

The Nine Month Miracle ©

Month One



Embryology Project
Advanced Biology, 2007-2008
Dr. Senegar-Mitchell

Nine Month Miracle Teacher's Guide
Copyright 1995 A.D.A.M. Software, Inc.



Month One



Overview

About twenty-four hours after fertilization the zygote starts dividing, doubling its number of cells with each division. After three days the solid ball of cells, called a morula (Latin for mulberry), consists of sixteen identical cells and is only as large as the original zygote. During the following days the morula divides more rapidly into hundreds of cells, forming a ring around a fluid-filled cavity called a blastocyst. One week after fertilization, the blastocyst attaches itself to the uterine wall and becomes buried in the thick uterine lining.

By cell differentiation, the delicate embryo begins to form specialized tissues. In the gastrulation process three germ layers form: the ectoderm, mesoderm, and endoderm. These layers will later develop into a brain, heart, spine, and other organs. At month 1, the embryo is about one-quarter-inch (5 mm) long. It has a heartbeat and many structures, which will become organs. During the first trimester (months 1 through 3), expecting parents learn about their pregnancy and make a first visit to a health professional such as a gynecologist or midwife. A healthy lifestyle is especially important at this early stage of pregnancy. Expecting mothers should avoid tobacco fumes, inhalants, exposure to environmental pollutants, X-rays, infectious microorganisms, and alcohol. Pharmaceutical drugs, including over-the-counter drugs, should only be taken when recommended by a health professional. Alcohol and drugs such as seizure medications and tetracycline can harm the embryo's developing brain.



Animations

Cell Division

About twenty-four hours after fertilization the zygote divides into two cells. Some fifteen hours later, the two cells divide to become four. At the end of three days, the fertilized egg cell has become a berry-like structure made up of sixteen cells. This structure is called a morula.

For eight or nine days after fertilization, the cells that will eventually form the embryo continue to divide within the fallopian tube. The blastocyst, a hollow structure formed by the cells is slowly carried toward the uterus by tiny hairlike projections called cilia. The blastocyst, though only the size of a pinhead, is composed of hundreds of cells. During the critically important implantation process this structure must attach to the uterine lining, or the pregnancy will fail to survive. If the blastocyst buries itself in the uterine lining, it will obtain nourishment from the mother's blood supply.

Month 1 EVU

At the end of month 1 the embryo is about one-quarter-inch long, the size of a rice grain. During month 1 many important structures are forming. For example, the heart starts beating early in the month, the liver and stomach are forming below the heart, and a primitive version of the eye is forming above the heart. The embryo's back has segmented structures, called somites, which will form the baby's ribs and vertebrae, or backbone. The somites start behind the embryo's head and curve around to a tail-like appendage, which eventually forms the sacrum and coccyx. At month 1, the vertebrae look quite different from the adult backbone. The most important structure forming is the brain in the region above the eye.

Nervous System Formation

The most critical stage of development for an embryo's nervous system is weeks 3 and 4 of pregnancy. The embryo is implanted in the uterine wall during week 2. On day 14 the embryo looks like a little disc. The first part of the nervous system that forms is an indentation called the neural groove. The groove deepens as the cells around it form ridges called neural folds. By day 27 the neural folds wrap around the neural groove and form the neural tube. This tube will become the spinal cord. Bundles of cells that look like building blocks, called somites, form the vertebrae.



Videos

Discovery of Pregnancy

A couple trying to conceive a baby learns through home pregnancy tests that the wife is pregnant.

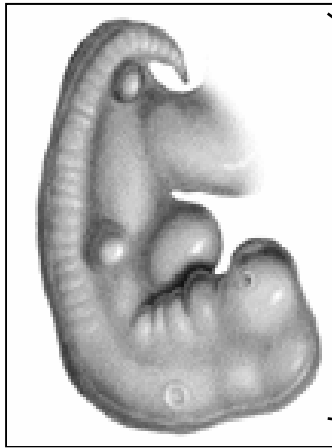
Pregnancy Test

Pregnancy tests detect the presence of HCG, Human Chorionic Gonadotropin, in the mother's blood or urine. HCG is a hormone produced by the placenta during pregnancy. HCG circulates through the mother's blood stream to her ovaries, causing them to produce estrogen and progesterone, to prevent the uterus from shedding its lining through menstruation. HCG appears in the mother's urine, because her blood is filtered by her kidneys, and HCG is passed out into her urine.

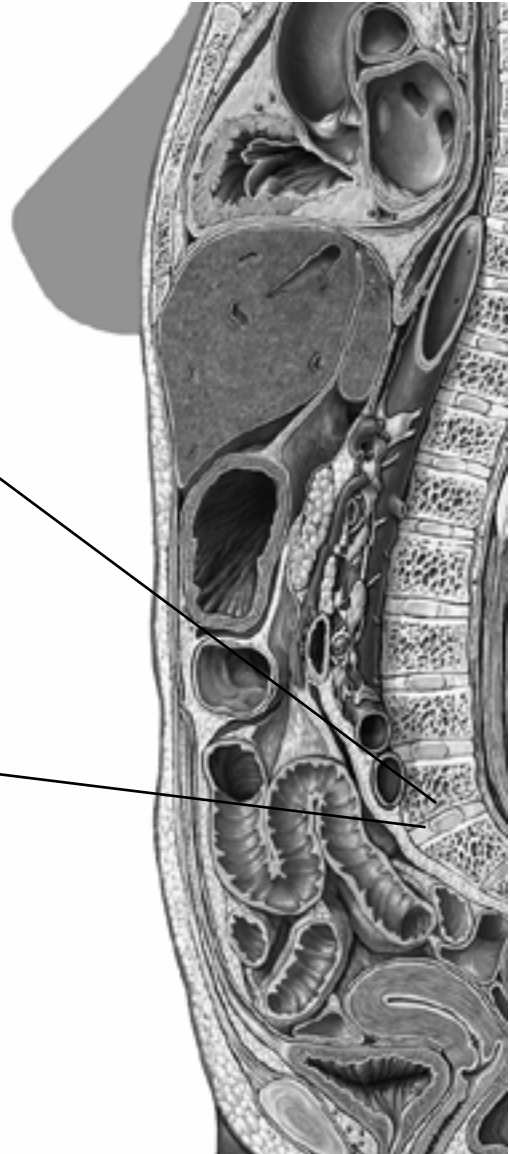
Sometimes a doctor chooses to do a blood test instead of a urine test. A blood test provides more accurate, earlier detection of HCG than does a urine test. Urine tests can be influenced by how much fluid a mother drinks, because fluid dilutes the concentration of HCG. These tests are more reliable if a urine sample is taken before eating or drinking in the morning when the urine is most concentrated.

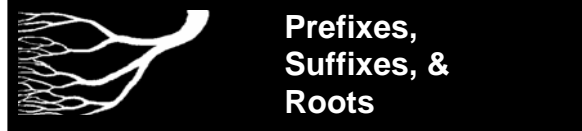


Month 1 Development



The 4 week-old embryo is about 0.16
0.2 inch (4 to 5 mm) crown-to-rump.





amnion
blastocyst
cell differentiation
chorion
chromosomes
cilia
embryo (adjective: embryonic)
estrogen
fertilization
HCG (human Chorionic Gonadotropin)
hormone
implantation
inner cell mass
lacunae
morula
neural fold
neural groove
neural tube
ovulation
placenta
progesterone
somite
spinal cord
umbilical cord
uterus (adjective: uterine)
yolk sac
zygote

amni, a fetal membrane
blast, a bud, sprout
cella, chamber
chori-, skin, membrane
chrom, color
chromo-, colored
cilia, eye lashes
cyst, a fluid filled bag
embryon, stem
fertil, fruitful
genes, born
gest, carried
horman, to urge on
in-, im-, in, into, inside
lacun, a basin, lake
morula, mulberry
oestrus, frenzy
ov-, egg
plak, flat, surface
pro, acting for
pro-, for
som, -some, body
umbilicus, navel
zyg, a yoke

Terms outside *Nine Month Miracle* Dictionary

conceive
differentiate
limb buds
teratogenic
Thalidomide
undifferentiated

Name _____

Date _____



**Nine Month
Miracle
References**

- Animations**
- Cell Division
- Conception
- Egg Cell Production
- Month 1 EVU
- Nervous System Formation
- Placenta Formation

Dictionary

Fetal Images

- Month One

Reference Text

- Conception
- Due Date
- Fetus
- Multiple Pregnancy
- Placenta
- Uterus

Videos

- Discovery of Pregnancy
- Pregnancy Test

The Long Journey

Task 1

Read the text below, then divide the underlined terms in the text with a partner. Using Nine Month Miracle References on this page, define your terms in the space below, then exchange definitions with your partner. If you need help or clarification, ask your teacher.

Most changes take place immediately after fertilization occurs. Pre-embryonic development begins with fertilization and ends with implantation of a blastocyst in the wall of the uterus. After implantation two events happen concurrently: the embryo develops rapidly during a period ending around week 8 after fertilization, and the placenta develops to support and nourish the developing embryo.

As these processes occur, the following structures are involved: 2-cell stage, 4-cell stage, blastocyst, brain, embryo at day 27, heart tubes, inner cell mass, lacunae, morula, neural fold, neural groove, neural tube, spinal cord, somites, and uterine lining

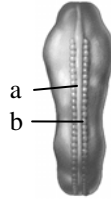
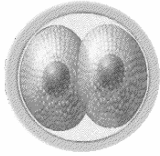
In the summer of 1978 baby Louise Joy Brown was born. She was the first baby conceived by *in vitro* fertilization in a glass dish.

Month One Worksheet

Name _____ Date _____

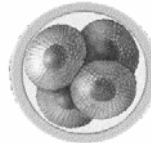
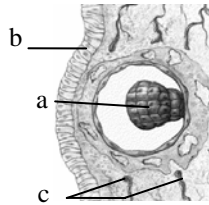
Task 2

Using *Nine Month Miracle* References shown on the previous page, label each structure below. When you are finished, turn to the next page and complete Task 3. Note: To identify Structure 8, refer to the Heart Formation animation in Month 2.



1 _____ 2 _____ 3a _____ 4 _____

3b _____

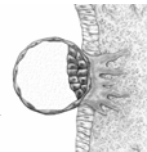
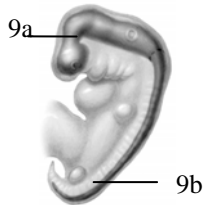


structure like this form the _____.

5 _____ 6a _____ 7 _____ 8 _____

6b _____

6c _____



9a _____ 10 _____ 11 _____ 12 _____

9b _____

Month One Worksheet

Name _____

Date _____

Task 3

- 1) Review the animations, this time focusing on the day each structure forms, changes, or starts an event during early development.
- 2) Next to each event listed below, write the number of the day it occurs during early development.
- 3) On the next page, write each event on the time line. Use brackets to show events that span days, for example, fertilization spans days 1 and 2.
- 4) Cut out the images on the right, and paste each in the appropriate space on the time line.

() heart begins to beat

() formation of blastocyst (early blastocyst stage)

() late blastocyst stage

() beginning of implantation

() formation of yolk sac

() implantation complete

() formation of lacunae, chorion, & amnion

() dividing zygote passes along uterine tube

() formation of embryonic disc

() formation of neural groove

() first missed menstrual period

() sperm penetrates egg

() process of fertilization (24-hour event)

() chromosomes of sperm and egg have joined (formation of zygote)

() zygote divides into 2 cells (2-cell stage)

() zygote divides into 4-, 8-, & 16-cell clusters

() zygote reaches 16-cell stage (morula)

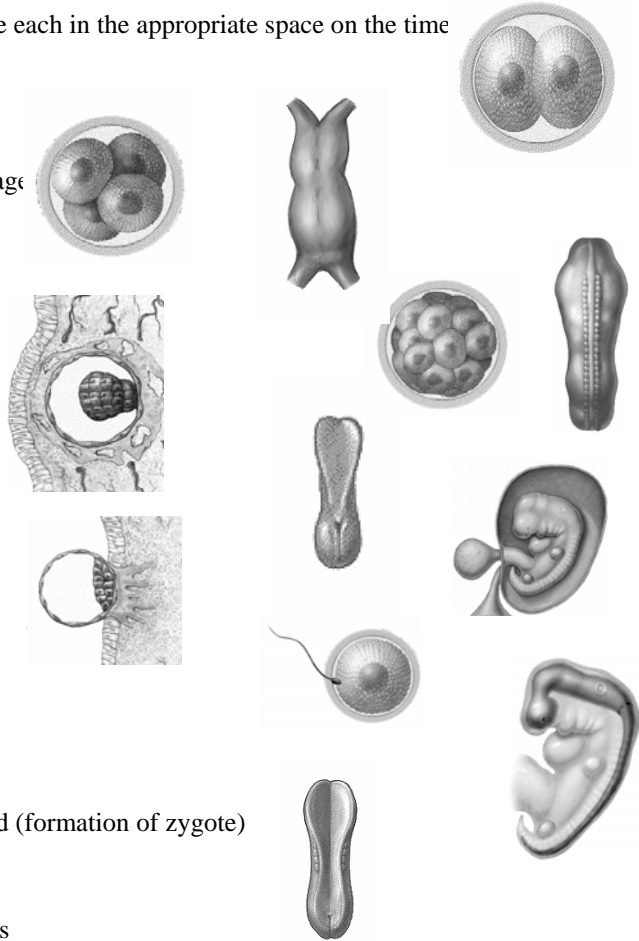
() ovulation

() formation of neural fold

() 4-week-old embryo

() formation of brain and spinal cord

() formation of limb buds



Early Development Time Line

Name _____ Date _____

IMAGES	DAYS	EVENTS
	0	
	1	Fertilization _____
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	
	16	
	17	
	18	
	19	
	20	
	21	
	22	
	23	
	24	
	25	
	26	
	27	
	28	