

## ACE Inhibitor Toxicity

ACE inhibitors are indicated for the treatment of hypertension, CHF, and diabetic nephropathy, and have several common toxicities. These toxicities include cough, angioedema, potassium changes, taste changes, hypotension, and pregnancy changes. Rash may also occur, along with increased renin and lower angiotensin II. As these drugs lower aldosterone,  $K^+$  is not secreted into the collecting duct, and patients may develop hyperkalemia.



PLAY PICMONIC

### CAPTOPRIL Mnemonic

#### Captain-Pearl

The CAPTOPRIL mnemonic can be used to remember the side effects of ACE inhibitors: **C**ough, **A**ngioedema, **P**otassium changes, **T**aste change, hyp-**O**-tension, **P**regnancy changes, **R**ash, **I**ncreased renin, and **L**ower angiotensin II. Another side effect is hyperkalemia.

### Cough

#### Coughing Coffee-pot

ACE inhibitors may cause a persistent dry cough, associated with the increased levels of bradykinin seen in patients.

### Angioedema

#### Angel-edamame

These drugs are a leading cause of drug-induced angioedema, frequently due to increased bradykinin levels. This is seen especially in patients with genetic predisposition to degrade bradykinin more slowly.

### Potassium Changes (Hyperkalemia)

#### Hiker-banana

ACE inhibitors may cause hyperkalemia, as decreased angiotensin also leads to decreased aldosterone. Aldosterone promotes excretion of potassium, so its inhibition leads to greater retention of these ions.

### Taste Change

#### Tongue with Delta-sign

A possible toxicity includes taste abnormalities, associated with the sulfhydryl group found in ACE inhibitors. This side effect is more commonly seen with high doses of captopril.

### Hypotension

#### Hippo-BP

Patients may experience hypotension, causing weakness, syncope or dizziness. Risk of these side effects may be minimized with a very low initial dose.

### Pregnancy Changes

#### Pregnant-woman with Delta-sign

ACE inhibitors may pose significant risks throughout all stages of pregnancy, especially if exposure occurs during the first trimester. Anomalies include stillbirths, fetal renal damage and congenital malformations.

### Rash

#### Dermatologist examining Rash

Rash may be seen with high doses of captopril, and is associated with the sulfhydryl group found in ACE inhibitors. Decreasing the maximum dose have made sulfhydryl-related complications less common.

**Increased Renin**

Up-arrow Wrenches

Increased renin concentrations in the blood may occur due to negative feedback of angiotensin I to angiotensin II conversion.

**Lower Angiotensin II**

Down-arrow Angel-tennis with (2) Tutu

These drugs inhibit angiotensin converting enzyme, which is responsible for the conversion of angiotensin I to angiotensin II.