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Spinal Nerves

The dorsal part of the neural tube is called the *alar plate* and the ventral part is called the *basal plate* (Fig. 1.2). Neurons developing from the alar plate are predominantly sensory in function and give rise to *dorsal nerve roots* arising from the spinal ganglia, and those at the basal plate are predominantly motor neurons and give rise to *ventral nerve roots*. At appropriate levels of the spinal cord, the ventral roots also contain axons from developing autonomic neurons. The dorsal and ventral roots unite to form the *spinal nerves*, which emerge from the vertebral canal through the *intervertebral foramina* lying in between the neural arches.

The cells of the spinal (dorsal root) ganglia are initially bipolar. They become unipolar by the coalescence of their two processes on one side of the parent cells.

Late in the fourth week of embryonic development, the rostral part of the neural tube undergoes flexion at the level of the future midbrain (Fig. 1.3A). This region is known as the *mesencephalon*. A slight constriction marks its junction with the *prosencephalon* (future forebrain) and *rhombencephalon* (future hindbrain).

The alar plate of the prosencephalon expands on each side (Fig. 1.3A) to form the *telencephalon* (cerebral hemispheres). The basal plate remains in place as the *diencephalon*. Finally, an *optic outgrowth* from the diencephalon is the forerunner of the retina and optic nerve.

The diencephalon, mesencephalon, and rhombencephalon constitute the embryonic brainstem.

The brainstem buckles as development proceeds. As a result, the mesencephalon is carried to the summit of the brain. The rhombencephalon folds on itself, causing the alar plates to flare and creating the rhomboid (diamond-shaped) fourth ventricle of the brain. The rostral part of the rhombencephalon gives rise to the pons and cerebellum. The caudal part gives rise to the medulla oblongata (Fig. 1.4).

Ventricular System and Choroid Plexuses

The neural canal dilates within the cerebral hemispheres, forming the lateral ventricles; these communicate with the third ventricle contained within the diencephalon. The two lateral ventricles communicate with the third ventricle through the *foramen of Monro* (*interventricular foramen*). The third and fourth ventricles communicate through the *cerebral aqueduct* (or *aqueduct of Sylvius*) in the midbrain (Fig. 1.5).

The thin roofs of the forebrain and hindbrain are invaginated by tufts of capillaries, which form the choroid plexuses of