Adenosine diphosphate receptor inhibitor

Adenosine diphosphate (ADP) receptor inhibitors are a drug class of antiplatelet agents, used in the treatment of acute coronary syndrome (ACS) or in preventive treatment for patients who are in risk of thromboembolism, myocardial infarction or a stroke. These drugs antagonize the P2Y12 platelet receptors and therefore prevent the binding of ADP to the P2Y12 receptor. This leads to a decrease in aggregation of platelets, prohibiting thrombus formation. The P2Y12 receptor is a surface bound protein found on blood platelets. They belong to G protein-coupled purinergic receptors (GPCR) and are chemoreceptors for ADP.

The first drug introduced in this class was ticlopidine but due to adverse effects it is not much used today. Ticlopidine, clopidogrel and prasugrel (Efient) are all thienopyridines that cause irreversible inhibition of P2Y12 inhibitors. They are all prodrugs which need to be converted to an active metabolite in-vivo to inhibit the P2Y12 receptor. On the other hand novel drugs like ticagrelor (Brilinta®) and cangrelor (Kengrexal®) are non-thienopyridines and reversibly inhibit P2Y12 meaning they act directly on the receptor without the requirement of metabolic activation and display faster onset and offset of action.

These drugs are frequently administrated in combination with aspirin (acetylsalicylic acid) to enhance platelet inhibition especially in patients with ACS or undergoing percutaneous coronary intervention (PCI).