

**Human Embryonic Development**

2004-2005

The slide features a central illustration of a human fetus in the womb, shown in a sagittal cross-section. To the right of the fetus is a small, square photograph of a newborn baby's face and hands. The text 'Human Embryonic Development' is written in a purple, serif font above the fetus. The entire content is framed by a blue border with corner crop marks.

**Human fetal development**

- **Day 1: 1<sup>st</sup> cleavage**
  - ◆ 1 cell becomes 2 (2-cell stage)
- **Day 2: 2<sup>nd</sup> cleavage**
  - ◆ 4-cell stage
- **Day 3: 6-12 cell stage**
  - ◆ can test at this stage for genetic diseases if done by IVF
- **Day 4: 16-32 cell stage**
  - ◆ solid ball of cells = morula

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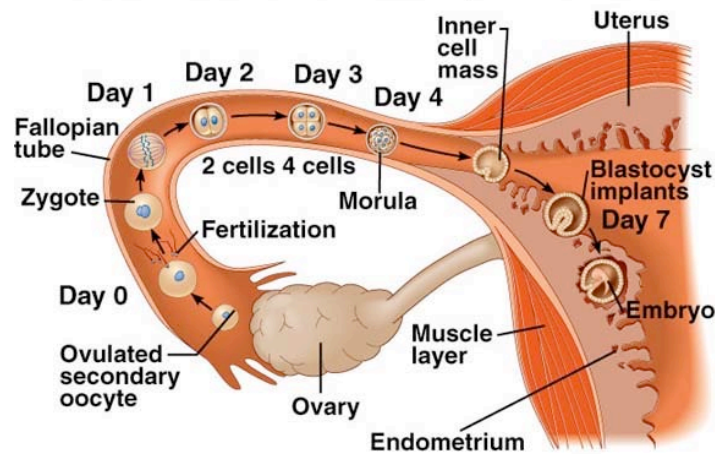
2004-2005

The slide contains a bulleted list of human fetal development stages. The text is in a blue, sans-serif font. The title 'Human fetal development' is underlined. The list items are marked with square bullets, and sub-points are marked with diamond bullets. The slide is framed by a blue border with corner crop marks.

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## Ovulation to implantation

### From ovulation to implantation



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## Human fetal development

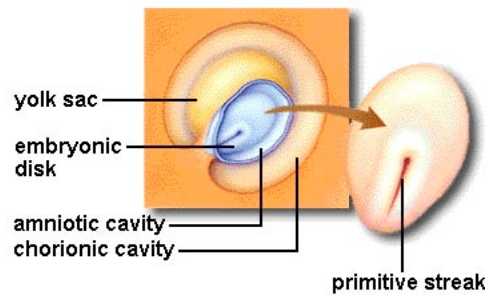
- Day 5:
  - ◆ solid morula develops into hollow, fluid-filled **blastula**
  - ◆ embryo will develop from the inner cell mass, or embryonic disc
- Day 6 -7:
  - ◆ blastocyst attaches to the endometrium (uterine lining) & burrows in: implantation
  - ◆ blastocyst starts to secrete **HCG** = human chorionic gonatotropin
    - stimulates estrogen & progesterone to prevent menstrual flow
    - causes "morning sickness" in some women...
    - pregnancy test measures the amount of this hormone!

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## Human fetal developmental

- Days 10 - 14:
  - ◆ pregnancy becomes established
  - ◆ fluid filled amniotic cavity starts to form
  - ◆ yolk sac starts to form
    - will make blood cells, germ cells
  - ◆ embryo starts to form from embryonic disc
  - ◆ chorion (placenta) starts to form
- At the end of this stage, a woman will have just missed her period!

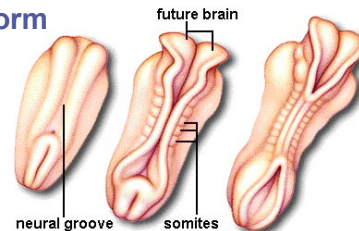


Day 14

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## Human fetal developmental

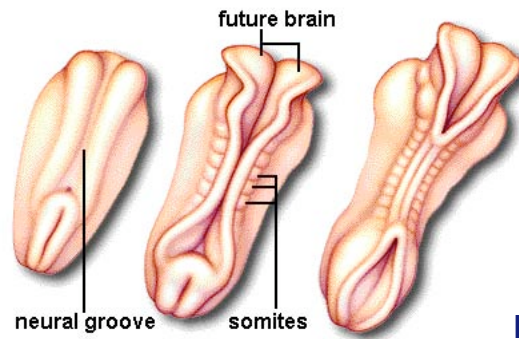
- Days 15 - 21:
  - ◆ emergence of the vertebrate body plan
  - ◆ **primitive streak** starts to form
    - the site of gastrulation (formation of 3 tissue layers = ecto, endo, and mesoderm)
  - ◆ **neural groove** begins to form
    - future spinal cord & brain
  - ◆ **somites** begin to form
    - bands of tissue that will become muscles & bones
  - ◆ **pharyngeal arches** begin to form
    - future face, neck, mouth, nose



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# AP Biology

## Vertebrate body plan



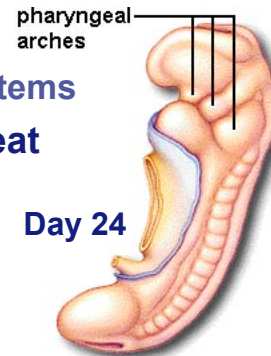
Day 19

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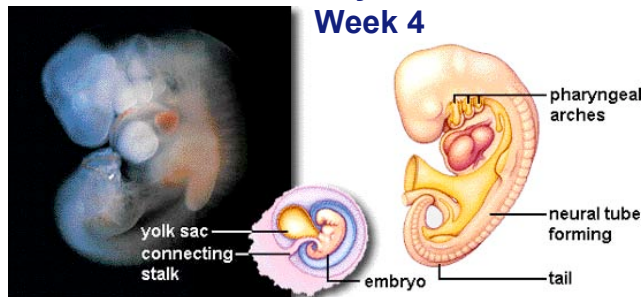
## Human embryonic developmental

- **Week 3 - Week 8 = embryo**
  - ◆ development of all organ systems
- **Day 22: the heart begins to beat**



Day 24

Day 28  
Week 4



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## Human embryonic development

- embryo showing tail & limb buds



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## Human embryonic development

- beginning of the eye can be seen, as well the bulging heart & the umbilical cord



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## Human embryonic development

- lens of the eye can be seen forming, the mass of the heart bulging from the chest, & the beginnings of the finger rays



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## Human embryonic development



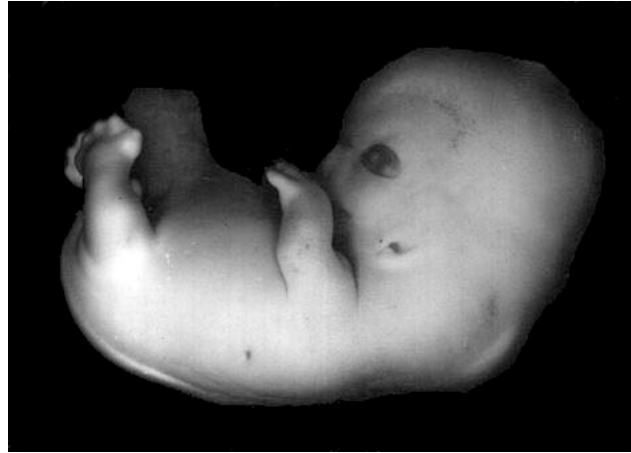
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## Human embryonic development

- beginning of the ear is clearly seen

note the bend of the elbow joint has begun, the fingers are forming and toes are beginning to bud off the foot



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## Human embryonic development

- Note the formation of the nose, eyelids, ear flap & well defined toes & fingers

Both the knee & the elbow are visible. 50–60 days: the embryo has formed most of basic organ systems & will spend remainder of development in “fetal” period. Organs grow, mature, & begin to learn their respective functions



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## Human fetal development

### Day 52:

- ◆ first brain waves can be detected
  - weeks 4-8 is when all major organ systems of body are formed & when most teratogens have greatest effect

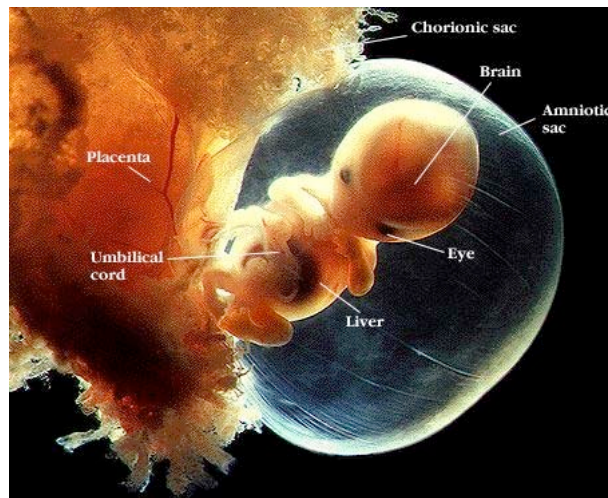
Week 8



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## Human fetal development

Week 10

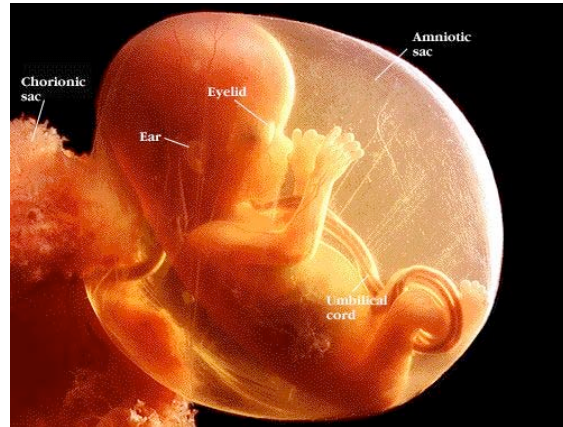


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## Human fetal development

- At 15 weeks the embryo begins to take on more of a typical baby's form & the attachment of umbilical cord can be clearly seen

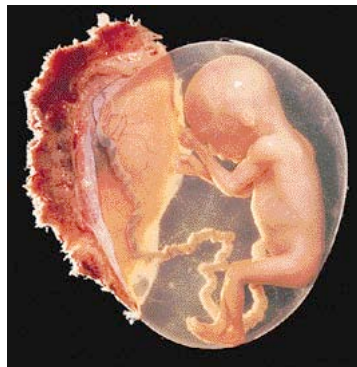


Week 15

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## Human fetal development

- Week 9 - week 40 = fetus
  - after 12 weeks or so, the baby's development is largely "finished"
    - some exceptions: brain & lung development



Week 16

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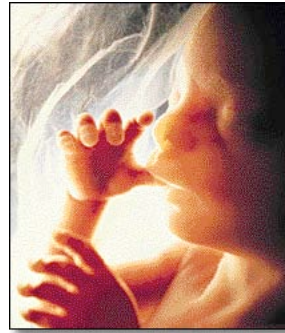


## Human fetal development

- The fetus just spends much of the 2<sup>nd</sup> & 3<sup>rd</sup> trimesters just growing  
...and doing various flip-turns & kicks inside amniotic fluid



Week 20



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## Human fetal development

- 24 weeks (6 months)

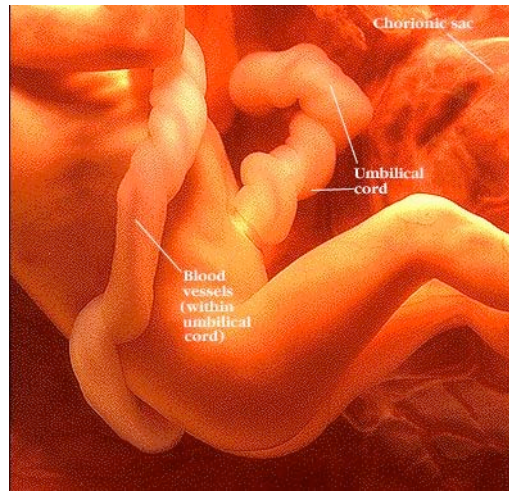
fetus is covered with fine, downy hair called lanugo. It's skin is protected by a waxy substance called vernix



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## Human fetal development

**30 weeks**

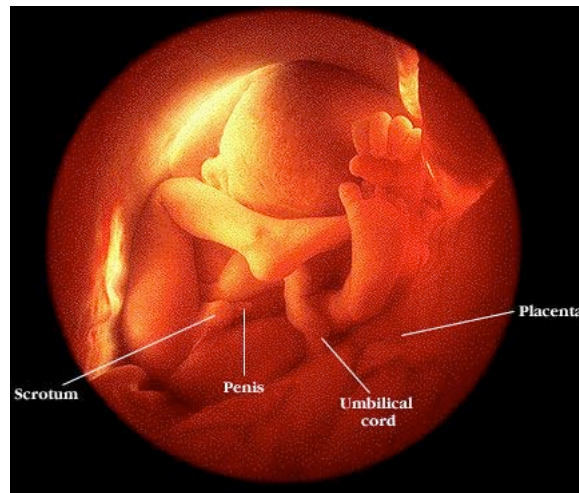


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## Human fetal development

▪ **32 weeks**

The fetus sleeps 90-95% of the day & sometimes experiences REM sleep, an indication of dreaming



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**The end of the journey!**



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