Chapter 9 – 2 to 4 Weeks: Germ Layers and Organ Formation

A. Organ Formation [1]
   1. Brain [1]
      i. By 3 weeks the brain is dividing into 3 primary sections called the forebrain, midbrain, and hindbrain [1]

Chapter 13 – Brain Growth

A. Rapid brain growth is evidenced by the changing appearance of the forebrain, midbrain, and hindbrain

Chapter 15 – 5 Weeks: Cerebral Hemispheres

A. Between 4 and 5 weeks, the brain continues its rapid growth and divides into 5 distinct sections [2]
   B. The cerebral hemispheres appear, gradually becoming the largest parts of the brain [3]
   C. Functions eventually controlled by the cerebral hemispheres [4]
      1. Thought [4]
      2. Learning [4]

Chapter 20 – 6 Weeks: Motion and Sensation

A. By 6 weeks the cerebral hemispheres are growing disproportionately faster than other sections of the brain

Chapter 23 – Hand Plates and Brainwaves

A. Brainwaves [5]
   1. Have been recorded as early as 6 weeks and 2 days [5]

Chapter 30 – 8 Weeks: Brain Development

A. At 8 weeks the brain is highly developed [6]
   B. At 8 weeks the brain constitutes almost half of the embryo [6]

Chapter 31 – Right- and Left-Handedness

A. By 8 weeks, 75% of embryos exhibit right-hand dominance [7]
   B. 25% of embryos are equally divided between left-handed dominance and no preference [7]
   C. This is the earliest evidence of right- or left-handed behavior [7]

Chapter 41 – 4 to 5 Months (16 to 20 Weeks): Stress Response, Vernix Caseosa, Circadian Rhythms

A. Circadian rhythms [8]
   1. From 19 weeks; fetal movement, breathing activity, and heart rate begin to follow daily cycles called circadian rhythms [8]

Chapter 43 – 6 to 7 Months (24 to 28 Weeks): Blink-Startle; Pupils Respond to Light; Smell and Taste

A. Brain growth [9]
1. During the third trimester of pregnancy, brain weight increases between 400 and 500% [9]
2. Rapid brain growth consumes more than 50% of the energy used by the fetus [9]

Chapter 44 – 7 to 8 Months (28 to 32 Weeks): Sound Discrimination, Behavioral States
A. Behavioral states [10]
1. The fetus displays periods of coordinated activity punctuated by periods of rest during the last 4 months of pregnancy [10]
2. Reflect the ever-increasing complexity of the central nervous system [10]

Footnotes

1 Bartelmez, 1923; O’Rahilly and Müller, 1999a; O’Rahilly and Müller, 1987; O’Rahilly and Müller, 1984; O’Rahilly and Gardner, 1979; Müller and O’Rahilly, 1983.
2 O’Rahilly and Müller, 1999a; Sadler, 2005.
3 O’Rahilly and Müller, 1987; Bartelmez and Dekaban, 1962; Moore, 1980; van Dongen and Goudie, 1980; O’Rahilly and Müller, 1999a; O’Rahilly et al., 1984; O’Rahilly and Gardner, 1979; Campbell, 2004.
5 van Dongen and Goudie, 1980; O’Rahilly and Müller, 1999a; Hamlin, 1964; Bernstine et al., 1955; Borkowski and Bernstine, 1955.
6 Jordaan, 1979; O’Rahilly and Müller, 1999a.
7 Hepper et al., 1998; McCartney and Hepper, 1999.
8 de Vries et al., 1987; Vitaterna et al., 2001; Rosenwasser, 2001; Romanini and Rizzo, 1995; Okai et al., 1992; Goodlin and Lowe, 1974.

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