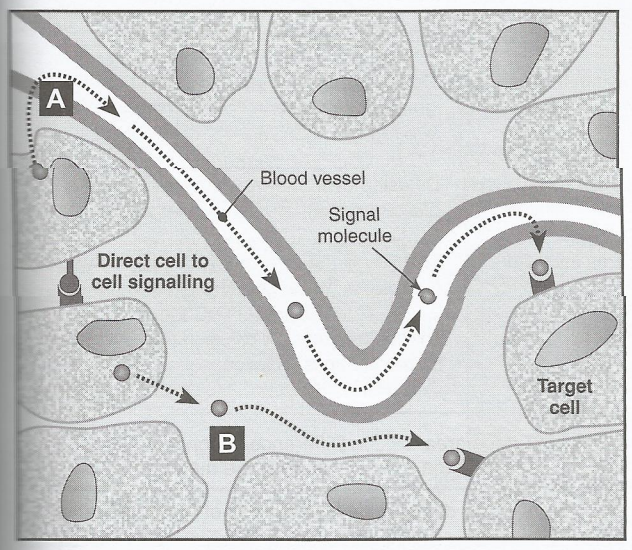
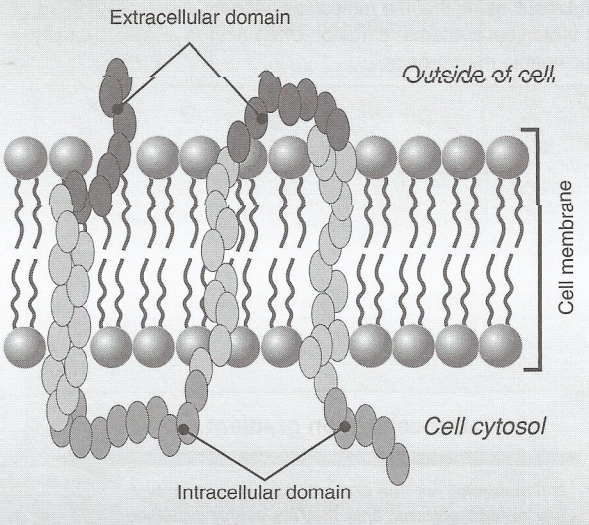
Cell Signalling and Receptors

Cells use **signals** (chemical messengers) to gather information about, and respond to, changes in their cellular environment and for communication between cells. The reception of the signal by membrane receptors is followed by a **signal transduction pathway**. Signal transduction often involves a number of enzymes and molecules in a **signal cascade**, which results in a large response in the target cell. Cell signalling pathways are categorised primarily on the distance over which the signal molecule travels to reach its target cell, and generally fall into three categories. The **endocrine** pathway involves the transport of hormones varying distances through the circulatory system. During **paracrine** signalling, the signal acts locally upon neighbouring cells. Cells also produce and respond to their own signals in a process called autocrine signalling.



Cells communicate through a variety of mechanisms. Hormone or **endocrine signals** are released by ductless endocrine glands and carried long distances through the body by the circulatory system to the target cells. Examples include sex hormones, growth factors and neurohormones such as dopamine. Signal molecules can also act upon target cells within the immediate vicinity (this is called **paracrine signalling**). The chemical messenger can be transferred through the extracellular fluid (e.g. at synapses) or directly between cells, which is important during embryonic development.

Structure of a Transmembrane Receptor



Transmembrane receptors span the cell membrane and bind signal molecules (ligands) which cannot cross the plasma membrane on their own. They have an extra-cellular domain outside the cell, and an intracellular domain within the cell cytosol. Ion channels and protein kinases are examples of transmembrane receptors.

1. Explain what is meant by cell signalling: _____

2. Identify the type of cell communication indicated by the letters A and B in the diagram, above left:

   (a) A: _____

   (b) B: _____

3. Describe the components that all cell signalling mechanisms have in common: _____

4. Explain the role of membrane-bound receptors in:

   (a) Hormonal responses: _____

   (b) Responses to drugs: _____

© BIOZONE International 2008-2011
ISBN: 978-1-877462-82-5
Photocopying Prohibited

Related activities: *New Medicines*
Weblinks: *Cell Communication, Hormones, Receptors and Target Cells*