm, followed by the fusion of the zygotes and the development of an organism with intermingled cell lines. This happens at a very early stage of development, such as that of the blastocyst. Such an organism is called a tetragametic chimera as it is formed from four gametes — two eggs and two sperm. Put another way, the chimera is formed from the merger of two nonidentical twins in a very early (zygote or blastocyst) phase. As such, they can be male, female, or hermaphroditic.

As the organism develops, the resulting chimera can come to possess organs that have different sets of chromosomes. For example, the chimera may have a liver composed of cells with one set of chromosomes and have a kidney composed of cells with a second set of chromosomes. This has occurred in humans, and at one time was thought to be extremely rare, though more recent evidence suggests that it is not as rare as previously believed. Most will go through life without realizing they are chimeras. The difference in phenotypes may be subtle (*e.g.*, having a hitchhiker's thumb and a straight thumb, eyes of slightly different colors, differential hair growth on opposite sides of the body, etc) or completely undetectable. Another tell tale of a person being a chimera is visible Blaschko's lines.

Affected persons are identified by the finding of two populations of red cells or, if the zygotes are of opposite sex, ambiguous genitalia and hermaphroditism alone or in combination; such persons sometimes also have patchy skin, hair, or eye pigmentation (heterochromia). If the blastocysts are of the same sex, it can only be detected