

## APPENDIX 2

### THE DEVELOPMENT OF THE UNBORN CHILD'S BODY

	<u>TIMING</u>	<u>SOURCE</u>
<b>ADRENAL GLANDS</b>		
The adrenal glands are developing.	8 <sup>th</sup> week after conception	Rugh, p 53
<b>AGE</b>		
Age is calculated from the first day of the last normal menstrual period (LNMP). This is the menstrual, or gestational, age. The actual age is calculated from the time of fertilization, about two weeks after the LNMP. Two weeks must be subtracted from the gestational age to arrive at the actual age of the developing human.	Nap	Moore, p 2
Ultrasonic tests can determine the size and probable age.	Nap	Moore, p 109
Menstrual, or gestational, age, is the length of time from the first day of the last menstrual period, a time that precedes conception by about two weeks.	Nap	Williams, p 151
<b>ANKLES</b>		
The ankles are present.	Day 54 after fertilization	England, p 181
<b>ANUS</b>		
The anus is present.	9 <sup>th</sup> week after fertilization	England, p 146
<b>ARMS</b>		
Upper limb buds appear.	Day 26 after fertilization	Larsen, p xi

Arm buds are present.	Day 26 +/- 1 of development	Williams, p 153
Upper limb buds are present.	Day 28 after fertilization	Moore, p 92
Arm buds are present.	Day 28 after fertilization	Sadler, front pages
Upper limbs are longer and bent at the elbows.	Days 49-51 after fertilization	Moore, p 91

## **BLADDER**

The urinary bladder is developing.	Day 39 after fertilization	Sadler, front pages
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## **BLOOD**

Blood and blood vessels begin to develop.	Days 13-15 after fertilization	England, p 110
The embryo begins to form blood cells.	Day 17 after conception	Rugh, p 17
The first blood vessels form.	Day 18 of development	Larsen, p 123
The mother's blood may be type O and that of fetus may be type A.	Nap	Rugh, p 217
Blood cells are developing.	End of 3 <sup>rd</sup> week after fertilization	Moore, p 76
Embryonic blood vessels begin to develop.	3 <sup>rd</sup> week after fertilization	Moore, p 76
Blood vessels appear.	3 <sup>rd</sup> week after fertilization	Williams, p 161
Blood cells and blood vessels are differentiated.	End of the 3 <sup>rd</sup> week of development	Sadler, p 77

The vascular system appears.	Middle of the 3 <sup>rd</sup> week	Sadler, p 208
The cardiovascular system has formed.	4 <sup>th</sup> week after fertilization	Williams, p 161
The aorta is developing.	Day 36 of development	Larsen, p 156
The major blood vessels of the body take on their final scheme.	Day 56 after conception	Rugh, p 53
Red blood cells are forming in the spleen.	End of 12 <sup>th</sup> week after fertilization	Moore, p 112

## **BONES**

The jaws, ribs, and vertebrae are changing from cartilage to bone.	7 <sup>th</sup> week after conception	Rugh, p 52
Ossification of the bones of the upper limbs has begun.	End of the 7 <sup>th</sup> week after fertilization	Moore, p 96
Ossification begins in the lower limbs, and is first recognizable in the femur.	8 <sup>th</sup> week after fertilization	Moore, p 97
The skeleton is developing.	2 <sup>nd</sup> month after conception	Rugh, p 52
Primary ossification centers appear in the, skelton, especially in the skull and long bones.	End of the 12 <sup>th</sup> week after fertilization	Moore, p 110, Sadler, p 113
Bones are clearly visible in ultrasound images.	Beginning of the 16 <sup>th</sup> week after fertilization	Moore, p 112

## **BRAIN**

The brain's divisions – the forebrain, the midbrain, and the hindbrain – are demarcated.	Day 19	Larsen, p 275
The forebrain is developing.	Day 26 after fertilization	Moore, p 95

The three primary parts of the brain are present.	Day 30 after conception	Rugh, p 41
The cerebral cortex, the part of the brain that controls the intellect and motor activity, begins to differentiate.	Day 33 after conception	Rugh, p 44
The cerebral vesicles are distinct.	Day 34 after fertilization	Moore, p 5
By using Doppler or real-time ultrasonic measurements, the brain can be visualized.	8 <sup>th</sup> week after fertilization	Williams, p 30

## **BREATHING**

Breathing movements have been detected.	9 <sup>th</sup> week after fertilization	Boddy, p 4
A fetus born at this time will attempt to breathe.	22 <sup>nd</sup> week after fertilization	Williams, p 154
The lungs are capable of breathing air. The central nervous system can direct rhythmic breathing and control body temperature.	26 <sup>th</sup> – 29 <sup>th</sup> weeks after fertilization	Moore, p 114

## **BRIDGE OF THE NOSE**

The bridge of the nose is visible.	Days 47-48 after fertilization	England, p 78
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## **BUTTOCKS**

The buttocks are present.	9 <sup>th</sup> week after fertilization	England, p 146
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## **CENTRAL NERVOUS SYSTEM**

The central nervous system begins to form.	Day 19 after fertilization	Sadler, front pages
The central nervous system appears.	Beginning of 3 <sup>rd</sup> week	Sadler, p 411
The anlage (i.e. the earliest discernible indication) of the central nervous system is present.	End of 4 <sup>th</sup> week of development	Larsen, p 52

## **CHEEK**

The cheek is visible.	Days 47-48 after fertilization	England, p 83
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## **CHIN**

The chin is visible.	8 <sup>th</sup> week after fertilization	England, p 81
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## **DIAPHRAGM**

The diaphragm forms.	Day 40 after conception	Rugh, p 47
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## **EARS**

The first indication of the developing internal ear can be found.	Approximately day 22	Sadler, p 382
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The primordia of the ears are present.	Day 23 after fertilization	Moore, p 5
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Otic placodes appear.	Days 24-25	Sadler, p 110
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The otic pit, a sign of the first development of the internal ear, is present.	Day 26 after fertilization	Moore, p 95
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The ear placode is present.	Day 28 after fertilization	Sadler, front pages
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The ears have started to form.	Day 30 after conception	Rugh, p 41
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The external ears are developing.	Days 35-49	Larsen, p 261
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Ear swelling is present.	Day 36 after fertilization	Sadler, front pages
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The ears are forming.	During the 2 <sup>nd</sup> month	Sadler, p 106
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The ears are developing rapidly.	7 <sup>th</sup> week after conception	Rugh, p 52
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The auricle, or external ear, is visible.	Day 54 after fertilization	England, p 92
The auricles of the external ear start to take on their final shape.	End of 8 <sup>th</sup> week after fertilization	Moore, p 100
The ears stand out from the head.	16 <sup>th</sup> week after fertilization	Williams, p 155; Moore, p 109

## **ELBOWS**

The elbows are developing.	Day 34 after fertilization	Sadler, front pages
The elbow region is visible.	Days 44-46 after fertilization	Moore, p 91
The elbows appear.	Day 44 after fertilization	Larsen, p xii

## **ESOPHAGUS**

The esophagus (the food tube leading to the stomach) begins to form.	Day 31 after conception	Rugh, p 43
The esophagus is developing.	4 <sup>th</sup> week of development	Sadler, p 274
The esophagus is developing.	Early in the 5 <sup>th</sup> week of development	Larsen, p 249

## **EYES**

The developing eye appears.	Day 22	Sadler, p 394
The primordia of the eyes are present.	Day 23 after fertilization	Moore, p 5
The lens placode is present.	Day 28	Sadler, p 90
The lens placode (the primordium of the lens) is present.	Day 28 after fertilization	Moore, p 92
The eye anlage is present.	Day 28 after fertilization	Sadler, front pages

The eyes begin their development.	Early in the 4 <sup>th</sup> week	Larsen, p 252
The development of the eye is first evident.	Beginning of the 4 <sup>th</sup> week after fertilization	Moore, p 492
The lens pits and optic cups are forming.	Day 30 after fertilization	Moore, p 5
Melanin first appears in the cells of the developing pigment retina.	Day 33	Larsen, p 257
Pigment can be seen in the retina.	Days 37-40 after fertilization	Moore, p 91
The eye muscles being to form.	Day 38 after conception	Rugh, p 47
The eyes become pigmented.	Day 40 after conception	Rugh, p 47
The eye is obvious, reflecting the fact that the retinal pigment has formed.	6 <sup>th</sup> week after fertilization	Moore, p 94
The eye is obvious.	About day 42 after fertilization	Moore, p 99
The pigmented eye is developing.	About 42 days after fertilization	Moore, p 99
The nerve cells of the retina form.	Day 44 after conception	Rugh, p 50
Pigmentation of the retina can be seen.	Days 43-49 of development	Sadler, p 110
The eyes are developing rapidly.	7 <sup>th</sup> week after conception	Rugh, p 52
The nerve connections from the retina to the brain are established.	Day 48 after conception	Rugh, p 51
The eye is heavily pigmented.	About 52 days after fertilization	Moore, p 100

The eyes are closing or closed.	9 <sup>th</sup> week after fertilization	Moore, p 109; Williams, p 155
Slow eye movements occur.	14 <sup>th</sup> week after fertilization	Moore, p 112
Rapid eye movements begin.	21 <sup>st</sup> week after fertilization	Moore, p 114
“Blink-startle” responses have been reported.	22 <sup>nd</sup> -23 <sup>rd</sup> weeks after fertilization	Moore, p 114
The eyes are open.	26 <sup>th</sup> week after fertilization	Moore, p 114

## **EYEBROWS**

Eyebrows are present.	13 <sup>th</sup> week after fertilization	England, p 209
Eyebrows are visible.	20 <sup>th</sup> week after fertilization	Moore, p 113
Eyebrows are visible.	By the 5 <sup>th</sup> month after fertilization	Sadler, p 114
Eyebrows are usually recognizable.	End of 22 <sup>nd</sup> week after fertilization	Williams, p 154

## **EYELASHES**

Eyelashes are usually recognizable.	End of 22 <sup>nd</sup> week after fertilization	Williams, p 154
Eyelashes are present.	26 <sup>th</sup> week after fertilization	Moore, p 109

## **EYELIDS**

The upper and lower eyelid primordia appear.	6 <sup>th</sup> week of development	Larsen, p 259
The eyelids are developing.	Day 40 after fertilization	Moore, p 238



The eyelids are formed.	Days 43-49 of development	Sadler, p 110
The eyelids form in the face.	Day 44 after fertilization	Larsen, p xii
The eyelids are closing.	End of 8 <sup>th</sup> week after fertilization	Moore, p 99-100
The eyelids are closed.	10 <sup>th</sup> week after fertilization	Moore, p 238

## **FACE**

The facial primordia begin to appear.	Early in 4 <sup>th</sup> week after fertilization	Moore, p 236
The face is developing.	Day 30 after fertilization	Sadler, front pages
The face is forming.	During the 2 <sup>nd</sup> month	Sadler, p 106
The face is unmistakably human.	2 <sup>nd</sup> month after conception	Rugh, p 54
The face begins to look human.	5 <sup>th</sup> week after conception	Rugh, p 45
The face becomes fuller and starts to look human.	Day 48 after conception	Rugh, p 51
The rudiment of the face is created.	Days 49 – 63	Larsen, p 230
The face is more human-like.	Days 50-56 after fertilization	Sadler, p 110
The face appears to be quite human.	Day 56 after conception	Rugh, p 53
Facial development mostly occurs.	4 <sup>th</sup> -8 <sup>th</sup> weeks after fertilization	Moore, p 236
By the end of the 8 <sup>th</sup> week after conception, the face clearly looks human.	End of 8 <sup>th</sup> week after fertilization	Moore, p 239

The face has all the human characteristics.	12 <sup>th</sup> week	Sadler, p 116
The appearance is human. The eyes face anteriorly. The ears have almost reached their final position on the sides of the head.	16 <sup>th</sup> week after fertilization	Moore, p 113
The parts of the face that form first are the lower jaw and the lower lip.	NAp	Moore, p 239

## **FEET**

Foot plates are developing.	Day 34 after fertilization	Moore, p 5; Sadler, front pages
The ends of the limb buds become flattened to form foot plates.	6 <sup>th</sup> week of development	Sadler, p 172
The feet have become distinct.	Day 37 of development	Larsen, p 209
Foot plates are formed on the lower limb buds.	Day 37 after fertilization	Larsen, p xii
Digital rays are present in the foot plates.	Days 36-42 of development	Sadler, p 110
Digital rays are separating.	Days 43-49	Sadler, p 110
Digital rays can be seen clearly in the foot plates.	Days 44-46 after fertilization	Moore, p 91
Notches appear between the digital rays in the feet	Days 49-51 after fertilization	Moore, p 91
The feet are well-formed and distinctly human.	8 <sup>th</sup> week after conception	Rugh, p 53

## FETUS

The fetal period begins on day 57 after fertilization and ends at birth. The tissues and organs that were formed during the embryonic period continue to grow during the fetal period, but the changes aren't as pronounced. Ultrasonic measurements are used to measure embryonic growth.

Day 57

Moore, p 3

## FINGERS

The primordia of the fingers, called digital rays, start to develop.

6<sup>th</sup> week after fertilization

Moore, p 94

Finger rays are visible.

Day 38 of development

Larsen, p 209

Finger rays are developing.

Day 38 after fertilization

Sadler, front pages

The rudiments of the fingers become evident.

Day 42 after conception

Rugh, p 47

The fingers are developing.

Day 43 after fertilization

Sadler, front pages

Thumbs and fingers with pads are present.

7<sup>th</sup> week after conception

Rugh, p 44

All the fingers are present.

7<sup>th</sup> week after conception

Rugh, p 52

The fingers are separated.

About day 52 after fertilization

Moore, p 100

The fingers are free.

Days 50-56

Sadler, p 110

The fingers are free and longer.

Days 52-53 after fertilization

Moore, p 91

The fingers of both hands are usually found close to the nose.

Day 56 after conception

Rugh, p 53

Local stimuli may induce partial closing of the fingers.

8<sup>th</sup> week after fertilization

Williams, p 169

The fingers are differentiated.	End of 10 <sup>th</sup> week after fertilization	Williams, p 154
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## **FINGERNAILS**

Fingernails begin to develop at the end of the digits.	About week 10 after fertilization	Moore, p 519
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Fingernail anlagen first appear.	About 10 <sup>th</sup> week	Larsen, p 311
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Fingernails are present.	End of 10 <sup>th</sup> week after fertilization	Williams, p 154
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## **FOREARM**

The forearm region can be distinguished.	Day 33 of development	Larsen, p 209
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## **FOREHEAD**

The forehead is developing.	Day 40 after fertilization	Moore, p 238
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## **GALLBLADDER**

The gallbladder appears.	Days 27-30 after conception	Rugh, p 42
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The gallbladder is developing.	Day 30 of development	Larsen, p 155
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The gallbladder is developing.	4 <sup>th</sup> week of development	Sadler, p 274
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## **HAIR**

The first hair follicles appear.	Day 44 after fertilization	Larsen, p xii
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Hair follicles first appear on the eyebrows, eyelids, upper lip, and chin.	End 2 <sup>nd</sup> month	Larsen, p 309
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Hair begins to develop.	9 <sup>th</sup> – 12 <sup>th</sup> weeks after fertilization	Moore, p 517
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Scattered rudiments of hair appear.	End of 10 <sup>th</sup> week after fertilization	Williams, p 154
Hair grows on the eyebrows and the upper lip.	End of 12 <sup>th</sup> week after fertilization	Moore, p 517
The first hairs appear in the region of the eyebrows and upper lip.	End of 3 <sup>rd</sup> month	Sadler, p 407
Scalp hair patterning is determined.	14 <sup>th</sup> week after fertilization	Moore, p 112
Some scalp hair is visible.	End of 18 <sup>th</sup> week after fertilization	Williams, p 154
Head hair is visible.	By the 5 <sup>th</sup> month after fertilization	Sadler, p 114
Hair becomes easily recognizable.	About 20 <sup>th</sup> week after fertilization	Moore, p 517
Head and body hair is visible.	20 <sup>th</sup> week after fertilization	Williams, p 155

## **HANDS**

Hand plates are present.	Day 33 after fertilization	Moore, p 5
Hand plates are developing.	Day 33 after fertilization	Larsen, p xii
Hand plates are developing.	Day 34 after fertilization	Sadler, front pages
Hand plates are formed and digital rays are present.	Days 33-36 after fertilization	Moore, p 91
Digital rays are present in the hand plates.	Days 36-42 of development	Sadler, p 110
Digital rays are clearly visible in the hand plates.	Days 41-43 after fertilization	Moore, p 91
Notches are present between the digital rays in the hand.	Days 44-46 after fertilization	Moore, p 91

Digital rays are separating.	Days 43-49 of development	Sadler, p 110
The hand plates are slightly flexed at the wrists.	Day 52 of development	Larsen, p 209
Digit separation in the hand is complete.	Day 56	Sadler, p 174
The hands are well-formed and distinctly human.	8 <sup>th</sup> week after conception	Rugh, p 53

## **HEART**

The embryo begins to form a heart.	Day 18 after conception	Rugh, p 17
The heart begins to pump.	Day 22 after fertilization	Larsen, p xi
The heart begins to beat.	Day 22 after fertilization	Moore, p 5; Larsen, p 104
The heart begins to beat.	Day 22 after fertilization	England, p 104
The heart starts to beat.	Day 24 after fertilization	Rugh, p 17
Blood begins to circulate throughout the embryo.	Day 24	Larsen, p 104
The heart begins to pump.	4 <sup>th</sup> week of development	Sadler, p 77
The separation of the heart into a primordial atrium and ventricle can be seen.	Day 28 after fertilization	Moore, p 95
Coronary vessels appear.	Day 32 after fertilization	Larsen, p xi
Echocardiography can detect heart movements.	About day 34 after fertilization	Williams, p 30
It is probable that the heartbeat of the embryo is similar to an adult's heartbeat.	Week 5 _ after conception	Rugh, p 53

The heart is contracting at a rate of 40 to 80 beats per minute, as measured with an electrocardiogram. 6<sup>th</sup> – 7<sup>th</sup> weeks after conception Rugh, p 53

The fetal heart is functionally complete and normal. 7<sup>th</sup> week after conception Rugh, p 53

## **HEELS**

The heels are developing. 7<sup>th</sup> week after conception Rugh, p 44

## **HUMAN LIFE**

Includes the period from conception to birth. From conception to birth Nijhuis, p xix

## **INTESTINES**

The intestines are defined. End of 1<sup>st</sup> month after conception Rugh, p 43

The primary intestinal loop forms. Day 32 after fertilization Larsen, p xi

The primary intestinal loop is forming. Approximately day 32 Sadler, p 281

The small intestine undergoes peristalsis. 9<sup>th</sup> week after fertilization Williams, p 169

The intestines are developing in the abdomen. 10<sup>th</sup> week after fertilization Moore, p 109; Williams, p155

## **JAWS**

The jaws are forming. 5<sup>th</sup> week after conception Rugh, p 45

The upper and lower jaws begin to fuse in the midline of the face. Day 38 after conception Rugh, p 47

The jaws are well-formed. Day 40 after conception Rugh, p 47

The lower jaw is developing. Day 40 after fertilization Moore, p 238

The lower jaw is developing. About day 56 after fertilization Moore, p 100

## **KIDNEYS**

The kidneys begin to develop. Early in 5<sup>th</sup> week after fertilization England, p 153

The kidneys are forming. Day 40 of development Larsen, p 156

The permanent kidneys appear. 5<sup>th</sup> week Sadler, p 305

The permanent kidneys are actively forming. 8<sup>th</sup> week after conception Rugh, p 54

## **KNEES**

The knees are developing. Days 47-48 after fertilization England, p 180

## **LARYNX**

The larynx is developing. Approximately day 32 Sadler, p 281

## **LEGS**

Leg buds are present. Day 28 +/- 1 after fertilization Williams, p 153

Leg buds are present. Day 29 after fertilization Sadler, front pages

Leg buds begin to form. Day 31 after conception Rugh, p 43

The legs have become distinct. Day 37 of development Larsen, p 209

The legs are short and the thighs are relatively small. Beginning of the 9<sup>th</sup> week after fertilization Moore, p 111



## LIMBS

Upper limb buds appear.	Day 24 of development	Larsen, p 209
Lower limb buds appear.	Day 28 of development	Larsen, p 209
Upper limb buds are present.	Day 26 after fertilization	Moore, p 5
Upper limb buds appear.	Days 26-27 of development	Sadler, p 110
Lower limb buds appear.	Days 28-30 after fertilization	Moore, p 91
Hind limb buds appear.	Days 28-30 of development	Sadler, p 110
Limb buds become visible.	End of 4 <sup>th</sup> week of development	Sadler, 7 <sup>th</sup> edition, p 154
Forelimbs are paddle-shaped.	Days 31-35 of development	Sadler, p 110
The limbs are forming.	2 <sup>nd</sup> month	Sadler, p 106
The forelimbs and hindlimbs appear as paddle-shaped buds.	Beginning of 5 <sup>th</sup> week	Sadler, p 106
Limb development takes place.	5 <sup>th</sup> – 8 <sup>th</sup> weeks of development	Larsen, p 209
The upper limbs are longer and bent at the elbows.	Days 49-51 after fertilization	Moore, p 91
The upper limbs are slightly bent at the elbows.	Day 52 of development	Larsen, p 209
The limbs are long and bent at the elbows and knees.	Days 50-56 of development	Sadler, p 110
All regions of the arms and legs are well-developed, including the toes.	Day 56 of development	Larsen, p 213

All areas of the limbs are apparent. In addition, the digits have lengthened and are completely separated.	End of week 8 after fertilization	Moore, p 97
The upper limbs have almost reached their final relative lengths and are a bit better developed than the lower limbs.	End of the 12 <sup>th</sup> week after fertilization	Moore, p 111
The lower limbs are well-developed.	14 <sup>th</sup> week after fertilization	Williams, p 155; Moore, p 109

## **LIPS**

The upper and lower lips are forming.	Early in 6 <sup>th</sup> week after fertilization	Moore, p 523
The upper lip is forming.	Days 43-49 of development	Sadler, p 110
The upper and lower lips are forming.	9 <sup>th</sup> week	Sadler, p 376

## **LIVER**

The liver is the first gastric gland or organ to develop.	Nap	Rugh, p 42
Liver cells begin to draw together.	Day 21 after conception	Rugh, p 42
The liver is developing.	4 <sup>th</sup> week of development	Sadler, p 274
The liver bud is present.	End of 1 <sup>st</sup> month	Sadler, p 271
The liver bud sprouts.	4 <sup>th</sup> week	Larsen, p 157
The liver bud is present.	Approximately day 25	Sadler, p 281
Liver cells can be recognized as the liver.	Days 27-30 after conception	Rugh, p 42
Liver ducts are forming.	5 <sup>th</sup> week after conception	Rugh, p 46

The liver is developing.	Day 39 after fertilization	Sadler, front pages
The liver is developing.	About 48 days after fertilization	Moore, p 99
Red blood cells are formed primarily in the liver.	9 <sup>th</sup> week after fertilization	Moore, p 112

## **LUNGS**

The lung bud is present.	Day 22	Sadler, p 210
The lung bud appears.	Days 22-24	Larsen, p 82
Lung buds may be seen.	Day 27 after conception	Rugh, p 43
The lung bud branches into left and right bronchial buds.	Days 26-28	Larsen, p 82
The lung bud appears.	Approximately 4 <sup>th</sup> week of development	Sadler, p 260
The lung bud develops.	4 <sup>th</sup> week after fertilization	Moore, p 262
Bronchi begin to form in the right and left lung.	7 <sup>th</sup> week after fertilization	Moore, p 262
The lungs have lobes and many-branched bronchioles.	8 <sup>th</sup> week after conception	Rugh, p 53

## **MOUTH**

The mouth opens for the first time.	Day 28 after conception	Rugh, p 42
The primitive mouth is forming.	Day 31 after fertilization	Moore, p 5
The oral and nasal cavities are confluent.	Day 36 after fertilization	Moore, p 5

The oral cavity is developing.	6 <sup>th</sup> week	Sadler, p 376
The mouth is present.	About day 56 after fertilization	Moore, p 100
Opening the mouth may be induced by local stimuli.	8 <sup>th</sup> week after fertilization	Williams, p 169

## **MUSCLE**

Building blocks are present for 40 pairs of muscles, which are located from the base of the skull to the bottom of the spinal column.	Day 28 after conception	Rugh, p 35
Muscles appear in the pelvic region.	Day 31 after conception	Rugh, p 43
All of the muscle blocks have appeared.	Day 36 after conception	Rugh, p 46
Muscular layers of the stomach, esophagus, and intestines begin to proliferate.	Day 56 after conception	Rugh, p 53
The first indication of limb musculature is observed.	7 <sup>th</sup> week of development	Sadler, 7 <sup>th</sup> edition, p 168

## **NECK**

A distinct neck connects the head with the body.	7 <sup>th</sup> week after conception	Rugh, p 51
The neck region is established.	End of 8 <sup>th</sup> week after fertilization	Moore, p 99
The neck is developed.	End of 8 <sup>th</sup> week after fertilization	England, p 96
The neck is well-defined.	12 <sup>th</sup> week after fertilization	Moore, p 109; Williams, p 155

## **NERVOUS SYSTEM**

The nervous system begins to form.	Day 18 after conception	Rugh, p 33
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The foundation of the brain, spinal cord and entire nervous system is established. The eyes also begin to be formed.	Day 20 after conception	Rugh, p 33
Movement of the muscles is being controlled by the nervous system.	6 <sup>th</sup> week after conception	Rugh, p 34
<b>NIPPLES</b>		
Nipples are formed.	Days 43-49 of development	Sadler, p 110
Nipples appear.	Day 44 after fertilization	Larsen, p xii
Nipples are visible.	Days 44-46 after fertilization	Moore, p 91
<b>NOSE</b>		
Nasal placodes – the primordia of the nose and the nasal cavities – have developed.	End of 4 <sup>th</sup> week after fertilization	Moore, p 239
Nasal placodes are present.	Day 30 after fertilization	Sadler, front pages
The nasal pits, which are the primordia of the nostrils and the nasal cavities, are forming.	Day 30 after fertilization	Moore, p 5 & p 239
The nasal organs have started to form.	Day 30 after conception	Rugh, p 41
The nasal pits are visible.	Days 31-32 after fertilization	Moore, p 91
The nasal pits are formed.	Days 31-35 of development	Sadler, p 110
The nasal pits deepen to form the nasal cavity.	Days 35-42	Larsen, p 230
The nostrils are developing.	Day 40 after fertilization	Moore, p 238
The nose is formed.	Day 38 after fertilization	Moore, p 5

The nose is forming.	During the 2 <sup>nd</sup> month	Sadler, p 106
The nasal passages open to the outside.	Day 46 after conception	Rugh, p 51
The nasal chamber is developing.	7 <sup>th</sup> week	Sadler, p 376
The nose is stubby.	About day 52 after fertilization	Moore, p 100

## **OVARIES**

The ovaries are differentiated.	16 <sup>th</sup> week after fertilization	Moore, p 112 & p 113
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## **PALATE**

The palate is developing.	About day 32 after fertilization	Moore, p 98
The palate is forming.	Day 44 after conception	Rugh, p 50
The primary palate is developing.	7 <sup>th</sup> week	Sadler, p 376

## **PALMS**

Palm creases appear.	3 <sup>rd</sup> month	Rugh, p 217
Fine palm lines have formed, which can be used to permanently identify the fetus. Finger, palm, and foot prints are never duplicated among individuals.	4 <sup>th</sup> month	Rugh, p 217

## **PANCREAS**

The dorsal pancreatic bud begins to grow.	Day 26	Larsen, p 158
The pancreas is defined.	End of 1 <sup>st</sup> month after conception	Rugh, p 43
The pancreas is developing.	4 <sup>th</sup> week of development	Sadler, p 274

The ventral pancreatic bud is present. The pancreas is developing.	Day 32 Approximately day 36	Larsen, p 157 Sadler, p 281
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The pancreas is developing.	Day 39 after fertilization	Sadler, front pages
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**PELVIS**

The pelvis is developing.	6 <sup>th</sup> week	Sadler, p 308
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**PENIS**

The penis and scrotum form.	5 <sup>th</sup> – 6 <sup>th</sup> weeks	Larsen, p 175
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The penis begins to form.	Day 42 after conception	Rugh, p 47
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**PHARYNX**

The pharynx is developing.	4 <sup>th</sup> week	Sadler, p 274
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The pharynx is developing.	About day 32 after fertilization	Moore, p 98
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The pharynx is present.	5 <sup>th</sup> week after fertilization	Rugh, p 45
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**PITUITARY GLAND**

The pituitary gland is developing.	5 <sup>th</sup> week after fertilization	Williams, p 178; Rugh, p 45
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**PRENATAL DEVELOPMENT**

The beginnings of the various organs and systems are established, especially in the third week when certain key organs start to develop.	1 <sup>st</sup> – 3 <sup>rd</sup> weeks of development	O’Rahilly, p 23
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The nervous, muscular, vascular, digestive, and skeletal systems are in an incipient state.	End of 1 <sup>st</sup> month after conception	Rugh, p 35,
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The beginnings of many of the organ systems, including the cardiovascular system, are established.	End of 4 <sup>th</sup> week after fertilization	Moore, p 91
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The embryo grows in length from 5 millimeters to approximately 16 to 17 millimeters.	Day 27 to day 37 of development	Sadler, p 220
It is believed that the majority of women do not realize they are pregnant during the first six weeks after conception.	6 <sup>th</sup> week after conception	Rugh, p 54
Although the embryo begins developing immediately after conception, the most visible advances occur during the third to eighth weeks.	3 <sup>rd</sup> – 8 <sup>th</sup> weeks after fertilization	Moore, p 2
The most important features of the body's form are determined because of the formation of organs that occurs during this time.	3 <sup>rd</sup> – 8 <sup>th</sup> weeks	Sadler, p 108
Most major organs and organ systems are formed during the embryonic period. The mother may not be aware of her pregnancy during this critical period, especially in the third and fourth weeks when the embryo is quite vulnerable.	During 3 <sup>rd</sup> – 8 <sup>th</sup> weeks	Sadler, p 106 & p 107
Great changes occur in appearance because of the emergence of a disproportionately large head and the formation of the limbs, face, ears, nose, and eyes.	During the 2 <sup>nd</sup> month	Sadler, p 106
The embryo has a distinct human appearance.	About day 56 after fertilization	Moore, p 100
The term embryo refers to the developing human being during the first eight weeks after conception. At the end of this period, all major structures have started to form.	End of 8 <sup>th</sup> week after fertilization	Moore, p 3
The embryonic period concludes at the end of the 8 <sup>th</sup> week after fertilization and the fetal period begins. Few, if any, new structures are formed after this time. Development during the fetal period involves growth and maturation of structures that are already present.	End of 8 <sup>th</sup> week after fertilization	Williams, p 153
The beginnings of all essential structures are present.	8 <sup>th</sup> week after fertilization	Williams, p 154



The organs and systems of the body are formed.	From late in the 3 <sup>rd</sup> week through the 8 <sup>th</sup> week	Larsen, p 319
The embryonic period consists of the first eight weeks after the last ovulation. During this time, the overwhelming majority (several thousand) of the named human structures appear, and the embryo is about 30 millimeters in length.	End of 8 <sup>th</sup> week	O’Rahilly, p 55
Scientists have examined the embryonic period in far greater detail than the fetal period, which begins in the ninth week and continues until birth. Few new features appear during the fetal period. Instead, the structures that are already present continue to develop.	End of 8 <sup>th</sup> week	O’Rahilly. p 55
The initial formation and development of nearly all of the organs is complete and they can be identified in a grossly recognizable state.	End of 8 <sup>th</sup> week of pregnancy	Carlson, p 407
The head is disproportionately large compared with the rest of the body.	End of 8 <sup>th</sup> week of pregnancy	Carlson, p 407
The embryo has human characteristics. The neck area is established and the eyelids are obvious and are closing. The auricles of the external ears begin to take their final shape.	End of 8 <sup>th</sup> week after fertilization	Moore, p 99
Squinting, incomplete closing of the fingers, and opening the mouth can be induced by local stimuli.	8 <sup>th</sup> week after fertilization	Williams, p 169
The face is broad, the eyes are widely separated, the ears are low-set, and the eyelids are fused. Humans develop continuously, starting at conception, but the changes don’t stop at birth. Obvious examples of further growth are the development of teeth and female breasts. In addition, the brain triples in weight between birth and age 16 years. By age 25, most developmental changes are finished.	9 <sup>th</sup> week after fertilization Nap	Moore, p 110 Moore, p 2

Physicians can now measure how the fetus is growing and what its state of health is with a very high degree of accuracy. Through advanced surgical procedures, doctors can operate on the fetus without leaving a scar.

Nap

Carlson, p 407

Ultrasonic imaging is used to measure the stages of development of the embryo.

Nap

Moore, p 3

## **PRIMORDIUM**

This term refers to earliest discernable sign of development of a particular organ or structure in the embryo. Similar terms are “rudiment” and “anlage”.

Nap

Moore, p 3

## **PROSTATE**

The prostate and seminal vesicles develop in males.

10<sup>th</sup> – 13<sup>th</sup>  
weeks

Larsen, p 175

## **QUICKENING**

The first definite perception of fetal movement by the mother.

Most often occurs during 14<sup>th</sup> – 18<sup>th</sup> weeks after fertilization

Williams, 18th edition, p 501

## **RECTUM**

The anorectal canal is developing.

7<sup>th</sup> week

Sadler, p 316

## **RESPIRATION**

Respiratory movements can transport amniotic fluid in and out of the respiratory tract

Beginning of the 4<sup>th</sup> month

Williams, p 177

Respiration is evident.

12<sup>th</sup> – 14<sup>th</sup> weeks after fertilization

Williams, p 169

## **RIBS**

The ribs begin to form and lengthen.

Day 35 of development

Larsen, p 48

## **SALIVARY GLANDS**

Some salivary glands appear.	About 6 <sup>th</sup> week after fertilization	Moore, p 236
The salivary glands begin to develop.	6 <sup>th</sup> -7 <sup>th</sup> weeks after fertilization	England, p 90

## **SEX**

The sex of the embryo is determined genetically.	At fertilization	Sadler, p 319
Genetic sex is established.	At fertilization	Williams, p 180
The embryo's chromosomal sex is determined.	At fertilization	Moore, p 37
The difference between a male and a female is determined genetically at the time of conception.	At conception	Rugh, p 7
Microscopic examination can identify the embryo's sex because the ovaries and testes have differentiated.	Day 46 after conception	Rugh, p 51
The gonads acquire male or female characteristics.	7 <sup>th</sup> week of development	Sadler, p 319
External examination can reveal whether the embryo is male or female.	Day 50 after conception	Rugh, p 7
External genitalia are starting to indicate whether the fetus will be male or female.	End of 10 <sup>th</sup> week after fertilization	Williams p 154
The sex can be established by ultrasonic measurement of the external genitalia.	12 <sup>th</sup> week after fertilization	Sadler, p 113
The sex is clearly distinguishable.	End of 12 <sup>th</sup> week after fertilization	Williams, p 154
The sex of the child can be determined from external examination.	12 <sup>th</sup> week after fertilization	Moore, p 109

## **SHOULDERS**

The shoulder region can be distinguished.	Day 33 of development	Larsen, p 209
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The shoulders are developing. About day 56 after fertilization Moore, p 100

## **SKIN**

The skin of the fetus is reddish and has a wrinkled appearance. During the 6<sup>th</sup> month after fertilization Sadler, p 114

## **SPINE**

The spinal cord is developing. About day 28 after fertilization Moore, p 97

Spinal nerves begin to sprout. Day 32 after fertilization Larsen, p xi

The spinal cord extends the entire length of the embryo. 3<sup>rd</sup> month of development Sadler, p 422

## **SPLEEN**

The spleen appears. Day 28 after fertilization Larsen, p xi

The spleen is forming. 5<sup>th</sup> week after conception Rugh, p 46

The spleen is formed. 5<sup>th</sup> week Larsen, p 159

## **STOMACH**

The stomach is developing. Approximately day 25 Sadler, p 281

The stomach is forming. About day 28 after fertilization Moore, p 97

The stomach appears. 4<sup>th</sup> week of development Sadler, p 276

The stomach is forming. Day 30 Larsen, p 157

The stomach begins to form. Day 31 after conception Rugh, p 43

The stomach is a scale model of what it will be at the time of birth.	Day 48 after conception	Rugh, p 52
<b>SWEAT GLANDS</b>		
Sweat glands are developing.	About 20 weeks after fertilization	Moore, p 517
Sweat glands first appear.	About 20 weeks	Larsen, p 311
<b>TEETH</b>		
The teeth begin to form.	Day 40 after conception	Rugh, p 47
The primary teeth are at the cap stage.	Day 56 after fertilization	Larsen, p xii
Tooth buds form from dental lamina.	4 <sup>th</sup> – 8 <sup>th</sup> weeks of development	Larsen, p 304
Dental buds are present.	8 <sup>th</sup> week	Sadler, 7 <sup>th</sup> edition, p 341
The tooth buds for permanent teeth begin to appear.	About 10 <sup>th</sup> week after fertilization	Moore, p 523
The tooth buds for the second and third permanent molars are developing.	At birth	Moore, p 523
<b>TESTES</b>		
The testes become identifiable.	6 <sup>th</sup> week	O’Rahilly, p 210
The testes have begun to descend.	20 <sup>th</sup> week after fertilization	Moore, p 113
<b>THIGHS</b>		
The thigh has become distinct.	Day 37 of development	Larsen, p 209

## **THYROID**

The thyroid gland begins to develop.	Day 20 after fertilization	Moore, p 5
The thyroid gland primordium first appears.	Late in 4 <sup>th</sup> week of development	Larsen, p 249
The thyroid is developing.	Late in 5 <sup>th</sup> week	Larsen, p 249
The thyroid gland, which plays a critical role in metabolism, begins developing.	End of month 1 after conception	Rugh, p 42
The thyroid is developing.	Approximately day 36	Sadler, p 281

## **TOES**

The rudiments of the toes become evident.	Day 42 after conception	Rugh, p 47
Toe rays are developing.	Day 43 after fertilization	Sadler, front pages
Toe rays appear.	Day 44 after fertilization	Larsen, p xii
The toes are developing.	Day 48 after fertilization	Sadler, front pages
The toes are well-formed.	7 <sup>th</sup> – 8 <sup>th</sup> weeks	Sadler, p 108
The toes are free.	Days 50-56	Sadler, p 110
The toes are beginning to separate.	About day 52 after fertilization	Moore, p 100
The toes are free and longer.	Days 54-55 after fertilization	Moore, p 91
The toes are separated.	About day 56 after fertilization	Moore, p 100
The toes are differentiated.	End of 10 <sup>th</sup> week after fertilization	Williams, p 154

## **TOENAILS**

Toenails begin to develop at the tips of the digits.	About 10 <sup>th</sup> week after fertilization	Moore, p 519
Toenails are forming.	End of 10 <sup>th</sup> week after fertilization	Williams, p 154
The nail anlagen form on the toes.	About 14 <sup>th</sup> week	Larsen, p 311
Toenails are present.	14 <sup>th</sup> week after fertilization	England, p 173

## **TONGUE**

The tongue appears.	Approximately 4 <sup>th</sup> week	Sadler, p 362
The development of the tongue begins.	Late in 4 <sup>th</sup> week of development	Larsen, p 247
The first sign of the tongue's development appears, the median tongue bud.	End of 4 <sup>th</sup> week after fertilization	Moore, p 233
The tongue appears.	Approximately 4 <sup>th</sup> week	Sadler, p 362
The tongue is developing.	Late in 5 <sup>th</sup> week	Larsen, p 249
The tongue is developing.	Early in 6 <sup>th</sup> week after fertilization	Moore, p 533
The tongue forms from the floor of the mouth.	Day 48 after conception	Rugh, p 51

## **TRACHEA (WINDPIPE)**

The trachea is developing.	During the 4 <sup>th</sup> week	Sadler, p 274
The trachea is developing.	Approximately day 30 after fertilization	Rugh, p 43
The trachea is developing.	Early in the 5 <sup>th</sup> week of development	Larsen, p 249

The trachea is developing.	5 <sup>th</sup> week after fertilization	Moore, p 262
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## **URETER**

The ureter is developing.	6 <sup>th</sup> week	Sadler, p 308
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## **URETHRA**

The penile urethra is forming.	End of 3 <sup>rd</sup> month	Sadler, 7 <sup>th</sup> edition, p 298
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## **UTERUS**

The uterus forms.	6 <sup>th</sup> – 7 <sup>th</sup> weeks	Larsen, p 175
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The uterus is formed.	18 <sup>th</sup> week after fertilization	Moore, p 113
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## **VAGINA**

The vagina forms.	6 <sup>th</sup> – 7 <sup>th</sup> weeks	Larsen, p 175
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Canalization of the vagina has begun.	18 <sup>th</sup> week after fertilization	Moore, p 113
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## **VERTEBRAE**

Somites, which will develop into the 33 pairs of vertebrae in the spinal column, are growing.	3 <sup>rd</sup> week after conception	Rugh, p 35
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## **VIABILITY**

The fetus is viable.	20 <sup>th</sup> week after fertilization	Moore, p 3
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A premature fetus born at this time may survive if given intensive care.	22 <sup>nd</sup> – 25 <sup>th</sup> weeks after fertilization	Moore, p 114
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## **WRIST**

The wrist is developing.	About day 48 after fertilization	Moore, p 99
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## ZYGOTE

An embryo, or a new human, comes into existence when a zygote is produced at fertilization by the combination of a sperm with an ovum. At conception Moore, p.2

The sperm has 23 chromosomes and so does the ovum, but the zygote has 46 chromosomes. Although half of its chromosomes come from each parent, the zygote is genetically different than either of them, and is, in fact, genetically unique. At fertilization Moore, p 37