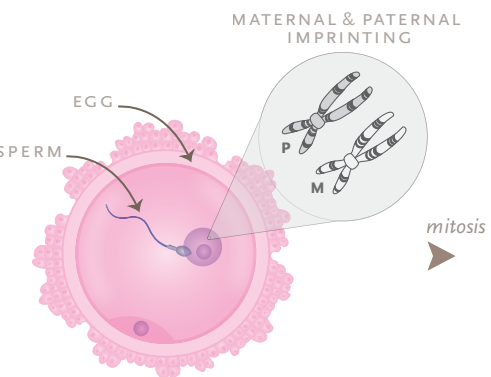


Human Development

in vivo

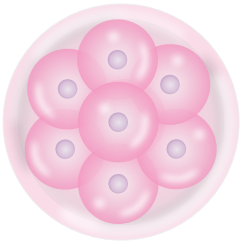
FERTILIZATION



ZYGOTE
day 0

Nuclear Fusion:
Fusion of egg and sperm provides a complete human genome (two sets of nuclear DNA). Upon fertilization, calcium ions flood the egg cytoplasm and trigger fusion of egg and sperm nuclei.

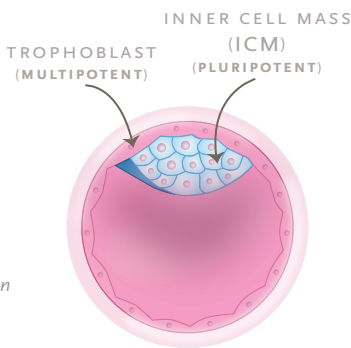
TOTIPOTENT cells



BLASTOMERE
day 3
8 cells

Clonal Cell Division:
Cells rapidly divide via mitosis producing a clonal population of 8 cells and at this stage identical twinning can occur.

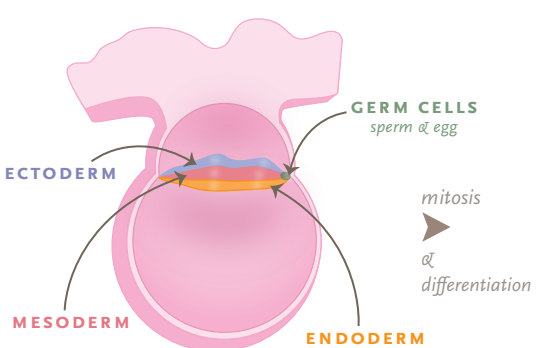
PLURIPOTENT & MULTIPOTENT cells



BLASTOCYST
day 5
~150 cells

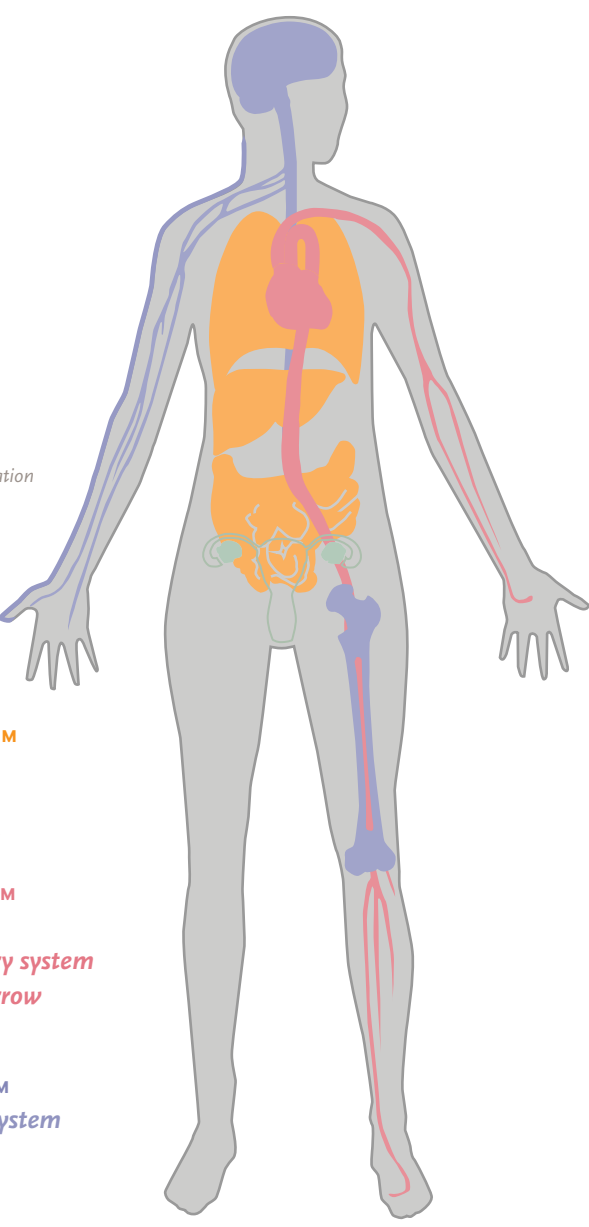
Cell Differentiation:
As cells migrate in response to maternal signals in the uterus, they specialize, or differentiate. The cells on the outer layer of the blastocyst are referred to as the trophoblast and support placental development. The cells in the interior of the hollow ball, are referred to as the inner cell mass (ICM) and develop into the fetus. Each cell of the ICM has the potential to differentiate into any cell of the body.

MULTIPOTENT cells



GASTRULA
day 14

Further differentiation into four germ layers:
ENDODERM
MESODERM
ECTODERM
GERM CELLS
Each germ layer gives rise to a different subset of cell populations in the body, giving rise to 200 different cell types in the adult body.



ENDODERM
lungs
liver
intestines
MESODERM
heart
circulatory system
bone marrow
adipose
ECTODERM
nervous system
bone
skin
GERM CELLS
sperm & egg