Chapter 11: Cancer

I. Definition: rapid and inappropriate division of tissue cells

   A. Cancer cells divide before reaching maturity.
   
   B. Cancer cells divide more rapidly than normal tissue cells.
   
   C. Cancer cells produce more cells like themselves.
   
   D. Cancer cells can form a mass or tumor that invades surrounding tissue.
   
   E. Cancer cells can metastasize.

II. How Cells Normally Control Division

   A. Proto-oncogenes
      
      1. Are part of normal genome.
      
      2. Produce proteins involved in stimulating cell division.
         a. growth factors
         b. kinases
         c. gene-activating factors
      
      3. Only one copy must mutate to an oncogene to promote cancer.

   B. Tumor Suppressor Genes Inhibit Cell Division
      
      1. Produce proteins that block specific steps of chemical signal cascades.

      Example: p53
         a. Halts cell division if DNA is damaged.
            b. Induces death of damaged cells that cannot be repaired.
      
      2. Inactivation of genes allows uninhibited cell division.
      
      3. Both copies must mutate to promote cancer.
III. Cancer Results from a Series of Events

A. Both genes and environment usually play roles.
   1. inherited disorders  e.g., retinoblastoma
   2. viruses  e.g., adenovirus
   3. chemical mutagens
   4. high energy radiation

B. Example: colon cancer
   1. Multistep process
   2. At least one overactive oncogene
   3. Several inactive tumor suppressor genes

IV. Possible Cancer Treatments

A. Surgery

B. Radiation therapy

C. Chemotherapy

D. Gene therapy?