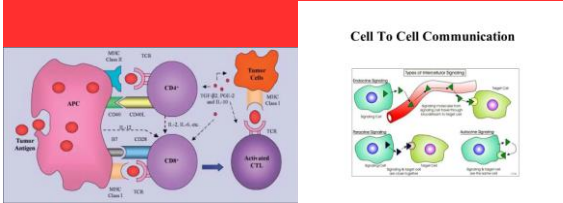
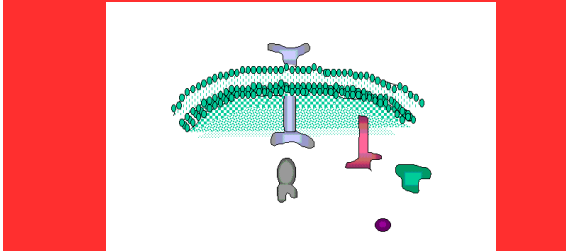


# 4.1 Cell Communication



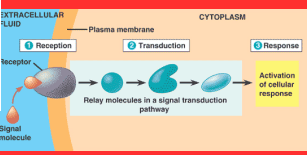
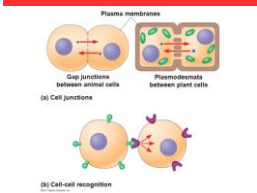
# ENDURING UNDERSTANDING

IST-3 Cells communicate by generating, transmitting, receiving, and responding to chemical signals.



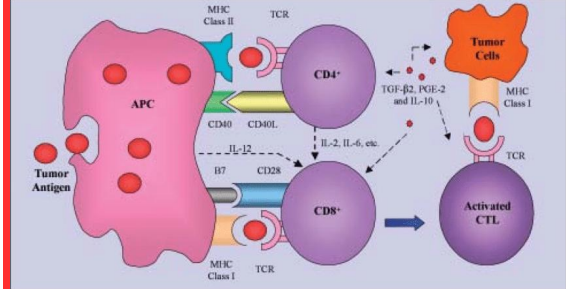
## IST-3.A Describe the ways that cells can communicate with one another

Cells communicate with each other through direct contact with other cells or from a distance via chemical signaling.



## Cells Communicate by Cell-to-Cell Contact

- Immune cells interact by cell-cell contact
- antigen-presenting cells (APCs) pass antigens to helper T-cells and killer T-cells.



## Cells communicate by cell-to-cell contact

- Plasmodesmata between plant cells allow material to be transported from cell to cell.

### Plasmodesmata create gaps that connect plant cells.

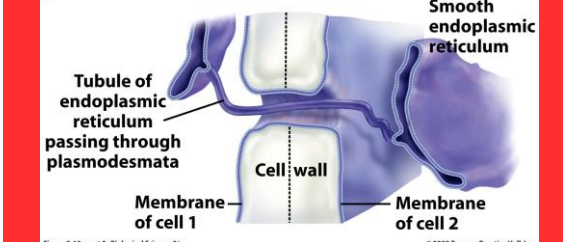
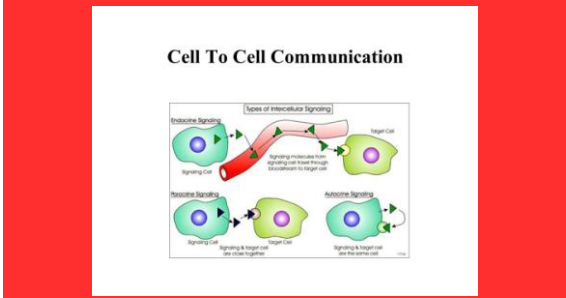


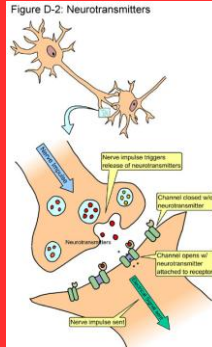
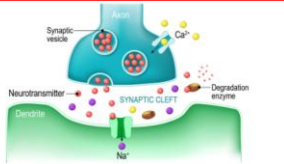
Figure 8-13a part 2 Biological Science, 2/e © 2005 Pearson Prentice Hall, Inc.

## IST-3.B Explain how cells communicate with one another over short and long distances



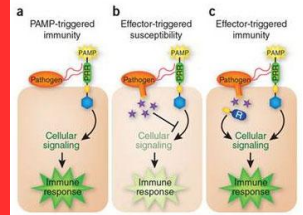
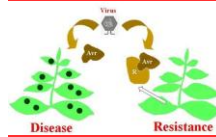
**Cells communicate over short distances by using local regulators that target cells in the vicinity of the signal-emitting cell**

- Neurotransmitters
  - Channel protein receptors detect neurotransmitters
  - Neurotransmitters that increase membrane permeability to sodium ions are excitatory.
  - Neurotransmitters that decrease membrane permeability to sodium ions are inhibitory.



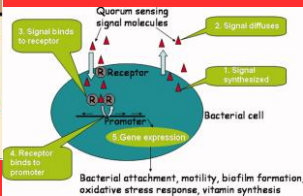
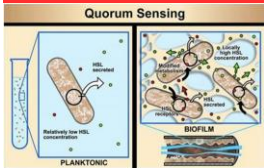
**Cells communicate over short distances by using local regulators that target cells in the vicinity of the signal-emitting cell**

- Plant immune responses
  - Innate (non-specific) and immediate
  - A pathogen attack produces a pathogen-associated molecular patterns (PAMPs)
  - These activate pattern-recognition receptors (PRRs) from plant
  - This "signal signature" results in the activation of a specific set of defense-related genes



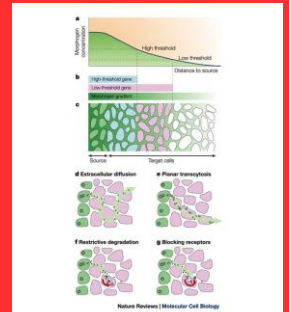
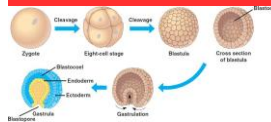
**Cells communicate over short distances by using local regulators that target cells in the vicinity of the signal-emitting cell**

- Quorum Sensing in microorganisms
  - Increase population in specific area.
  - Creates biofilms



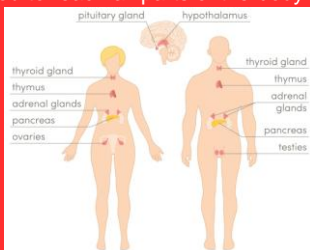
**Cells communicate over short distances by using local regulators that target cells in the vicinity of the signal-emitting cell**

- Morphogens in embryonic tissue
  - Signal tissue development
  - Diffusion creates gradients that affect development



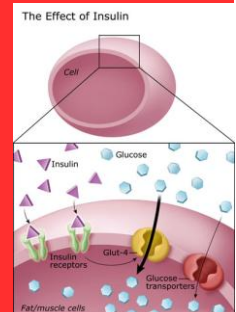
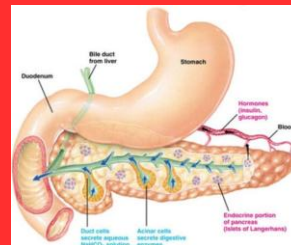
**Signals released by one cell type can travel long distances to target cells of another cell type.**

- Endocrine cells release signaling molecules, which are specific and can travel long distances through the blood to reach all parts of the body.



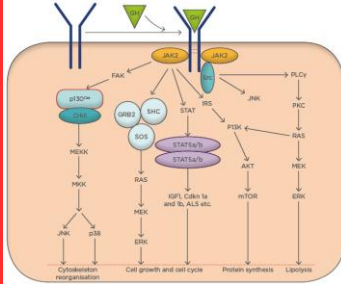
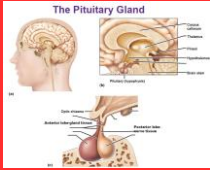
**Insulin**

- Secreted by Pancreas in response to elevated glucose levels
- Signals uptake of glucose by cells



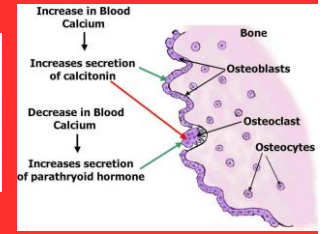
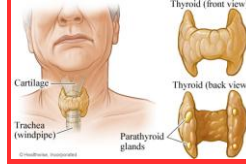
## Human Growth Hormone

- From Anterior Pituitary
- Stimulates cell growth



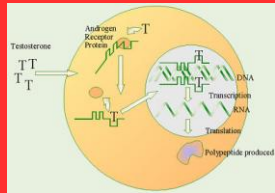
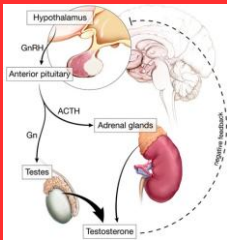
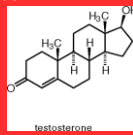
## Thyroid Hormones

- Increases metabolism and heat production (*calorigenic effect*) in most cells
- Regulate high Ca<sup>2+</sup> levels with calcitonin
- Ca<sup>2+</sup> ions regulate response



## Testosterone

- Secreted by testes, ovaries, and adrenal glands
- Binds to AR (androgen receptors)
- Acts as a "selective transcription factor"
- Response depends on target tissue



## Estrogen

- Major sex steroid hormone produced by ovaries in women.
- Also produced in a lesser amount in men.
- Receptors include the brain, bones, and blood vessels
- Estrogen targets appear at 3 different cellular levels.
  - Membrane targets. (estrogen receptors (ER) and ion channels)
  - Cytosolic targets (signal pathways for gene expression or protein activation)
  - Nuclear targets (direct modulation of gene expression).

