

READING NOTES: SIGNALLING

MICHAEL DEWITT

Caveat Emptor

1. SIGNALS AND RESPONSES

- Receptors can be extracellular or intracellular
 - Extracellular receptors activate intracellular cascades that affect protein activity or transcription
 - Intracellular receptors initiate transcription
- Extracellular ligands can act locally or through long distance pathways
- Many proteins don't move into the cell but they can initiate efficient signalling
- If a protein is hydrophilic it won't move into the cell without some additional help (e.g., a channel, a chaperone protein)
- Hydrophobic and some gases can permeate the cell membrane and thus don't necessarily require chaperones or channels
- Hydrophobic molecules work through intracellular receptors to often direct nuclear transcription
- **Steroids** are large hydrophobic molecules which are developmental signals

1.1. Cell-cell communication.

- **Contact dependent** cells touch each other
- **Paracrine** acts through nearby cells (e.g., local mediators and signal cells interact with local targeted cells)
- **Synaptic** often in neurons which acts more locally
- **Endocrine** most common in mammalian cells where an endocrine cell enters blood stream, interacts with a receptor, then triggers target cell.

1.2. Response Rates.

- **Gene expression** is generally slower (minutes to hours) due to the number of steps (transcription, translation, error checking)
- **Altered protein function** are fast. Typically phosphorylation.

Molecules with rapid turnover can in concentration much more dramatically. Also describes inherit stability. Many RNAs and proteins are unstable so they have a typically smaller half-life. Smaller/ shorter half-lives have a more drastic impacts to signalling.

REFERENCES

DEPARTMENT OF BIOLOGY, WAKE FOREST UNIVERSITY, WINSTON SALEM, NC 27101
Email address: dewitt23@wfu.edu
URL: www.michaeldewittjr.com