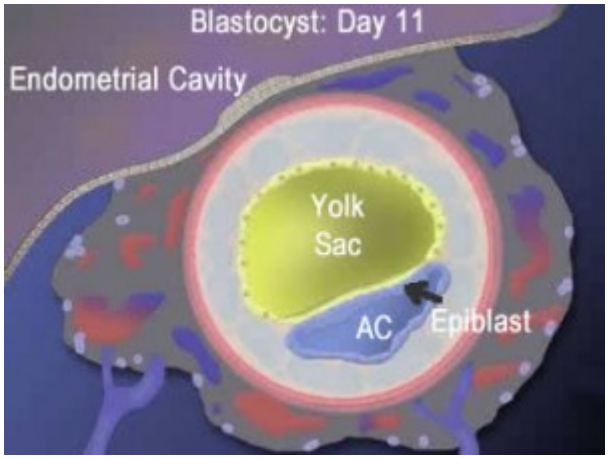
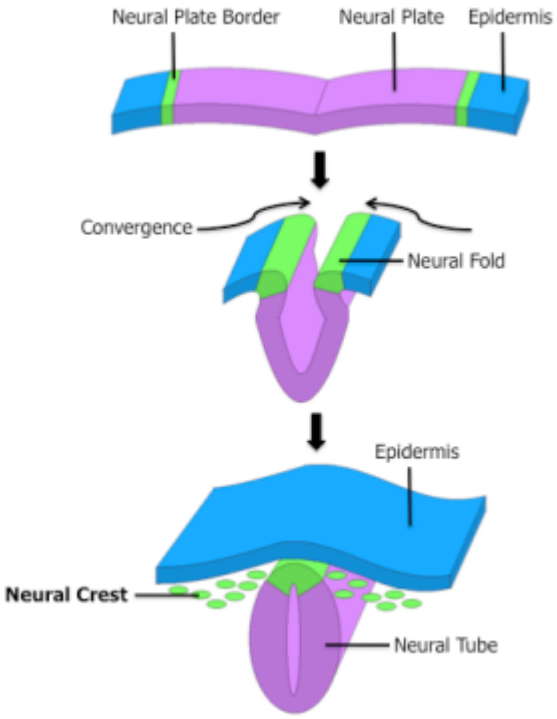
Normal CNS Embryology and Early Development



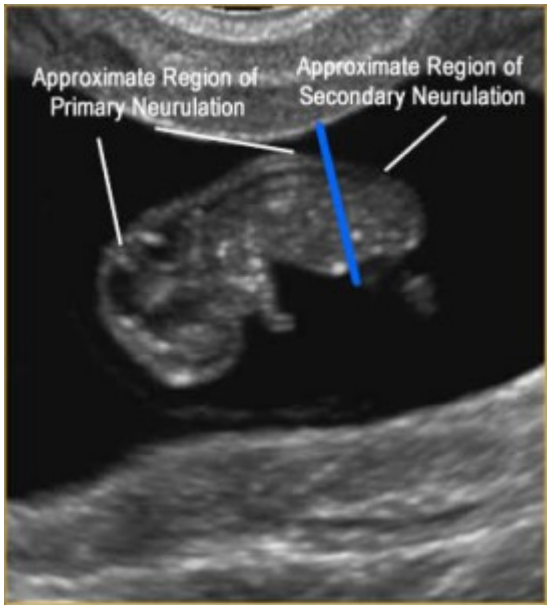
Above. The developing embryo is demonstrated at approximately Day 11. The arrow points to the epiblast or the embryonic disc, the cells of which are destined to form the fetus. A primitive streak develops from the epiblast by day 17 and by day 19, a notochordal* process occurs, with primitive neural folds by about day 23. By day 25, the first somites appear and by day 28, the neural folds begin to fuse. [1]

*from the mesoderm of the 3 cell layers which include ectoderm and endoderm.



Above:

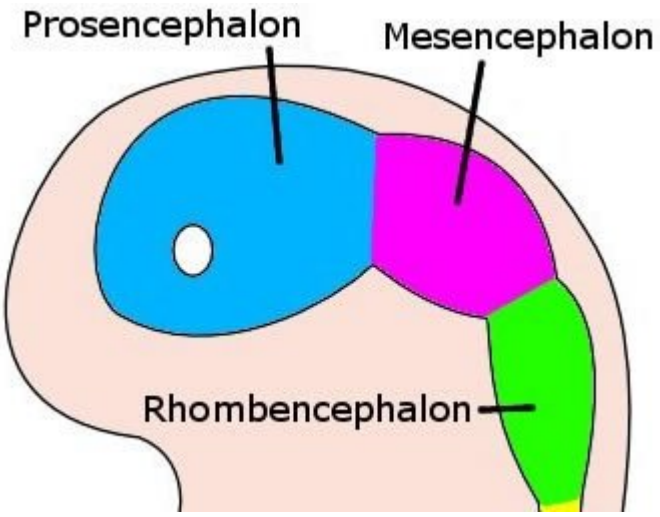
A. The precursor of the neural crest is ectoderm which is induced by a primary neural induction process most likely originating from the notochord and occurring from approximately day 19 to day 23. [2]
B. At around day 23, the neural folds begin to appear and fuse by day 29.
C. The neural tube is destined to form the brain and the spinal cord.
D. The continued folding of the ectoderm and endoderm fuse to form the body cavity.
Above figure. [3]



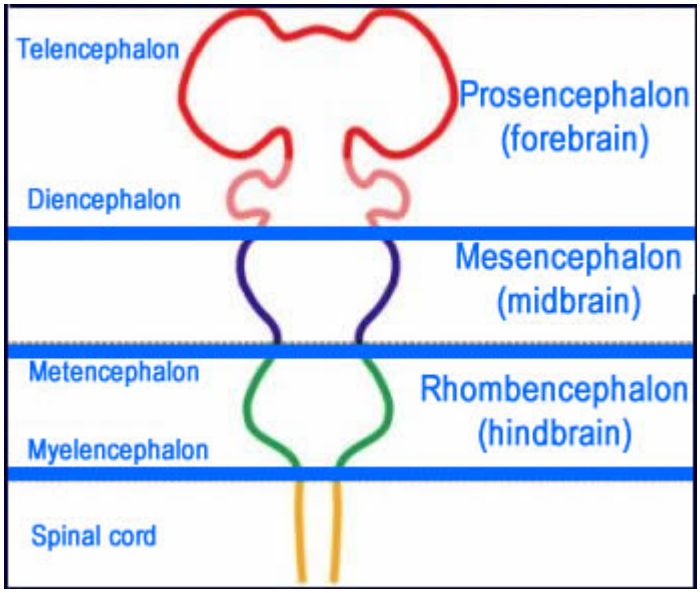
Above. The development of the central nervous system undergoes a process of neurulation.

Primary neurulation: the folding of the neural folds to form the neural tube.

Secondary neurulation: the neural development in the caudal (lower) part of the embryo by an indifferent cell mass known as the caudal eminence or end-bud. The region of secondary neurulation is induced by the caudal eminence.



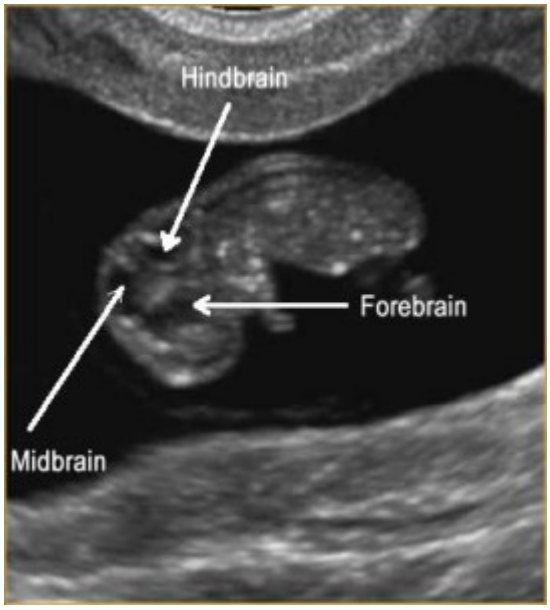
Above. In the 4th week, the upper part of the neural tube bends at the level of the future midbrain (the Mesencephalon). The Prosencephalon is the future fore-brain, and below the mid-brain is the hind-brain, the Rhombencephalon.
Above figure. [4]



Above. The prosencephalon consists of the telencephalon which forms the cerebral hemispheres, and the diencephalon which forms the optic and thalamic tissues.

The mesencephalon mid-brain remains unchanged and forms a portion of the brain stem (tectum, cerebral peduncle, pretectum, and mesencephalic duct). The rhombencephalon consists of the metencephalon and myelencephalon.

The metencephalon forms the part of the brain stem which includes the pons and cerebellum, and the myelencephalon forms the part of the brain stem which includes the medulla oblongata. Above figure. [5]



Above. The relative anatomic locations of the forebrain, midbrain, and hindbrain in the human fetus.

References

1

O'Rahilly, R. and Muller F., Human Embryology and Teratology. Second Edition. Wiley-Liss. 1996. pages 361-401.

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2

O'Rahilly, R. and Muller F., Human Embryology and Teratology. Second Edition. Wiley-Liss. 1996. pages 361-401.

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Source: http://en.wikipedia.org/wiki/Neural_crest

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