ACE Inhibitors

ACE inhibitors are antihypertensive drugs that work by inhibiting the renin-angiotensin-aldosterone-system. They help to lower blood pressure by inhibiting angiotensin-converting enzyme and decreasing the amount of angiotensin II and aldosterone. Effects of inhibiting this conversion are translated into lowered arteriolar resistance and increased venous capacity. This drug class decrease cardiac output and index, and stroke volume. Furthermore, natriuresis is increased, while there is decreased resistance in the blood vessels of the kidney.A side effect of these drugs is increased bradykinin, which may display as a persistent dry cough in patients.

PLAY PICMONIC

-Pril Suffix
Pearls
ACE inhibitors share a "-pril" suffix, and include drugs like captopril, enalapril, and lisinopril.

Indications

Hypertension
Hiker-BP
These drugs were initially developed to treat hypertension, and can be used alone or in combination. It was later that they were found to be helpful in other renal and cardiovascular diseases.

CHF
CHF Heart-balloon
ACE inhibitors are indicated to treat CHF, when left ventricular systolic dysfunction exists. They can also be used in angina, cardiac ischemia, and post-MI patients.

Diabetic Nephropathy
Dyed-beads Kidney
ACE inhibitors are effective in treating diabetic nephropathy, caused by diabetes mellitus. Research has shown that ACE inhibitors are renal protective and slow the associated morphological changes in the glomeruli seen with renal disease.

Mechanism of Action

Inhibits ACE
Inhibiting-chains on Ace
ACE inhibitors inhibit angiotensin-converting enzyme, which is secreted by the lungs and kidneys. This inhibition prevents the formation of angiotensin II, thus preventing activation of AT-1 receptors in the adrenal cortex. Furthermore, this leads to lowered aldosterone levels.

Decreases GFR
Down-arrow Gopher
Angiotensin II maintains or even increases glomerular filtration rate (GFR) by preferentially constricting the efferent arteriole. ACE inhibitors prevent the formation of Angiotensin II. This causes relaxation of the efferent arteriole so GFR decreases. For this reason, ACE inhibitors are contraindicated in patients with bilateral renal artery stenosis as these patients already have a low GFR from low RBF.

Inhibits Constriction of Efferent Arteriole
Inhibiting-chains on Constrictor around E-fairy Artery
ACE inhibitors block efferent arteriolar constriction (normally caused by angiotensin II), thus decreasing GFR. It should be noted that there will be increased concentration of renin because of the negative feedback of angiotensin I to angiotensin II conversion.

Side Effect

Increased Bradykinin

Up-arrow Brady-crying

Inhibition of angiotensin converting enzyme leads to increased levels of bradykinin, which is a potent vasodilator and is associated with a dry cough.

Cough

Coughing Coffee-pot

A common adverse effect of ACE inhibitors is a persistent dry cough, often associated with the increases in the levels of bradykinin.