

Congestive Heart Failure

Vasodilators

8 yr old mongrel dog

- gradual weight loss
- exercise intolerance
- coughing
- anorexia



examination

- some lung sounds
- severe systolic murmur

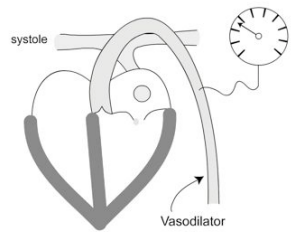
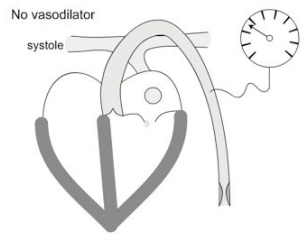
- irregular beat

CHF

- cardiac output down
- blood pressure down
- sympathetic tone up
 - vasoconstriction
 - tachycardia
- salt and water retention up

congestive heart failure

- rest
- low salt diet
- vasodilators
- diuretics
- long acting inotropes
- (antiarrhythmics)



vasodilators

- angiotensin converting enzyme inhibitors
- nitrates
- odds & sods

ACE inhibitor effects

- **normal animals**

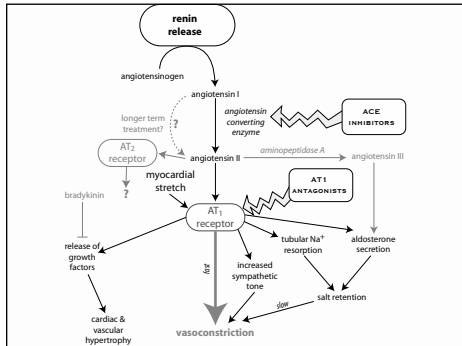
- none

- **CHF**

- arterial & venous dilatation

- reduction in pre and afterload
 - reduction in myocardial work & O₂ consumption
 - reduction in pressure across valves

- promotes myocardial remodelling



ACEI indications

- **congestive heart failure**
- **especially mitral regurgitation**
- **± diuretics**

side effects

- **hypotension (± tachycardia)**
- **anorexia**
- **vomiting**
- **diarrhoea**
- **(cough)**

care

- **hyponatraemia**
–frusemide
- **renal failure**
- **breeding bitches**

drugs

- **enalapril**
- **benazepril**
- **quinapril**
- **captopril**
- **etc, etc**

congestive heart failure

- **rest**
- **low salt diet**
- **vasodilators**
- **diuretics**
- **long acting inotropes**
- **(antiarrhythmics)**

AT₁ antagonists

- **losartan**
- **candesartan**
- **not much experience in dogs**

other vasodilators

- **nitrates**
- **calcium channel blockers**
- **hydralazine**

nitrates

- **converted to NO**
- **venous & arterial relaxation**

nitrates

- **nitroprusside**
 - very short half life
 - anaesthesia / intensive care only
- **nitroglycerine (glyceryl trinitrate)**
 - longer half life
 - iv / transcutaneous ointment
- **isosorbide dinitrate**
 - similar but tablets

Ca channel blockers

- **vasodilators**
 - nicardipine
 - nifedipine, etc etc.
- **antiarrhythmics**
 - verapamil
 - diltiazem

8 yr old mongrel dog

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examination

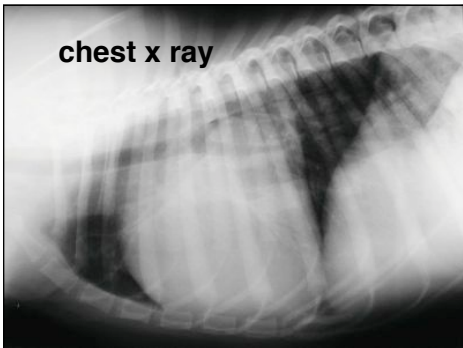
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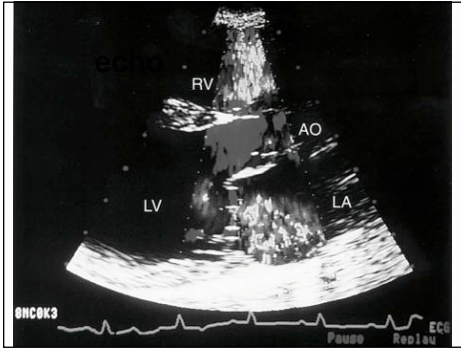
further investigations?

- chest x ray
- ECG
- ultrasound

chest x ray



ECG lead II



problems

- valvular incompetence
- pulmonary oedema
- ventricular ectopic beats

priorities

- avoid excitement
- pulmonary oedema
- arrhythmia
- increase forward flow

drugs

- **pulmonary oedema**
 - diuretics
- **ventricular ectopic beats**
 - antiarrhythmics
- **forward flow**
 - vasodilators
 - ACE inhibitors
 - inotropes?

vasodilators

- reduce afterload and shown to prolong life in congestive heart failure
- angiotensin converting enzyme inhibitors block production of ATII, probably most useful in dogs, usually with frusemide
- nitrates - converted to nitric oxide (EDRF)