

## 29: EMBRYOLOGY: WEEK 5

We have two very different types of drawings here. The first one is very symbolic, with blue, red and yellow representing our three layers and what they are turning into. The second drawing will be more realistic, showing the three-dimensional shape of the embryo, similar to what you would see in a photograph.

We have two blue layers in this first drawing: the epidermis and the neural tube. The neural tube can't really be called by this name anymore, however. It is turning into the central nervous system and four distinct areas can be labeled: the spinal cord, the **forebrain**, **midbrain** and **hindbrain**. The forebrain will turn into the **cerebrum**, which is the gray wrinkly part we envision when we think of a brain. The cerebrum is the part that does "thinking." The midbrain will turn into many inner parts, such as the thalamus, the hypothalamus, and the hippocampus. These middle parts are important for regulating things such as appetite, body temperature, and blood pressure, and also for storing memories. The hindbrain will become the lower parts such as the cerebellum and the brain stem. These control basic function such as balance, reflexes, breathing, and the waking and sleeping cycles. The lower part of the neural tube turns into the spinal cord.

The endoderm has differentiated into areas that will become the digestive system and the lungs. Right where the throat branches off into both the esophagus leading to the stomach and the trachea leading to the lungs, there will be a flap called the **epiglottis** that can close over the tube that leads to the lungs while food is being swallowed. The endoderm also contributes to organs and glands that are associated with the digestive system such as the liver and pancreas. In the throat area the endoderm will contribute to the structure of the thyroid and other glands. (NOTE: The endoderm alone does not form all these systems. It becomes the inside layer of all of these. The mesoderm will form the outer part.)

The opening at the end of the gut tube is called the **cloacal** (*klo-AK-al*) **opening**. If you've studied birds, you might recognize the word **cloaca**. A cloaca is an opening that expels both urine and feces. Bird droppings are a mixture of urine and feces. The cloacal opening in a human embryo is a temporary structure and will eventually change into the anal opening. Right now the embryo is not expelling either urine or feces, and the wastes are being collected partially by the allantois. Some molecular wastes are also beginning to go out through the developing placenta. At this stage, both the mouth opening and the cloacal opening are not really open, but are covered with a membrane. In a few weeks the membranes will rupture and then openings will actually be open. The allantois will shrink and retreat to the inside of the embryo, helping to form the top part of the urinary bladder. (A remnant of the allantois will always remain on top of the bladder, but it will not have any function.) The yolk sac is also still visible and functioning at this stage.

We can also see the area where the heart is developing. Although not nearly fully formed yet, the cells are already beginning to contract in rhythm. Remember, these cells are joined by gap junctions so that they can communicate very well with each other. This diagram does not show the many blood vessels that have already formed. We saw them in the last drawing lesson.

The second drawing shows us a more realistic view of the embryo. We can see the bumpy somites, and we can see lumps that are the growing heart and liver. A tiny eye spot and ear spot are just barely visible. By the end of week 5 there are little bumps, or "buds," that are the beginnings of arms and legs. The end of the embryo is sometimes called the "tail bud," though it is not a tail. It will shrink as the legs grow. The amnion now looks more like a sac. Notice that the yolk sac is outside of the amniotic sac.

(NOTE: If you look at 5-6 week embryo pictures on the Internet, be aware that many of them will not show you the yolk sac, even though it is definitely still present at this stage.)