Section B: Chemical Signals and Their Modes of Action

1. A variety of local regulators affect neighboring target cells

2. Most chemical signals bind to plasma-membrane proteins, initiating signal transduction pathways

3. Steroid hormones, thyroid hormones, and some local regulators enter target cells and bind to intracellular receptors
1. A variety of local regulators affect neighboring target cells

- **Growth factors**: proteins and polypeptides that stimulate cell proliferation

- Example: nerve growth factor (NGF) affects certain embryonic cells, developing white blood cells, and other kinds of cells
• **Nitric oxide (NO)**

  • Though a gas, NO is an important local regulator.
  
  • When secreted by neurons, it acts as a neurotransmitter.
  
  • When secreted by white blood cells, it kills bacteria and cancer cells.
  
  • And when secreted by endothelial cells, it dilates the walls of blood vessels.
**Prostaglandins (PGs):** modified fatty acids.

- PGs secreted by the placenta stimulate uterine contractions during childbirth.
- Other PGs play a role in inflammation and the blood flow to the lungs.
2. Most chemical signals bind to plasma-membrane proteins, initiating signal-transduction pathways.
Different signal-transduction pathways in different cells can lead to different responses to the same signal.

Fig. 45.4

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• Signal-transduction pathways allow for small amounts of a hormone to have a large effect.
3. Steroid hormones, thyroid hormones, and some local regulators enter target cells and bind to intracellular receptors

- Examples: estrogen, progesterone, vitamin D, NO.
  - Usually, the intracellular receptor activated by a hormone is a transcription factor.

Fig. 45.3b