

Difference Between Mode of Action and Mechanism of Action

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Key Difference – Mode of Action vs Mechanism of Action

When a substance enters a living cell, it brings about physical, chemical, structural and functional changes by interacting with the host's [metabolism](#) and biochemical pathways. These interactions can either induce the normal action of the cell or inhibit the action of the cell. During [drug](#) discovery and administration, it is of great importance to identify the effect caused by the drug to the host system and how the effect is caused by bio chemical interactions, which is more appropriately termed as the Pharmacokinetics of the drug. The terms, Mode of action and Mechanism of Action describe the above two scenarios. **Mode of action of a biomolecule entering the body refers to the mode in which the action is brought about and is characterized by the changes that take place in terms of physiological aspects. Mechanism of action refers to the process by which a substance undergoes bio chemical changes within the host in order to bring about the specific action of the administered substance.** This is the key difference between Mode of Action and Mechanism of Action.

What is Mode of Action?

Mode of action of a substance such as a drug, an [antibiotic](#) or a [pesticide](#) or a weedicide refers to the physical, anatomical or functional change caused by the action of that particular substance to the host cell. This change is described at the cellular level, but the outcomes could be macroscopic. The mode of an antibiotic such as [Penicillin](#), which is isolated from *Penicillium notatum*, is the destruction of the [bacterial cell](#) wall by preventing the cross link formation between the [peptidoglycan](#) layers. This will result in further destruction of the particular pathogenic bacteria. Thus, the mode of action is important in characterizing substances into groups based upon its resulting actions. For example, all antibiotics that inhibit cell wall synthesis in pathogenic bacteria are classified as cell wall degrading antibiotics and Penicillin, ampicillin and β – lactam containing antibiotics are classified under this category.

What is Mechanism of Action?

The mechanism of action of any biomolecule entering the host system describes the series of bio chemical reactions they undergo in the host cell which results in their mode of action. Biochemical alterations that take place after the administration of a biomolecule is specific and take place under controlled conditions. They can be an [enzyme](#) resulting in forming an enzyme – substrate complex or a ligand binding with its receptor via weak interactions or an antibody binding with its [antigen](#). The changes brought about by interfering the host cell metabolism is also known as the Pharmacokinetics of a drug or any other chemical entering the cell. The mechanism of action of a drug/antibiotic or any other chemical is highly specific. Thus, when administering correct doses, drugs that are determined upon prolonged research on the particular molecule should be administered. The specific substance should be targeted for a specific cell or organ in the host where that substance will interact with the host mechanism either to upregulate or downregulate the action.

The mechanism of action of Penicillin can be described as follows;

The β lactam ring of penicillin irreversibly binds with the active sites of transpeptidase and acylates by preventing the formation of cross links. When cross link formation is prevented, the cell wall formation in bacteria is prevented. Thus, a specific inhibitor enzyme reaction takes place via specific irreversible binding.

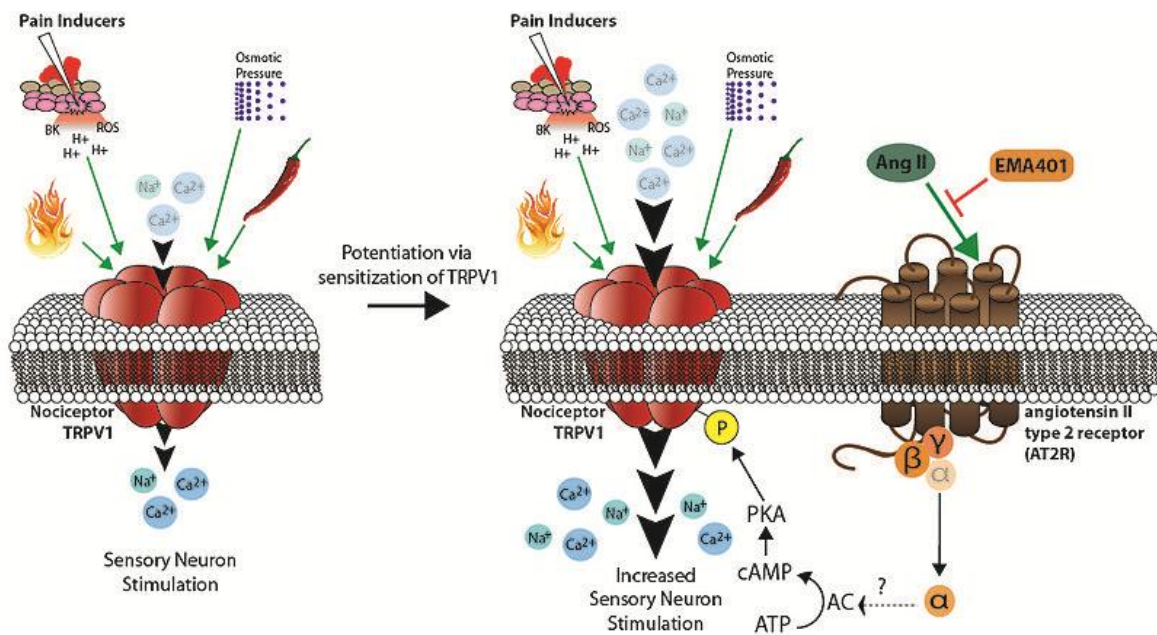


Figure 02: Example of EMA401 Mechanism of Action: Inhibition of TRPV1 Phosphorylation

What are the similarities between Mode of Action and Mechanism of Action?

- Both actions take place following the administration of a foreign biomolecule into a host cell.
- Both actions are important in drug designing and metabolism.

What is the difference between Mode of Action and Mechanism of Action?

Mode of Action vs Mechanism of Action	
Mode of action of a biomolecule refers to the mode in which the action is brought about and is characterized by the changes that take place in a cell.	Mechanism of action refers to the process by which the substance undergoes bio chemical changes within the host in order to bring about the specific action of the administered substance.
Result	
As a result of the mode of action, physiological, chemical and functional changes occur in the cell.	As a result of the mechanism of action, an alteration of a bio-chemical reaction occurs.
Importance	
Mode of action is important in characterizing different compounds based on their resulting action.	Mechanism of action is important in designing drugs, elucidating the dose of the particular drug and evaluating its effects upon administering.

Summary – Mode of Action vs Mechanism of Action

The mode of action and the mechanism of action of a drug or an antibiotic have a narrow difference in terms of biochemistry as both refer to a change that takes place after the administration of a foreign molecule to the host cell. Both these concepts are widely studied in Pharmacology and are a current trend in developing new drugs for disease targets and pathogenic microorganisms. Mode of action of a biomolecule refers to the mode in which the action is brought about and is characterized by the changes that take place in a cell. Mechanism of action refers to the process by which

the substance undergoes bio chemical changes within the host in order to bring about the specific action of the administered substance. This is the difference between mode of action and mechanism of action.

References:

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