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Acetylcholinesterase Isozyme Banding May Be Useful in Revealing Heart Failure

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**ACETYLCHOLINESTERASE ISOZYME
BANDING MAY BE USEFUL IN
REVEALING HEART PATHOLOGY.**

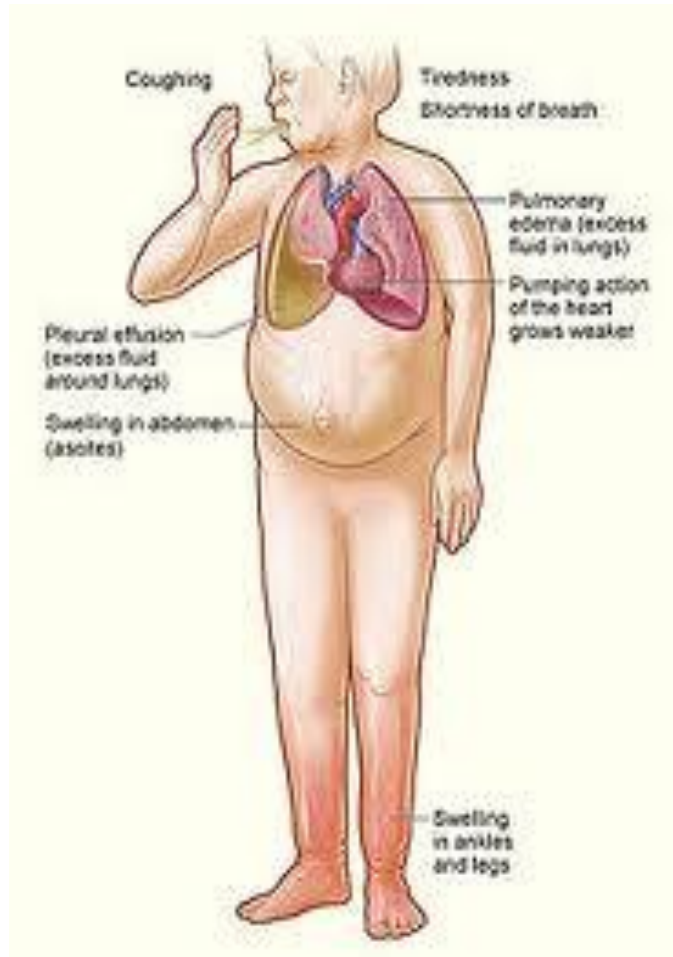
**Cherelle Palmer
Spring 2012**

HEART FAILURE

- Heart failure is a condition in which the heart can no longer pump enough blood to the rest of the body.
- Long-term chronic condition
- May only affect one side of the heart
- Can lead to various, potentially fatal, complications



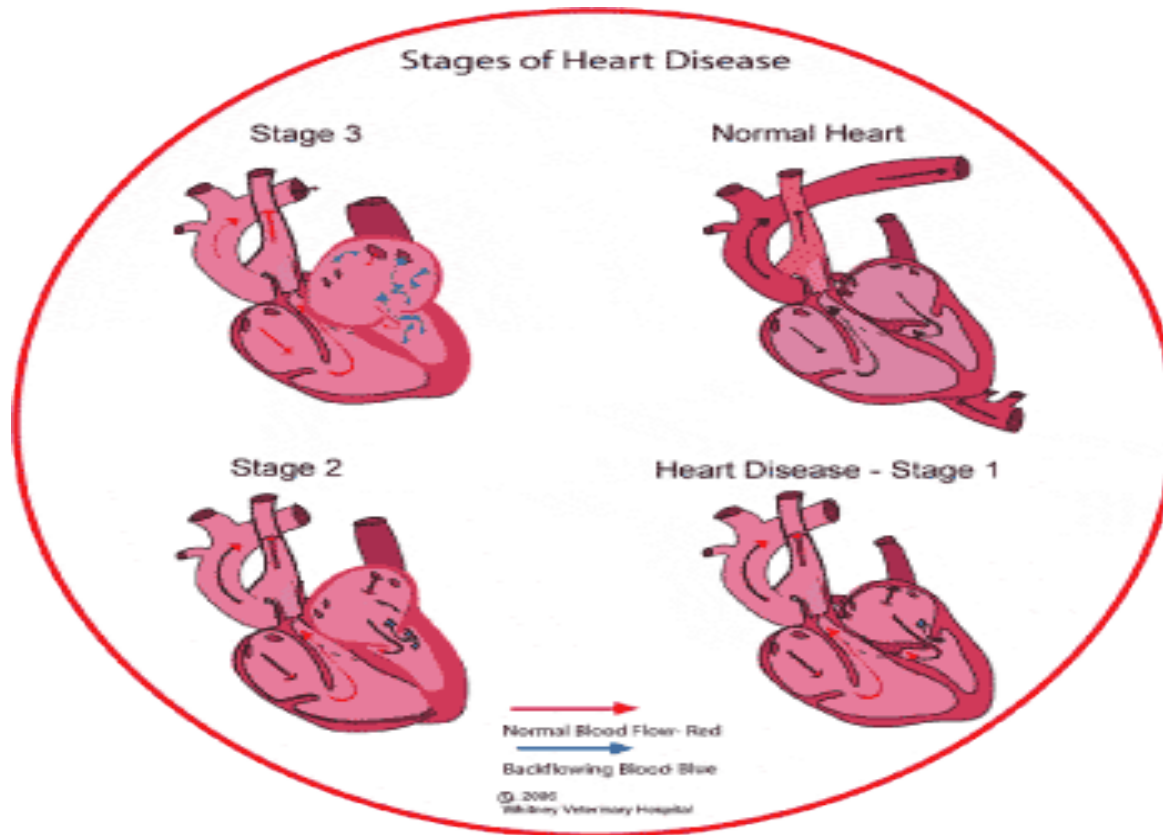
SYMPTOMS OF HEART FAILURE



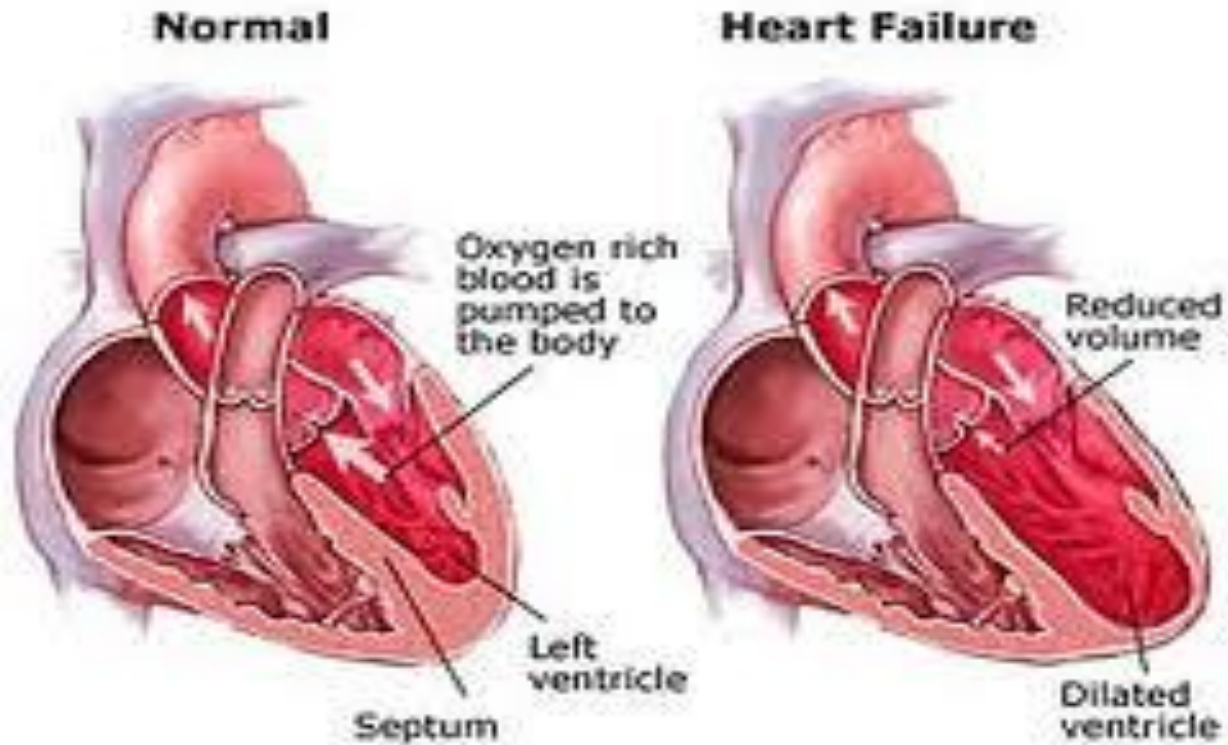
- Cough
- Fatigue, weakness, faintness
- Loss of appetite
- Need to urinate at night
- Irregular pulse
- Shortness of breath
- Swollen feet and ankles
- Weight gain



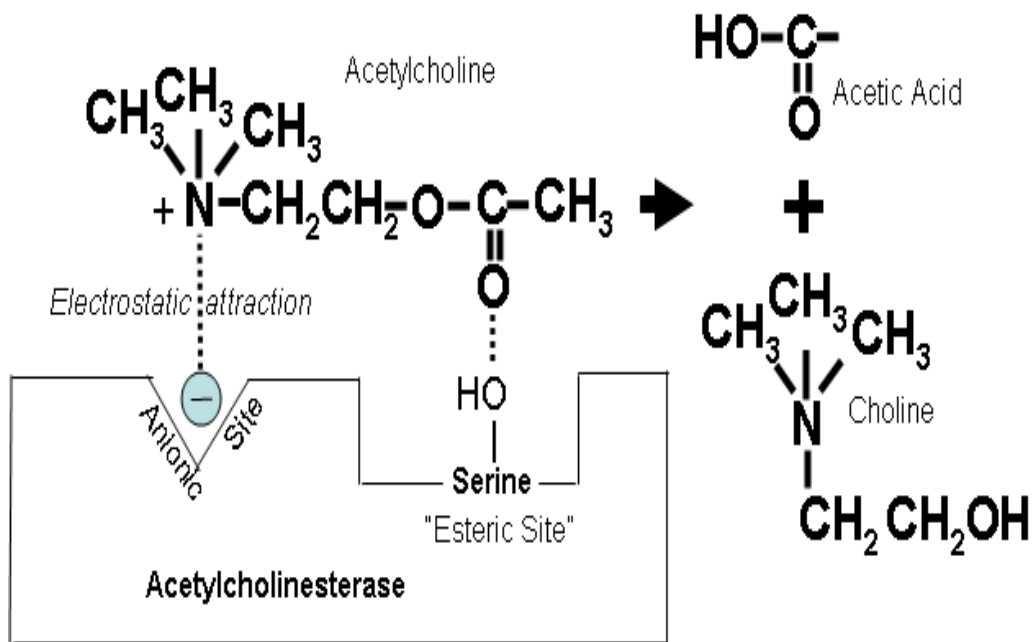
STAGES OF HEART FAILURE



NORMAL VS. FAILURE

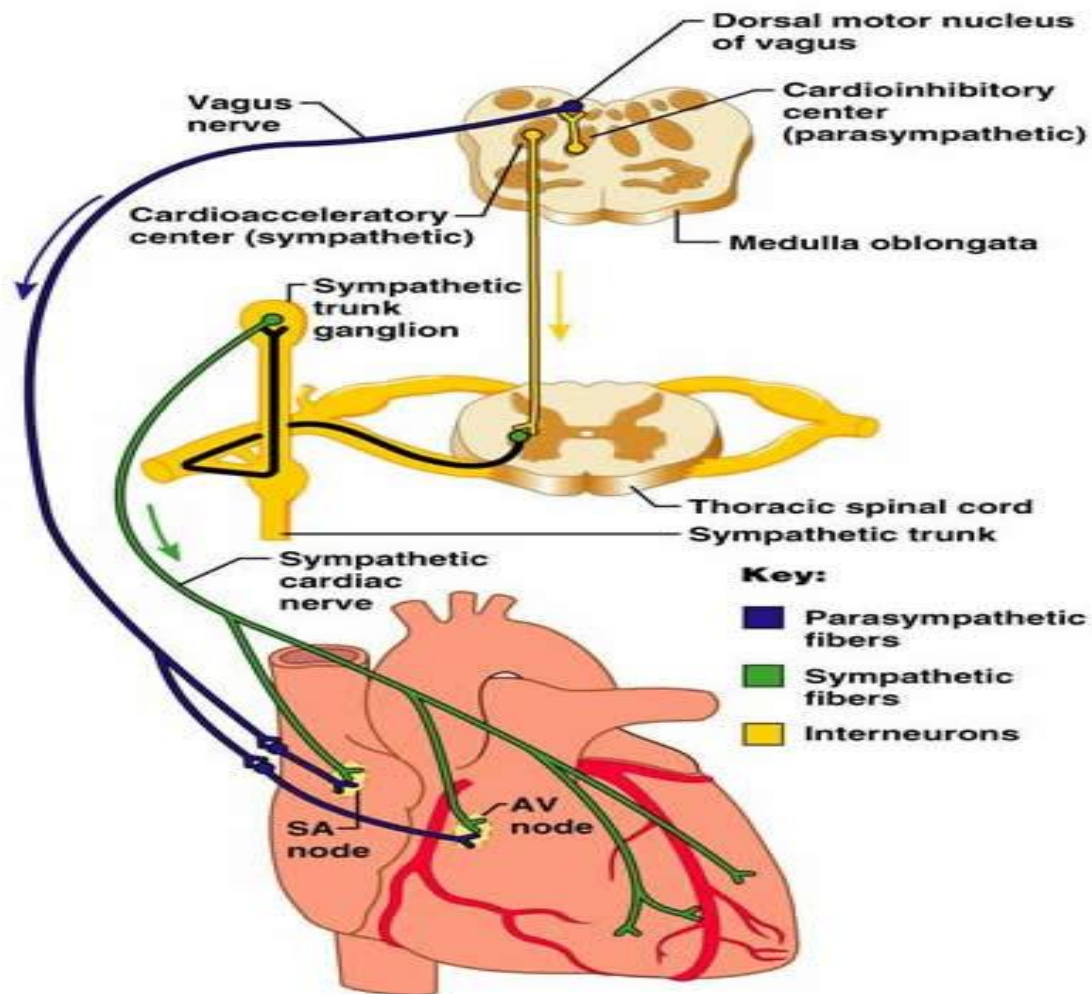


ACETYLCHOLINESTERASE



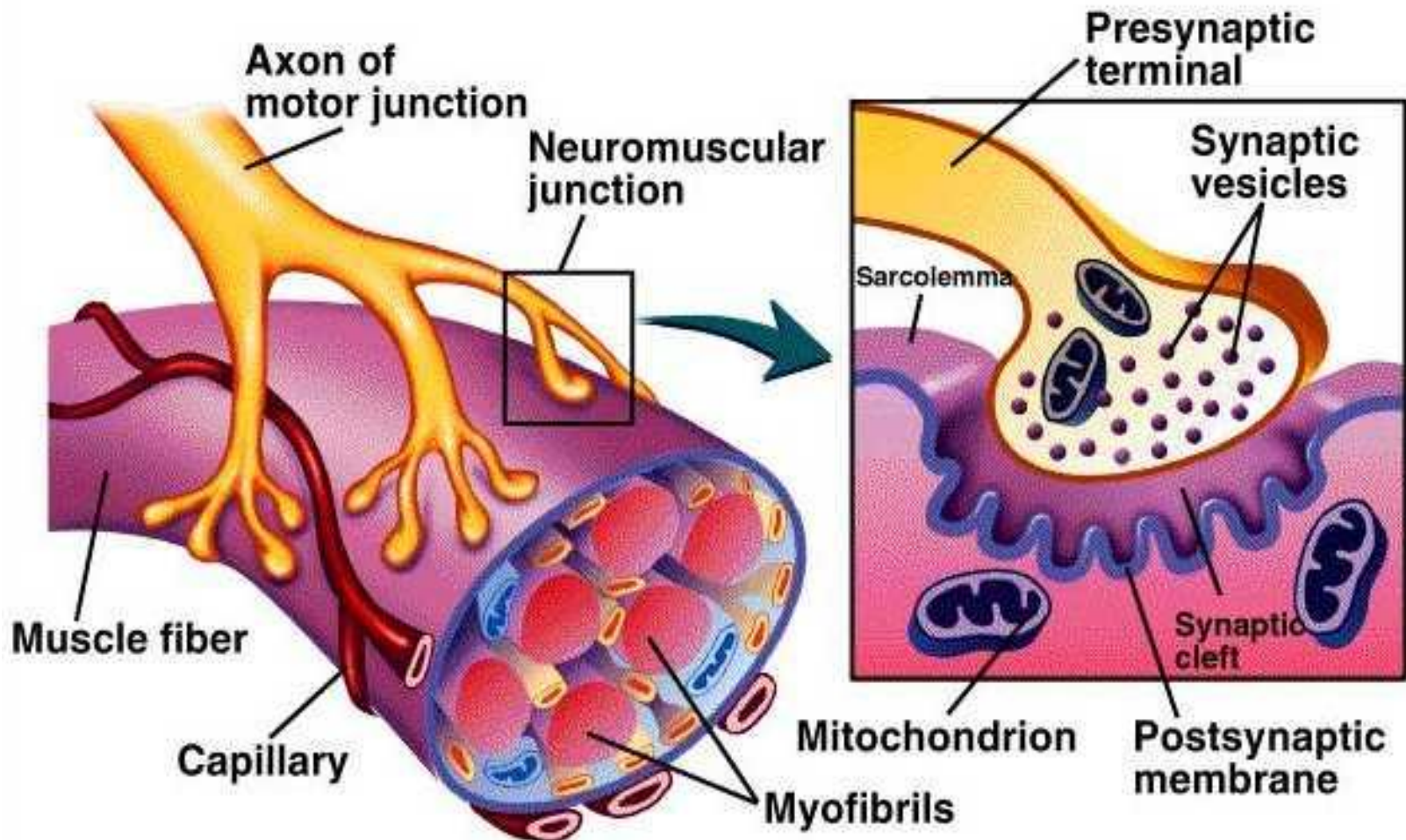
- An enzyme that degrades the neurotransmitter acetylcholine, producing choline and an acetate group.
- Mainly found at neuromuscular junctions

AUTONOMIC NERVOUS SYSTEM



SYNAPSE AT NEUROMUSCULAR JUNCTION

Neuromuscular Junction



WHAT WE KNOW...

- Cardiopathology provides insights into the functioning heart and its circulatory vessels.
- Recent studies have proposed a critical role for esterases in heart failure.
- Evidence points to a loss of vagal (parasympathetic) control and a parallel increase in sympathetic activity as the disease progresses.



BASIS OF RESEARCH

- Acetylcholinesterase isozyme banding may be useful in revealing heart pathology.
- Acetylcholinesterase isozyme activity in a variety of muscle and extra-cardiac tissues may fluctuate in response to the progression of HF.
- We hypothesize that Acetylcholinesterase activity will decrease in response to the progression of heart failure.



PROTOCOL

REMOVE TISSUES → HOMOGENIZE →
CENTRIFUGE →

REMOVE SUPERNATANT → STANDARDIZE



POLYACRYLAMIDE GEL ELECTROPHORESIS
(PAGE)



DENATURED SAMPLE

NON-DENATURED SAMPLE



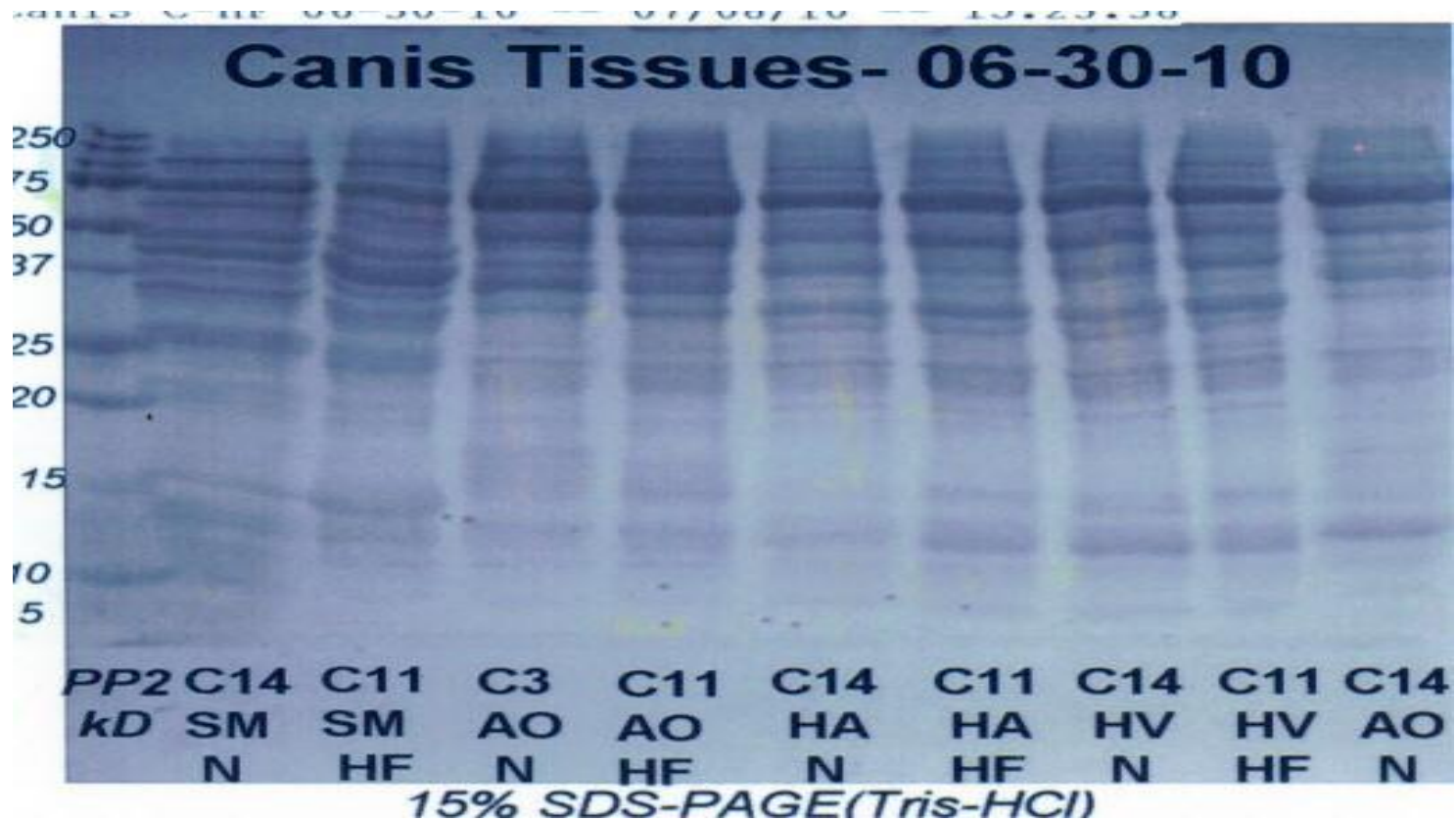
TOTAL PROTEIN



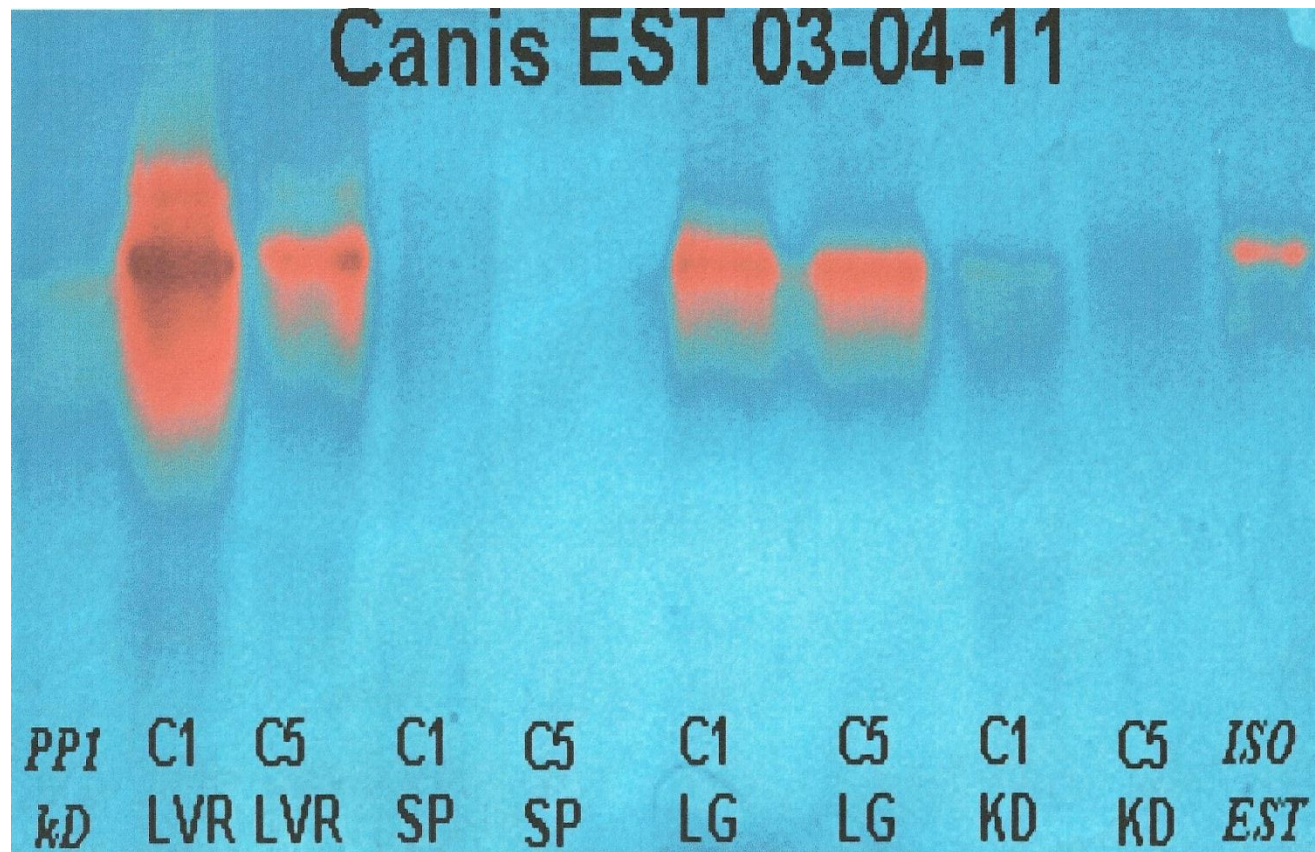
ISOZYME ACTIVITY



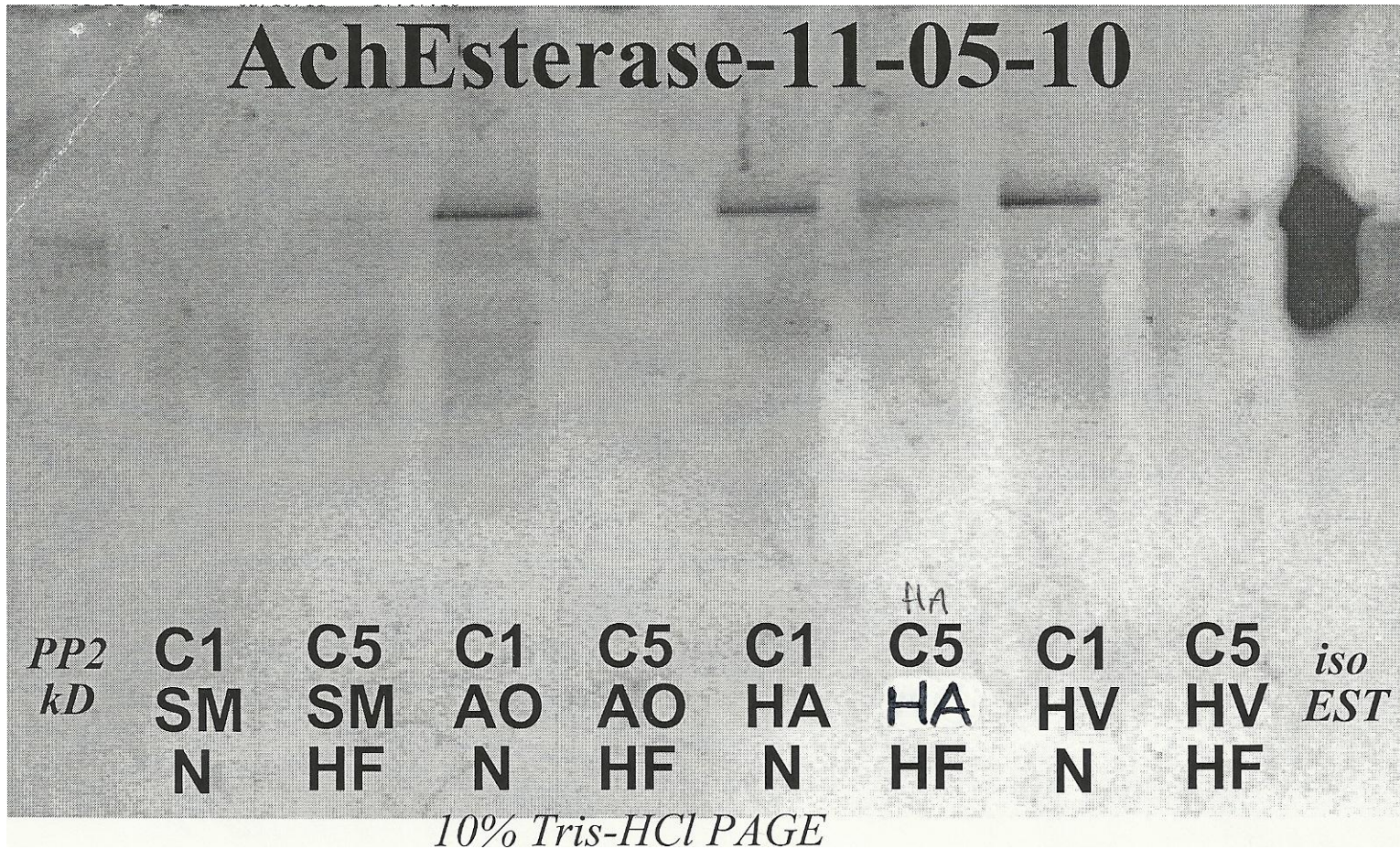
TOTAL PROTEIN



SOFT TISSUES



HEART



CONCLUSION

- Decreased AChE activity in heart failure does support the initial hypothesis of increased metabolic demands. → AChE banding activity diminishes in KD, SP, AO, HV, and HA as HF progresses.
- Further research needs to be conducted to determine whether this decrease is due to cardiopathology
- Some tissues display minimal activity

