Ion	Cytoplasm (mM)	Extracellular fluid (mM)	Ratio of Permeabilities	Nernst Potential (mV)
K^+	400	20	1	−74
Na^+	50	440	0.04	55
Cl^-	52	560	0.45	−60

Note: Data were recorded at 6.3°C, resulting in $\frac{KT}{q}$ = 25.3 mV.

Cell to Cell Signaling.

Cell-to-Cell Signaling is the Process where Cells Communicate with each other by Sending and receiving Signals, enabling them to Coordinate their activities and respond to their environment.

This Communication is vital for Various biological Processes, including development, Immunity and tissue maintenance.

Cells Can Signal each other through direct Contact or by releasing Signaling molecules that are received by other Cells.

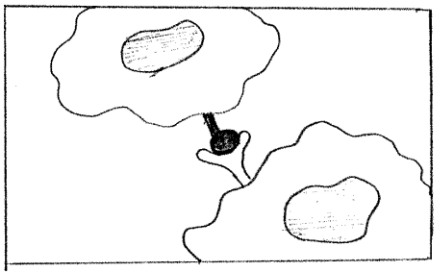
Signaling Molecules and their receptors:

A Variety of Signaling molecules (from Simple gases to Proteins) act as ligands that bind to receptors expressed by their target cells.

There is a Considerable Variation in the Structure and function of the different types of molecules that Serve as Signal transmitters.

Modes of Cell-Cell Signaling:-

1. Direct Cell-Cell Signaling:-



→ Signaling by direct Cell-Cell interactions Plays a Critical role in regulating the behaviour of Cells in animal tissues.

→ The interactions take place during embryonic development as well as in the maintenance of adult tissues.

2. Signaling by Secreted Molecules:-

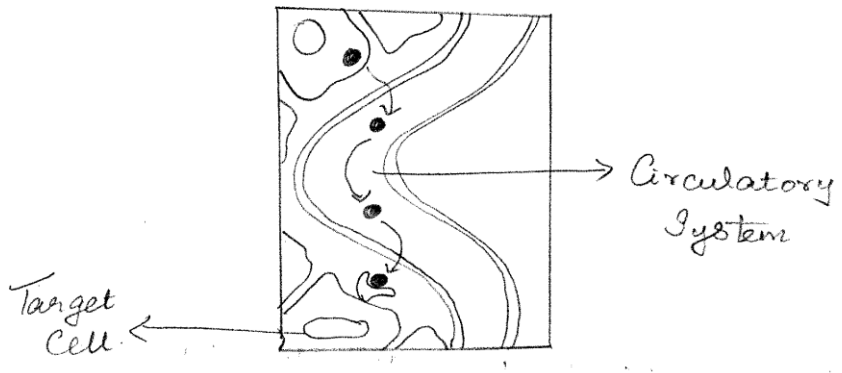
This type of Signaling Can be divided

into three general Categories based on the distance over which Signals are transmitted.

(a) Endocrine Signaling

The Signaling molecules (hormones) are Secreted by Specialized endocrine cells and Carried through the Circulation to act on target cells at distant body Sites.

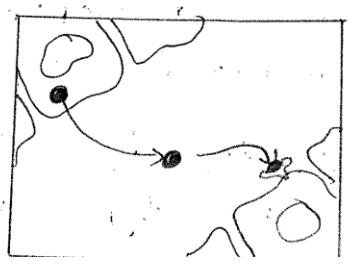
e.g., endocrine glands. Pituitary, thyroid, Parathyroid, Pancreas, adrenal glands and gonads.



(b) Paracrine Signaling:-

A molecule released by one cell acts on neighbouring target cells,

e.g., Neurotransmitter.

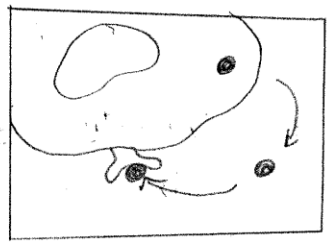


(c) Autocrine Signaling :-

Some cells respond to signaling molecules that they themselves Produce.

for eg :- T- lymphocytes

Abnormal autocrine signaling frequently Contributes to the uncontrolled growth of Cancer cells.



Types :-

1. Steroid Hormones and Nuclear Receptor Superfamily :-

Steroid Hormones → molecules that diffuse across the plasma membrane of their target cells and bind to intracellular receptors.

Nuclear Receptor Superfamily → factors and directly regulate gene expression in response to ligand binding.

2. Nitric Oxide and Carbon Monoxide :-

Nitric Oxide → Synthesized from the amino acid arginine by the enzyme

nitric Oxide Synthase.

Carbon monoxide → Signaling molecule in the nervous System.

3. Neurotransmitters:-

→ They are Small, hydrophilic molecules that Carry Signals between neurons and target cells.

4. Peptide Hormones and Growth factors:-

The widest Variety of Signaling molecules in animals are Peptides, ranging from only a few to more than 100 amino acids.

Cyto Kines - regulates the development and differentiation of blood Cells and Control the activities.

5. Eicosanoids:-

The Eicosanoids are a Class of lipids that function in Paracrine and autocrine Signaling.

—