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Chapter 16: Development, Stem Cells, and Cancer

***16.1 A program of differential gene expression leads to the different cell types in a multicellular organism***

24) Explain what occurs in *cell differentiation* and *morphogenesis*.

25. Differential gene expression results from different activators in different cells. How do different sets of activators come to be present in two cells? Explain how each of these occurs:

a. distribution of *cytoplasmic determinants*

b. different *inductive signals*

26. What is meant by *determination*? Explain what this means within an embryonic cell.

27. What process ensures that all the tissues and organs of an organism are in their characteristic places? Where do the molecular cues that control this process arise?

28. What is controlled by *homeotic genes*?

***16.2 Cloned organisms and stem cells are useful for basic research and other applications***

19) How is *nuclear transplantation* performed in animals?

21) What are *stem cells*? What is the major difference between *embryonic stem cells* (*ES*) and *adult stem cells*?

22) How might *induced pluripotent stem cells* (iPS) resolve the debate about using stem cells for medical treatments?

***16.3 Cancer results from genetic changes that affect cell cycle control***

29) What mechanism is involved in the beginning of tumor growth? Discuss *oncogenes* and proto*- oncogenes* and how they are converted. What mechanism is involved in the beginning of tumor growth?

30. *Tumor-suppressor genes* help prevent uncontrolled cell growth. One that is found mutated (and therefore nonfunctional) in more than 50% of human cancer is *p53*. So important is the *p53 gene* that it is sometimes called the “guardian angel of the genome.” Describe the double whammy that results from mutation of *p53*.

31. Explain the *multistep model of cancer development* and compare it to embryonic development.