

Congestive Heart Failure

more interesting stuff...



congestive heart failure

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



7 yr old Doberman

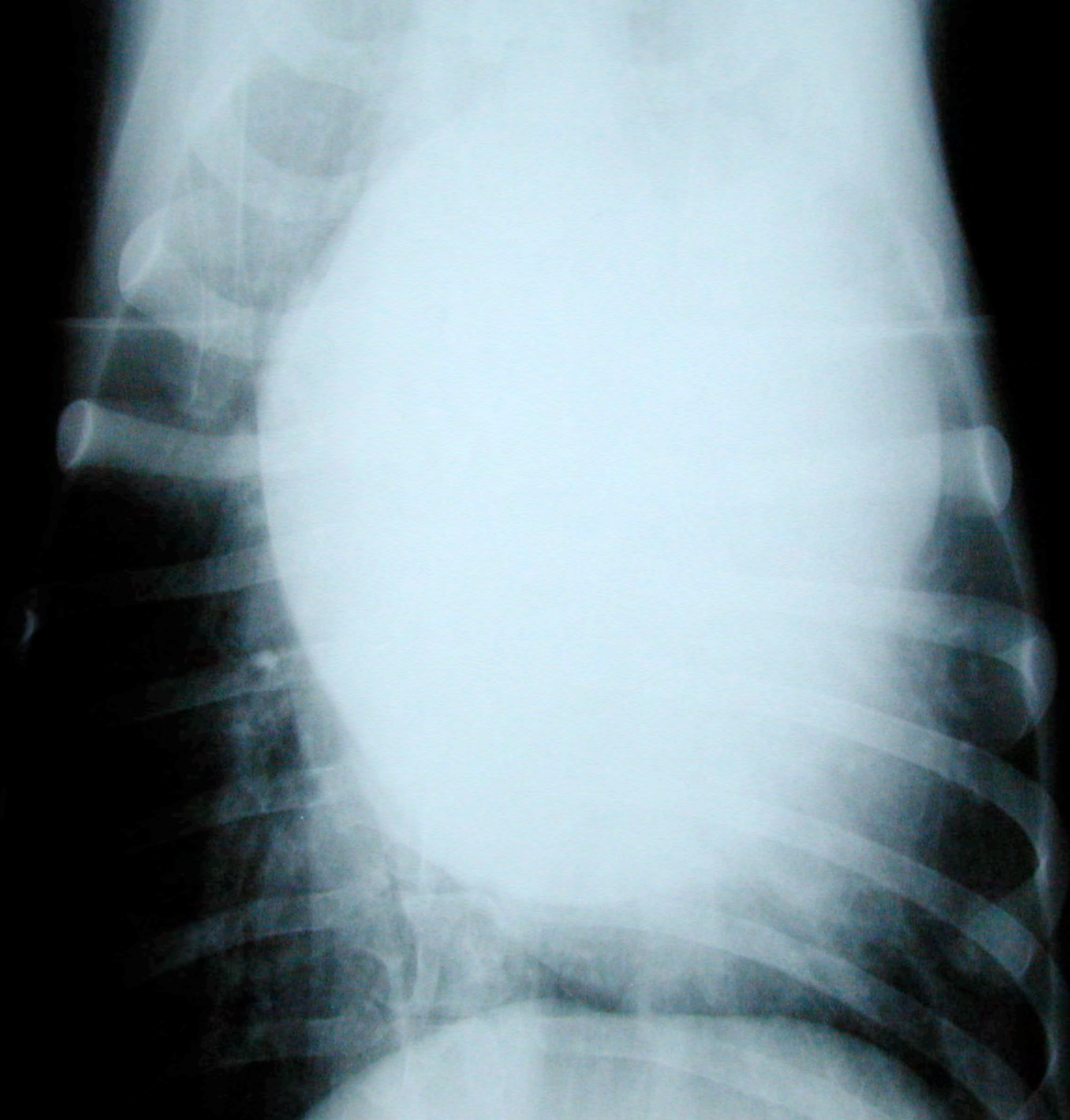
- cough
- lethargy / exercise intolerance
- anorexia
- ascites
- sudden onset 1 week ago

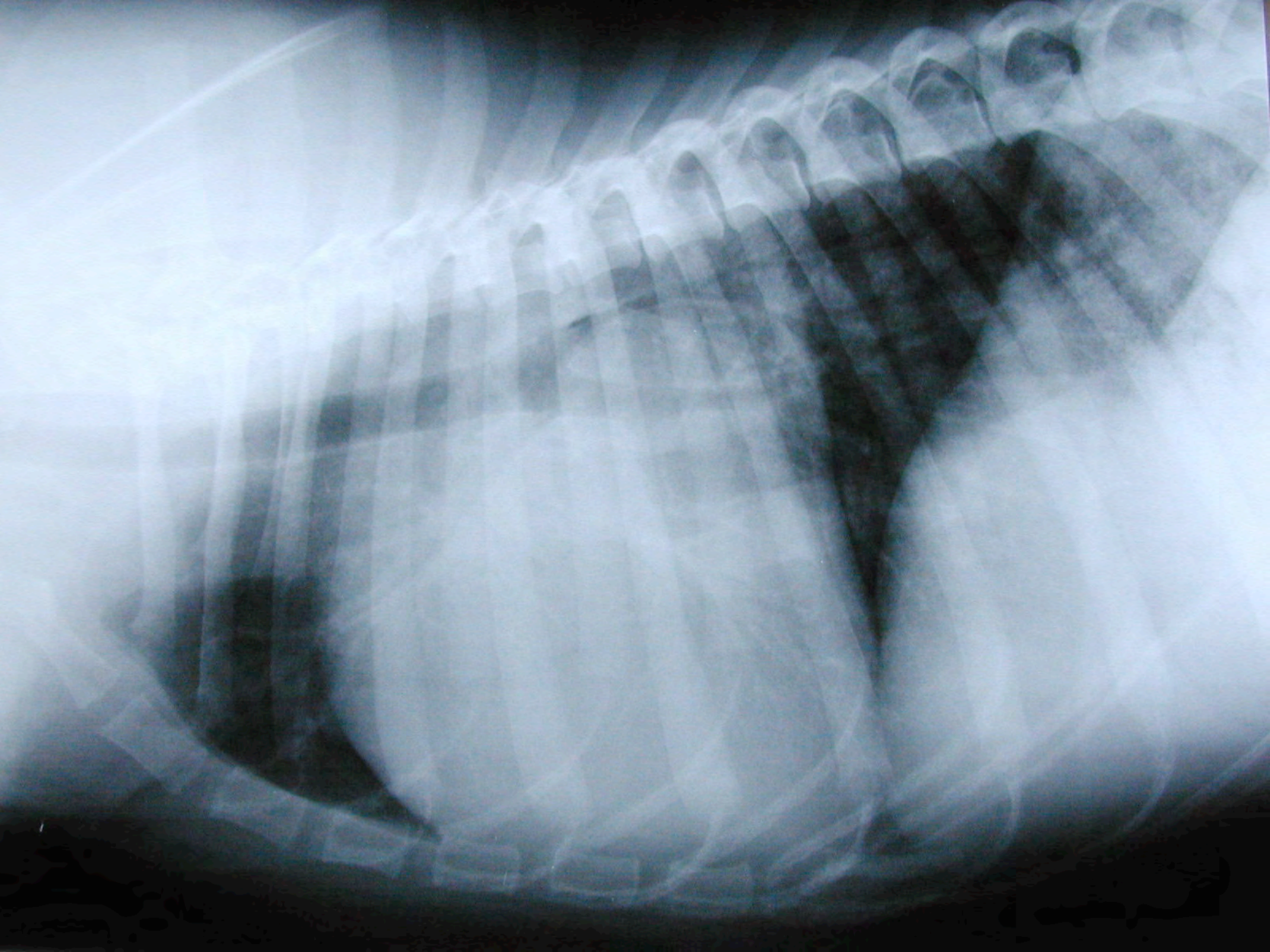


examination

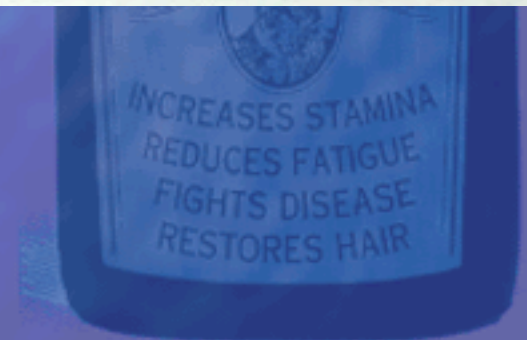
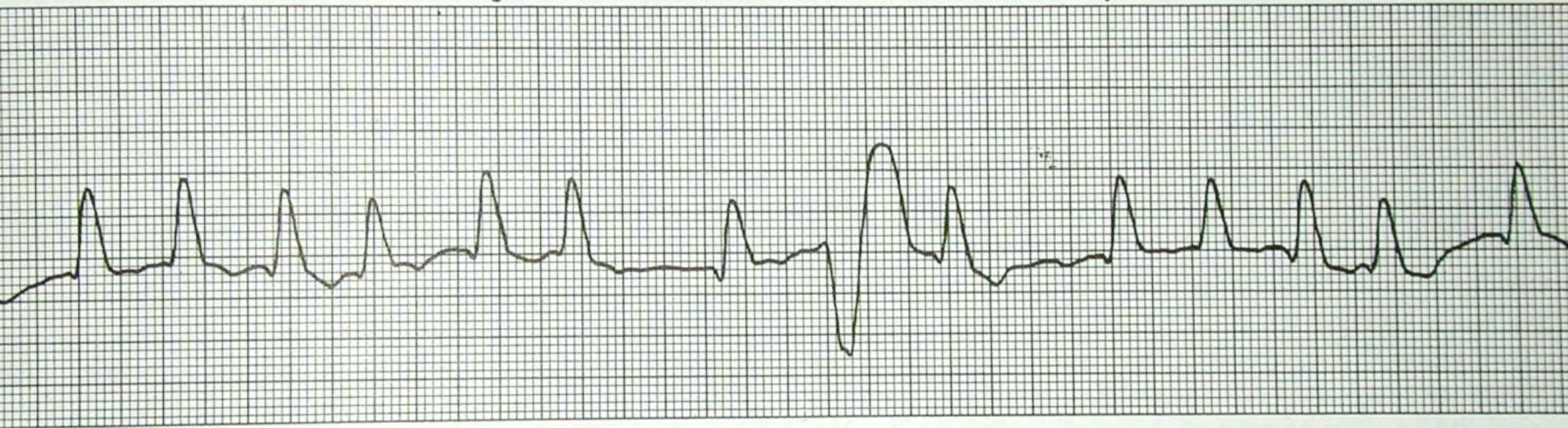
- soft systolic murmur
- heart rate 148
- harsh lung sounds







ECG lead II



diagnosis

- dilated cardiomyopathy



treatment

- diuretics
- positive inotropes
- antiarrhythmics?



positive inotropes

- sympathomimetics
- cardiac glycosides
- phosphodiesterase inhibitors



cardiac glycosides

- = digitalis





cardiac glycosides

- **digoxin**
- digitoxin
- ouabain
- lanatoside C
- strophanthin
- squill
- convallotoxin
- some toads' skin



chemistry

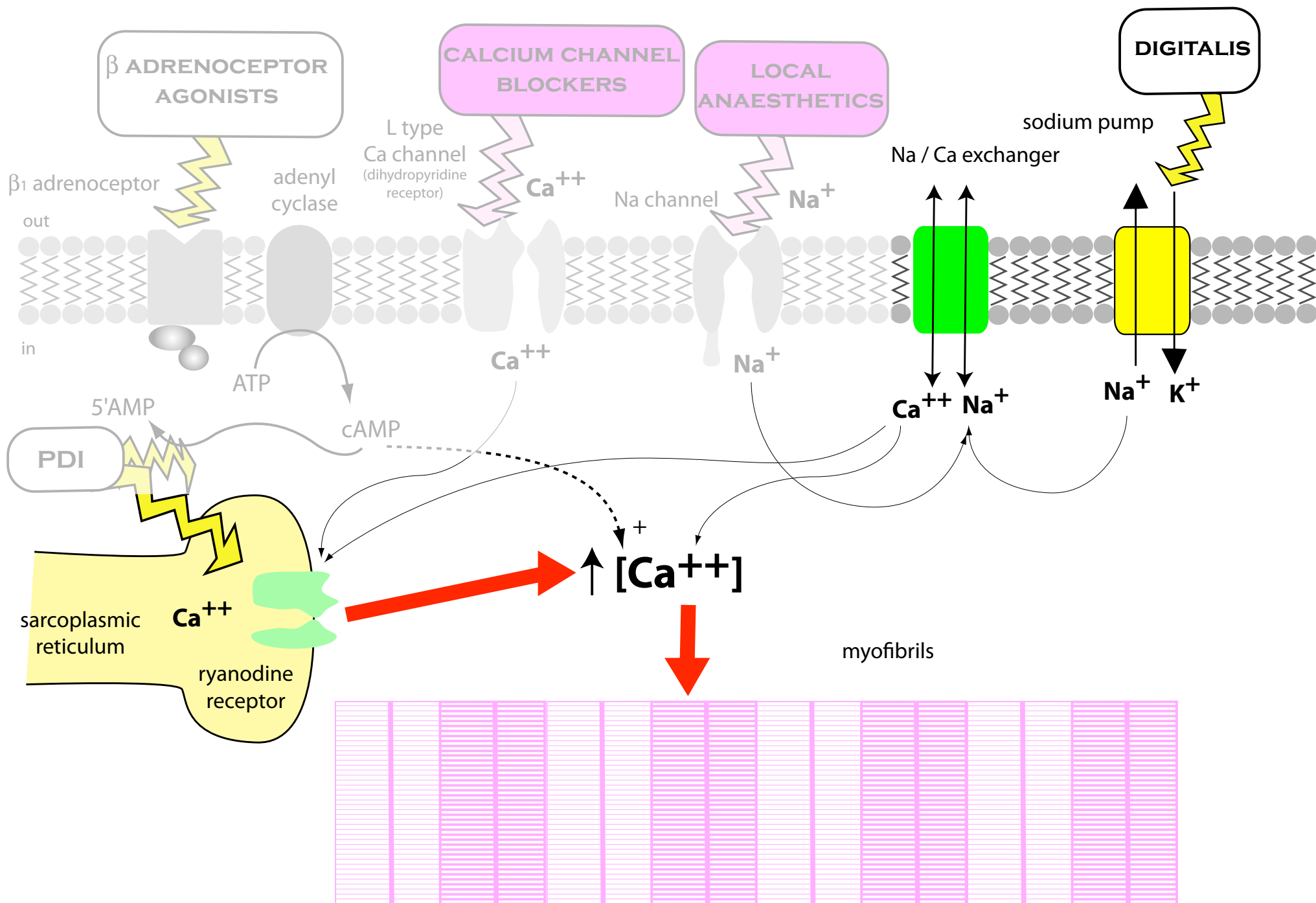
- steroid nucleus
- lactone group
- 3 sugars



effects

- **positive inotropic**
- **negative chronotropic**





negative chronotropy

- vagal stimulation
- potentiation of ACh
- SA & AV node



indications

- **congestive heart failure**
 - especially DCM
- **supraventricular tachycardias**
 - atrial fibrillation



side effects

- **cardiac**
 - ventricular tachyarrhythmias
 - heart block
- **generalised**
 - nausea / anorexia
 - vomiting



contra-indications

- ventricular tachycardias
- pericardial disease



toxicity

- **mild**
 - reduce dose / withdraw drug
- **ventricular tachyarrhythmias**
 - lignocaine, phenytoin
 - Ca blockers
- **accidental overdose**
 - cholestyramine
 - digoxin antibodies



pharmacokinetics

- **half life**
 - dog 24 - 36h
 - cat 33 - 58h
- **elimination**
 - 85% renal



clinical use

- loading dose then maintenance dose
 - not recommended
- small dose and work up



monitoring

- nausea / vomiting
- plasma levels



interactions

- **do not use with**
 - quinidine
 - verapamil
- **care with**
 - diuretics
 - altered K⁺ concentrations



positive inotropes

- sympathomimetics
- cardiac glycosides
- phosphodiesterase inhibitors



phosphodiesterase inhibitors

- **methylxanthines**

- caffeine
- theophylline
 - aminophylline
 - etamiphylline
- theobromine

- **synthetic**



phosphodiesterase inhibitors

- methylxanthines
- synthetic
 - milrinone
 - oxpentifylline
 - sildenafil
 - pimobendan



phosphodiesterase

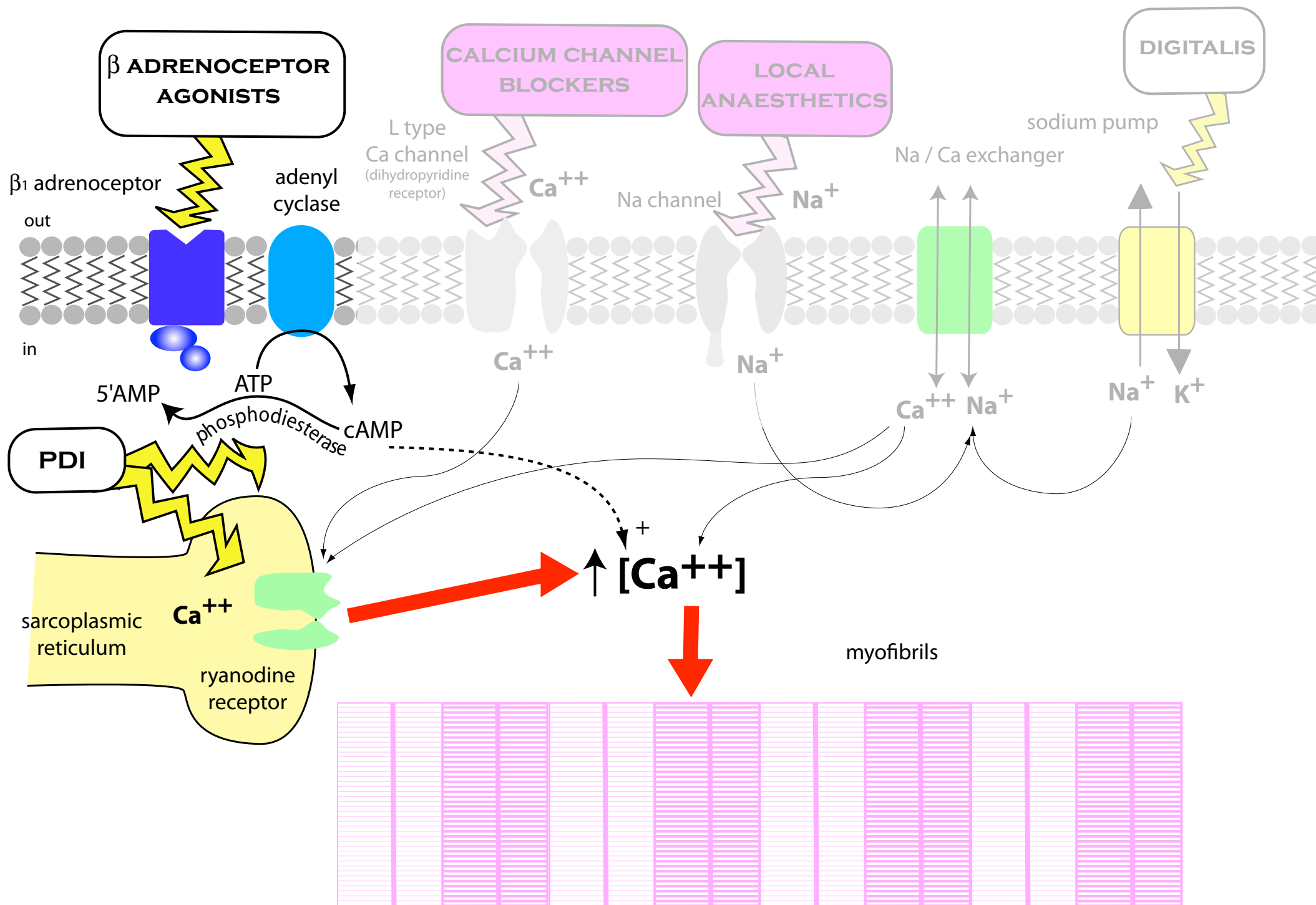
- **PDE 3**
 - milrinone
 - pimobendan?
- **PDE 4**
 - oxpentifylline
- **PDE 5**
 - sildenafil
- **$\alpha 1$ & $\alpha 2$**
 - theophylline



PDI effects

- positive inotropy
- vasodilatation
- bronchodilatation
- CNS stimulation
- diuresis





effects

- **pimobendan**
 - PDE inhibition
 - “calcium sensitisation”



indications

- mild - moderate CHF



side effects

- sudden death in people
- none obvious in dogs



overdose

- tachyarrhythmias
- convulsions



congestive heart failure

- digoxin binds competitively to potassium binding site of sodium pump
- low potassium increases effect
- positive inotrope, negative chronotrope
- side effects - vomiting & anorexia, ventricular tachycardia
- indications - atrial fibrillation with tachycardia, congestive heart failure
- phosphodiesterase inhibitors are useful and safe in mild / moderate CHF

