Benazepril ($C_{24}H_{28}N_2O_5$) is an angiotensin coverting enzyme (ACE) inhibitor that is used in the clinical treatment of dogs that have been diagnosed with dilated cardiomyopathy (DCM) [1]. This medication reaches its peak in the bloodstream within 0.5-1.0 hours [2]. The presence of food in the GI tract does not influence absorption and at least 37% is absorbed by the body [2]. The liver converts benazepril into its active form benazeprilat, an ACE inhibitor [2].

Dilated Cardiomyopathy

Cardiomyopathy is a term meaning diseased heart muscle [3]. DCM results in thinning of the heart muscle due to stretching to accommodate abnormally large dilated heart chambers [3]. DCM is considered to be hereditary in approximately 20–35% of human patients, while canine DCM has also been suspected to be an inherited disease because of its prevalence in certain breeds, including the Doberman Pinscher [4]. The primary problem in Doberman DCM is within the heart muscle cells (myocytes): the heart becomes unable to contract normally, leading to abnormal function [3].

In the early occult (asymptomatic) stages of disease, the heart compensates for the poor contractile ability by increasing chamber size, temporarily improving the output of the heart (stroke volume) [3]. As the disease progresses, further dilation of the heart no longer improves stroke volume, leading to increased pressure within the heart (heart failure) [5]. This causes a back up of blood in the blood vessels within the lungs and causes fluid to leak out into the lungs, eventually leading to death [5]. This is considered the overt (symptomatic) stage of disease, with symptoms including shortness of breath, coughing, fainting episodes, poor appetite and weight loss [5]

Synthesis of Angiotensin II (Ang II) contributes to DCM: it increases blood pressure and is associated with the abnormal growth and death of myocytes: the renin-angiotensin system has found to be up regulated when in heart failure [6]. Ang II is a vasoconstrictor itself and also increases the secretion of aldosterone (both aldosterone and vasoconstriction causes increased blood pressure) [7]. Ang II acts through G-protein coupled receptors present within in the heart and the vessel walls [7]. There is evidence that treatment with ACE inhibitors in the occult (asymptomatic) stage of disease will slow progression of the disease, prolong life and delay the onset of overt (symptomatic) stage [8].

Benazepril and Dilated Cardiomyopathy

There is a significant association between the administration of benazepril and the onset of overt DCM in Doberman Pinschers with asymptomatic DCM [8]. Benazepril targets the production of Ang II, decreasing blood pressure and the abnormal growth and death of heart muscle cells [7].

Benazeprilat, competes with Ang I for binding at the ACE. This blockage prevents the conversion of Ang I to Ang II, decreasing levels of Ang II in the blood [2][9]. This blocks the vasoconstrictive effects of Ang II and decreases aldosterone levels in the blood. [7][10]. Benazeprilat may also act on kinase II, an enzyme identical to ACE that degrades vasodilator bradykinin.

Benazepril delays the onset of heart failure in Dobermans with DCM by blocking the affects of Ang II. It reduces blood pressure (reduces stress on the heart) and reduces the abnormal growth and death of myocytes that is associated with Ang II.

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