

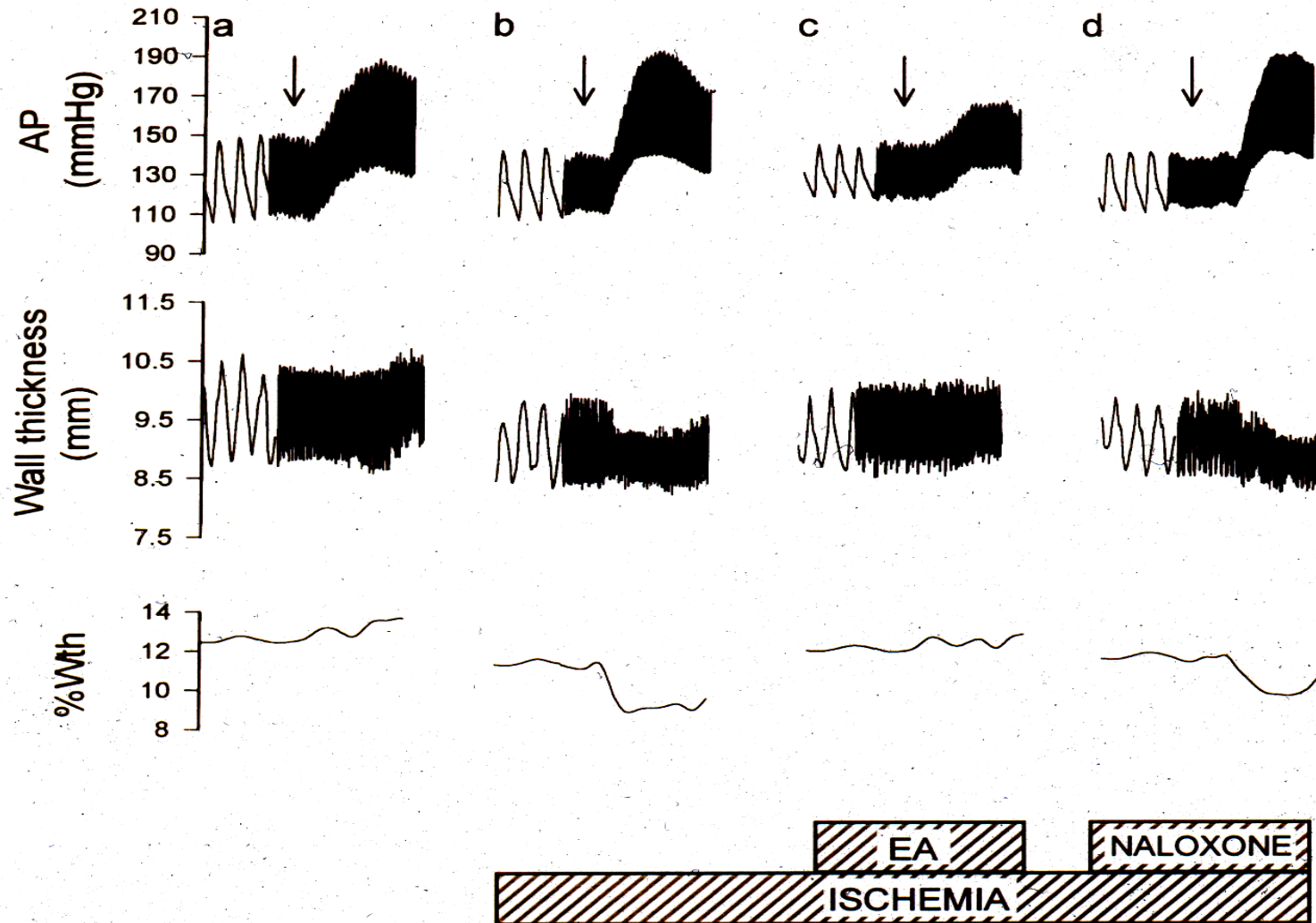
ISAMS – 2013 (Stockholm)

Brain Stem Autonomic Mechanisms Underlying Acupuncture's Hypertensive Actions

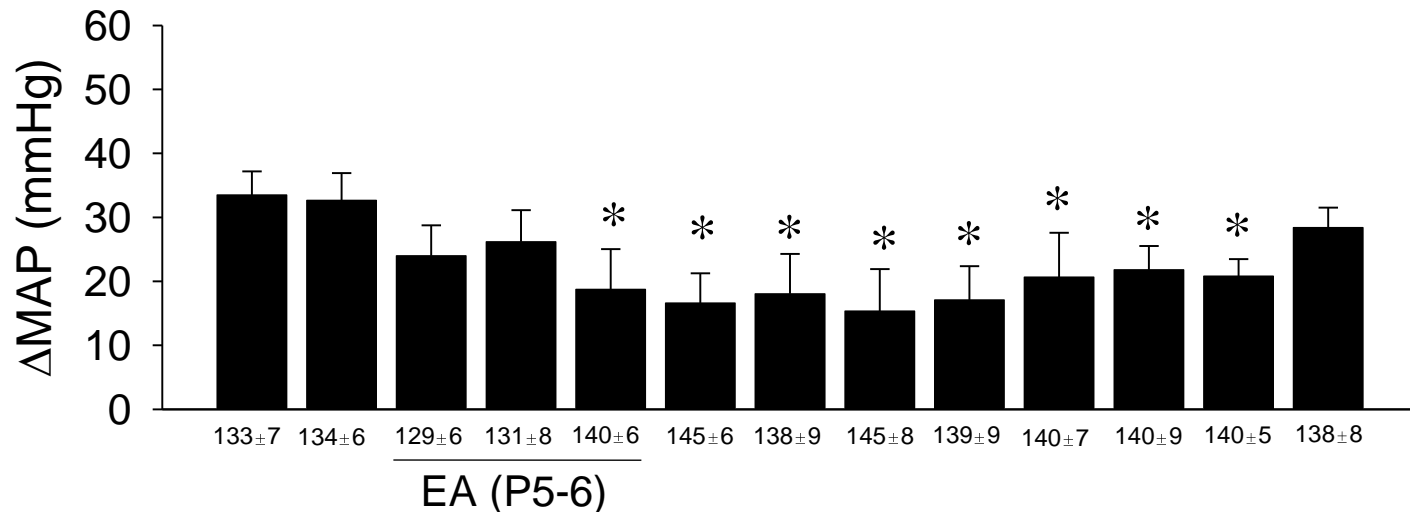
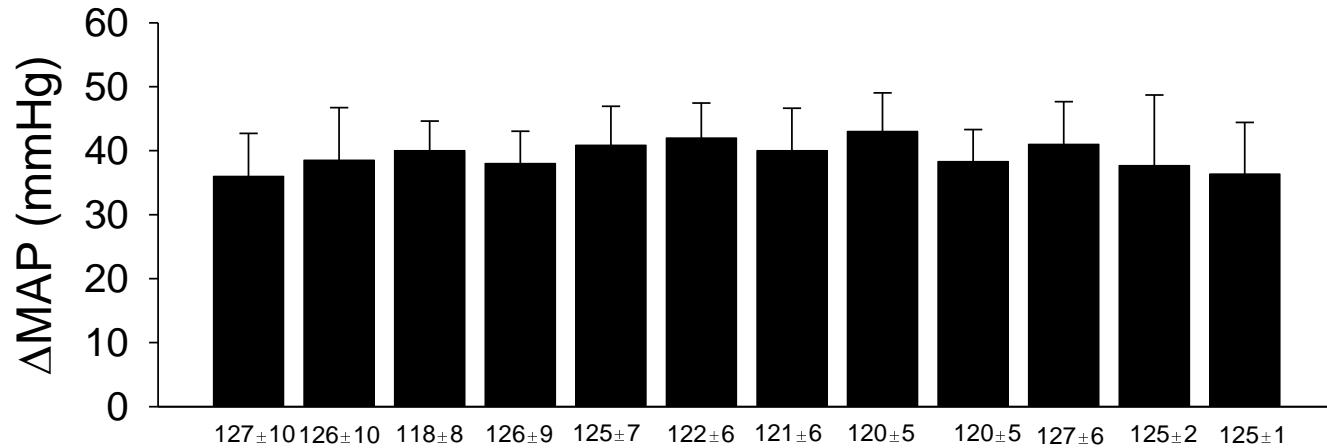
John Longhurst, MD, PhD

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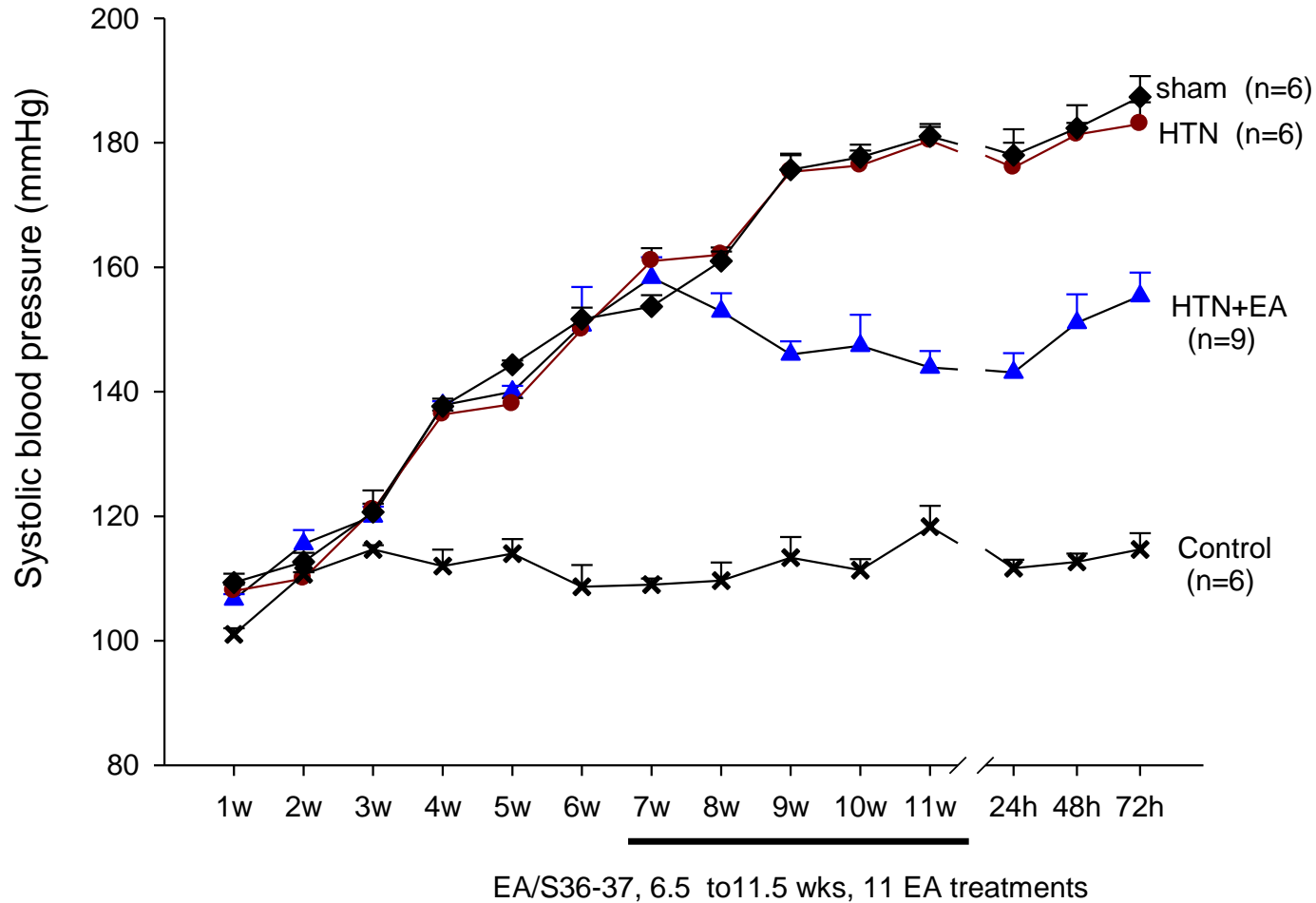
Electroacupuncture in Experimental Demand-Induced Myocardial Ischemia



Influence of Low Frequency Electroacupuncture on Experimental Elevations in Blood Pressure

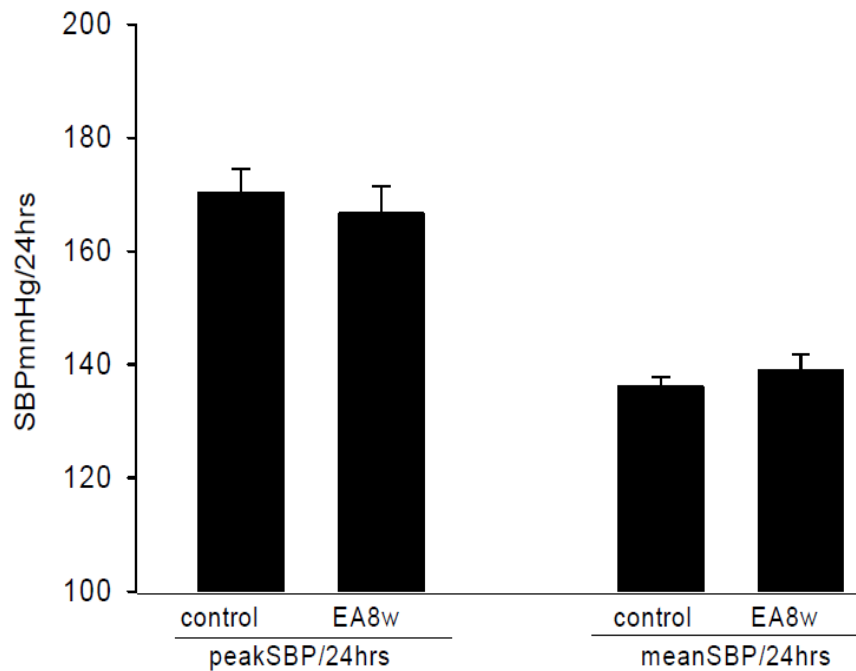


Systolic Blood Pressure in Cold-Induced Hypertension Response to Repetitive Electroacupuncture

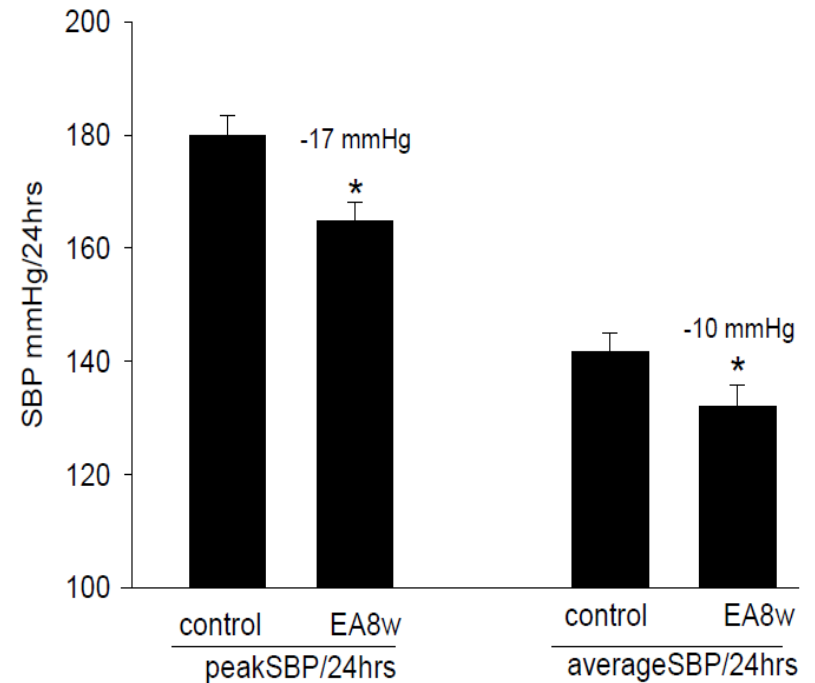


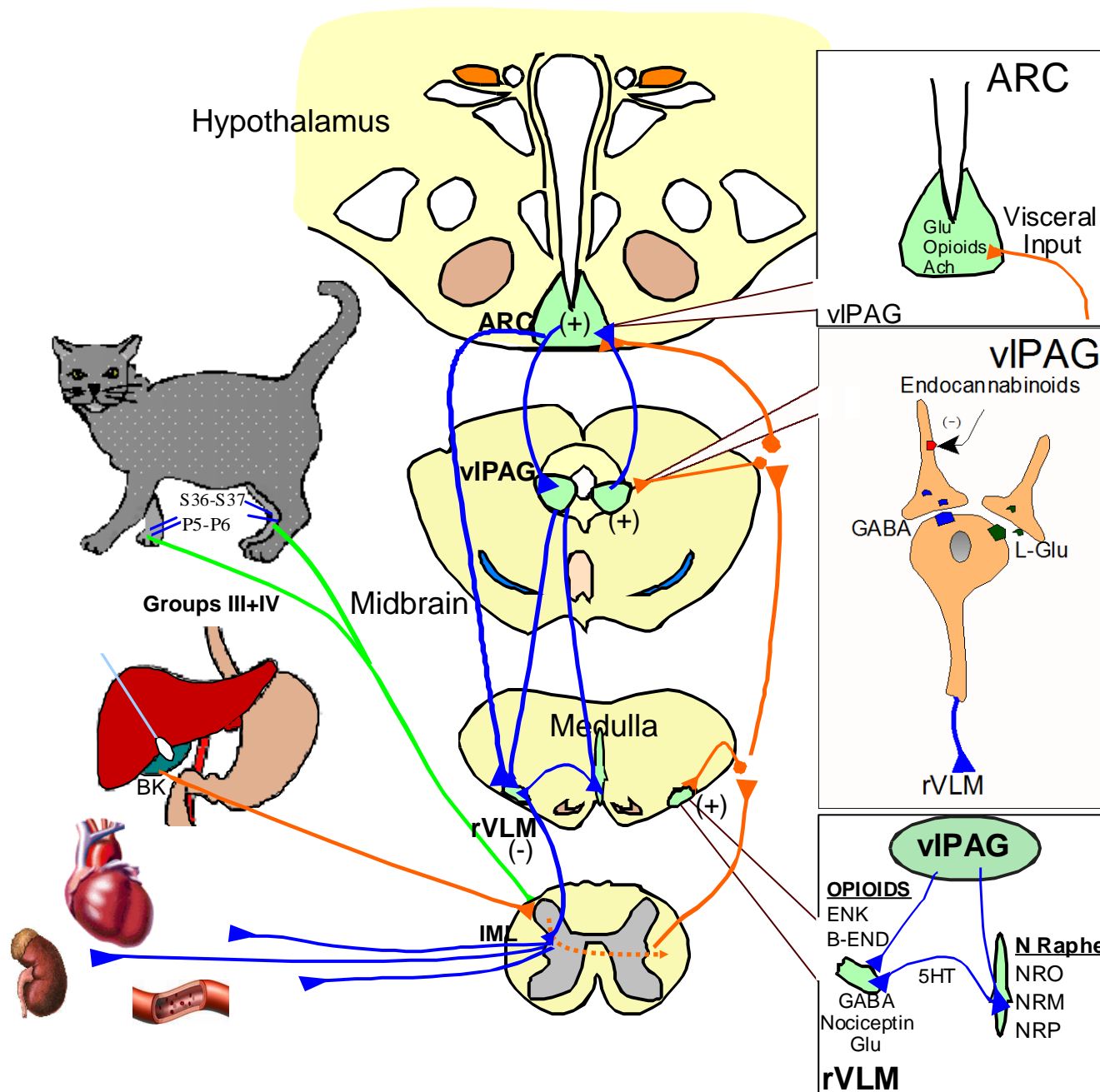
Systolic BP in Cross-over Hypertension Group (n=10)

A. EA at LI 6-7 + G36-37



B. EA at P 5-6 + S 36-37



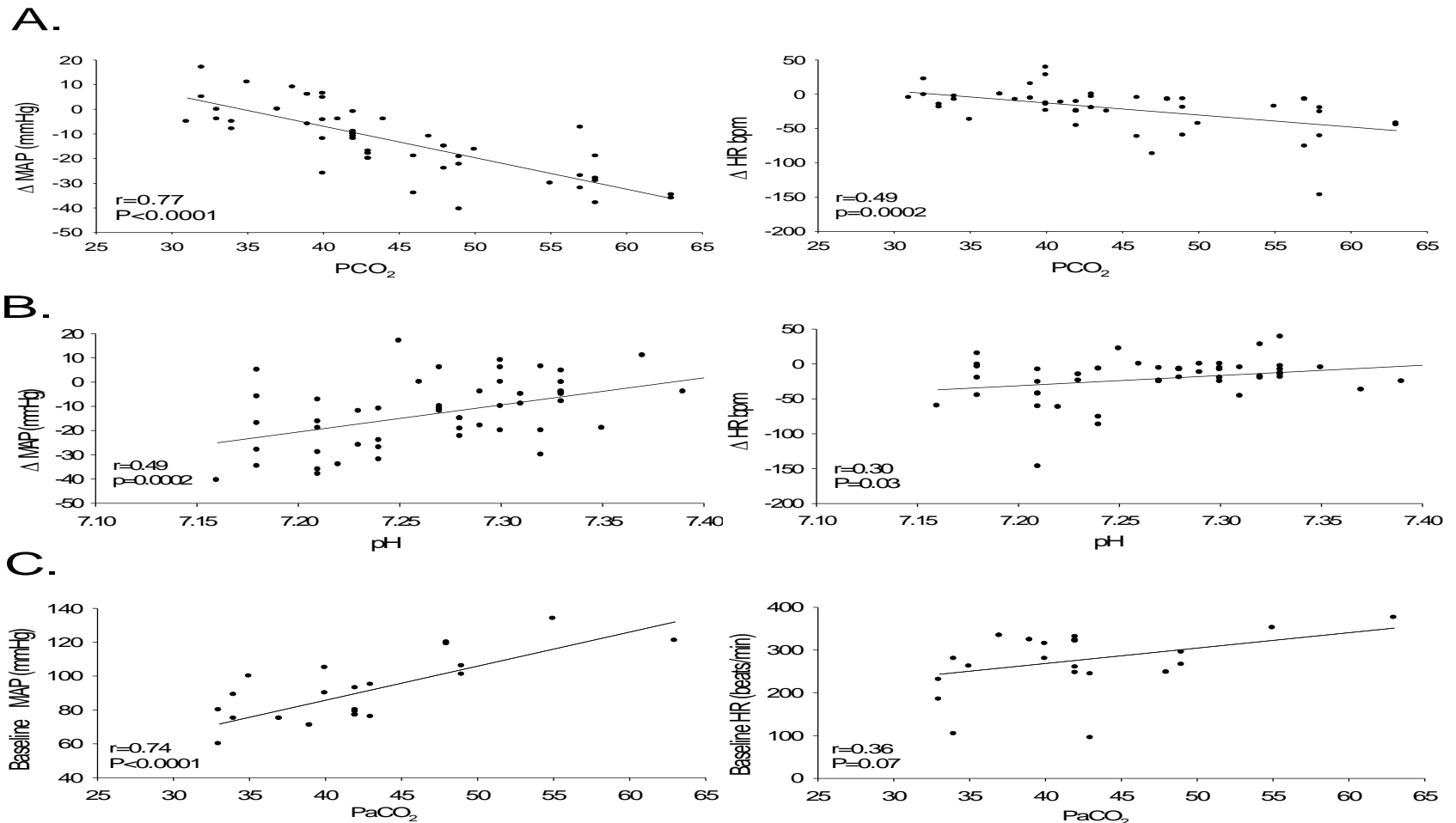


Acupuncture WHO (1999) Report

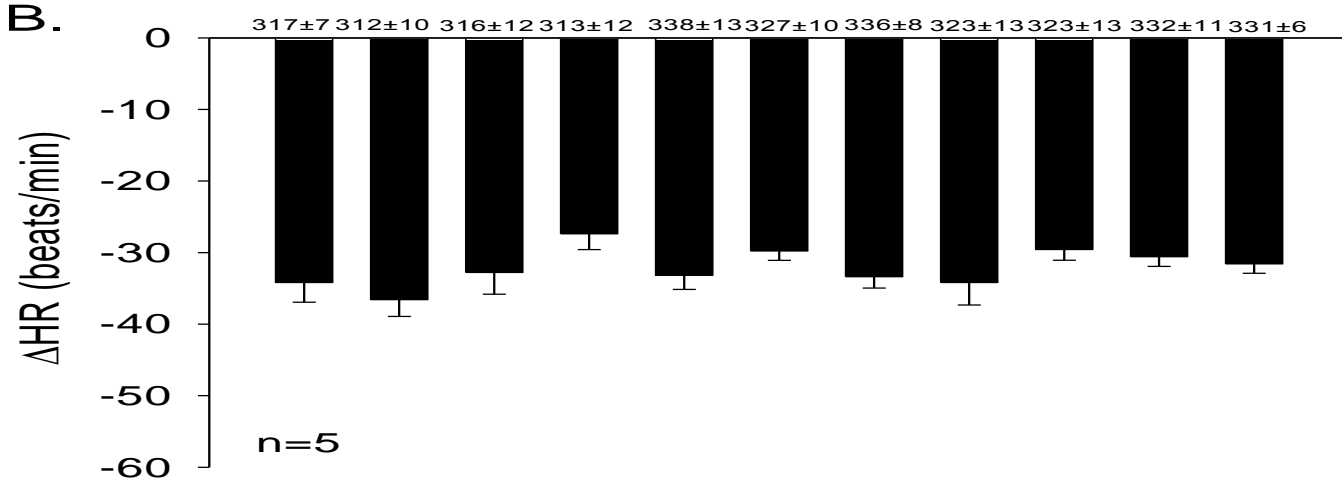
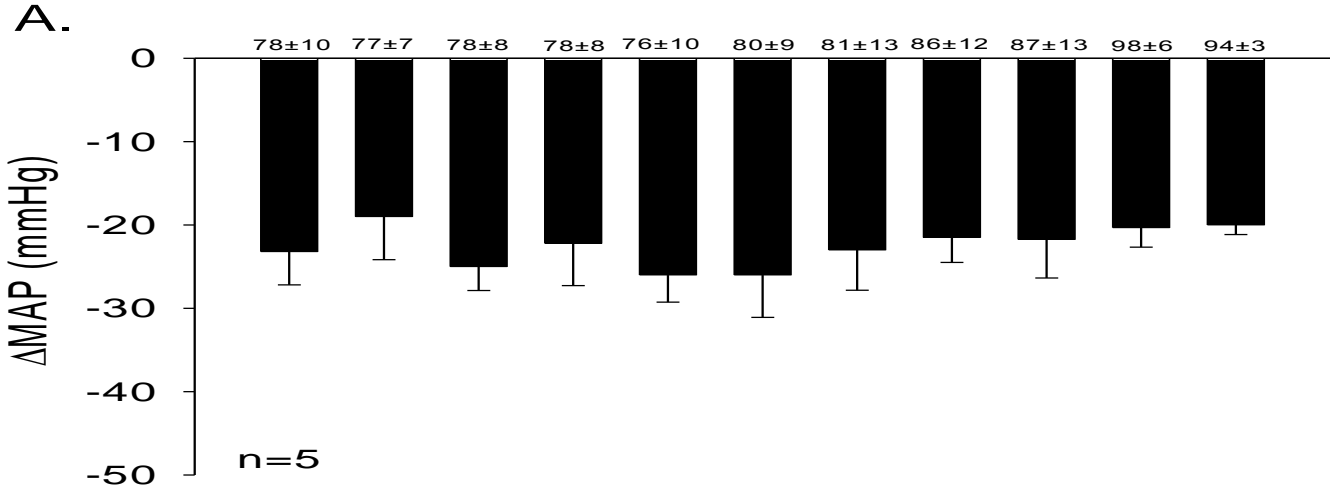
Diseases and symptoms in which Rx is proven:

1. Pain (many types)
2. Allergic rhinitis
3. Depression
4. Nausea and vomiting (morning sickness)
5. Dysentery (acute Bacillary)
6. **Blood pressure**
7. Induction of labor
8. Leukopenia
9. Fetal malposition (breech)
10. Stroke

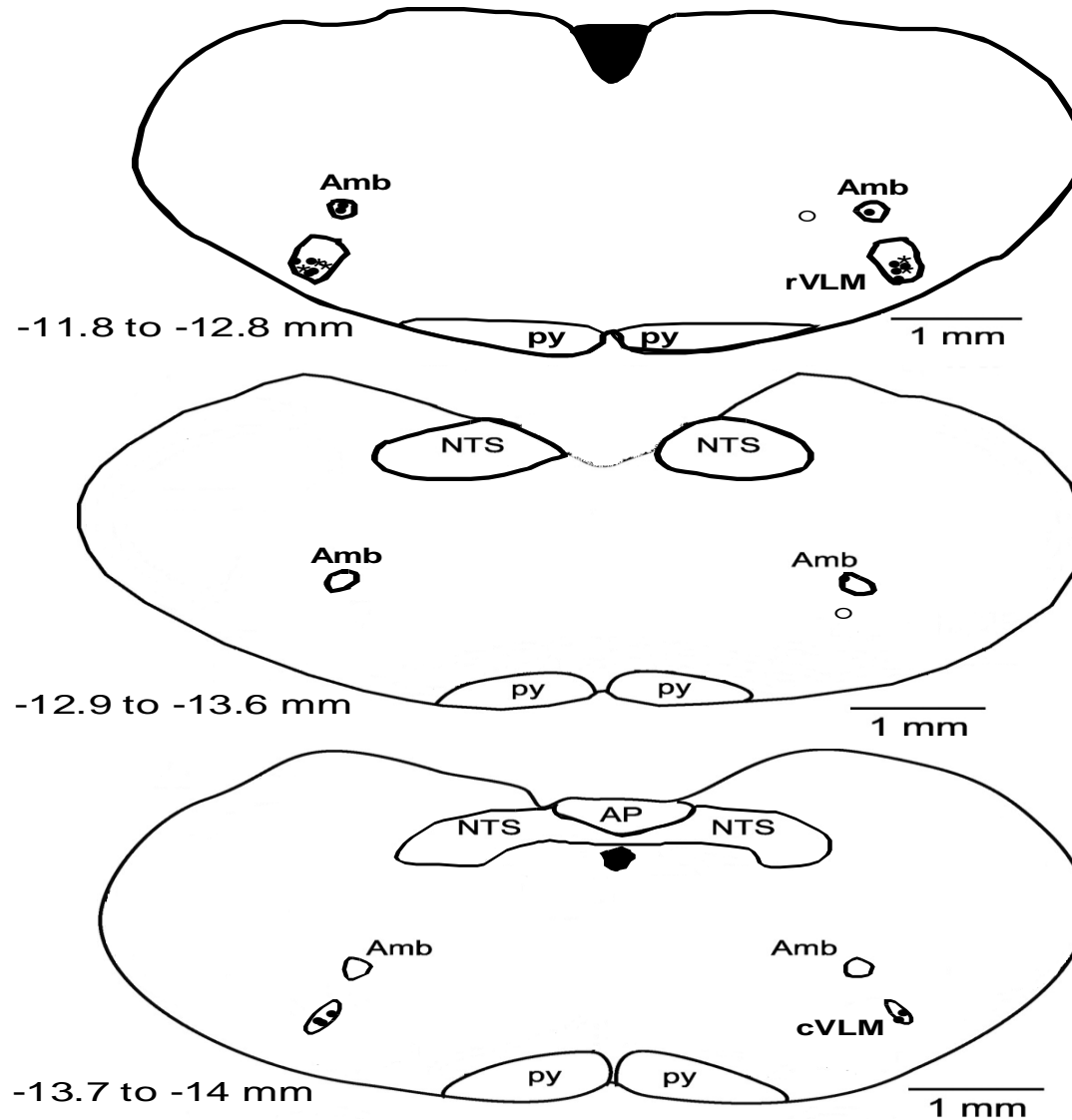
Hemodynamic Responses to Gastric Distension – Effects of Arterial Carbon Dioxide and pH



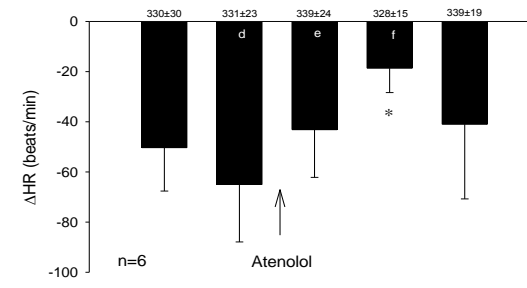
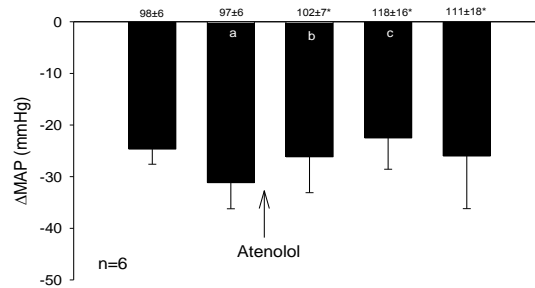
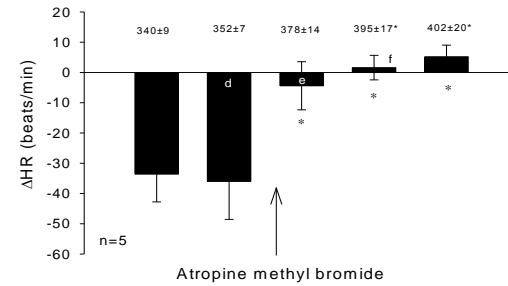
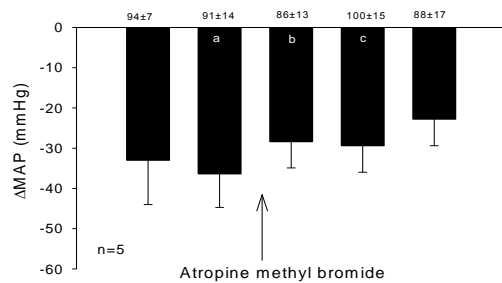
Cardiovascular Responses to Repeated Gastric Distension in Hypercapnic-Acidotic Rats



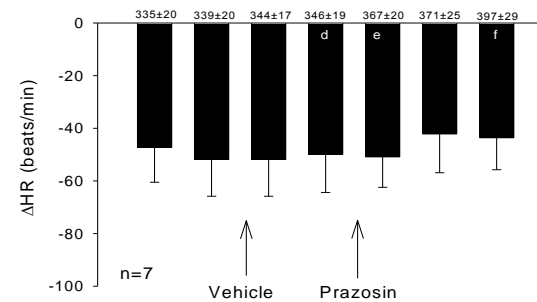
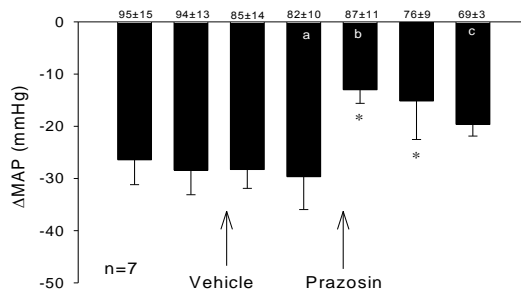
Anatomy of Brain Stem Regions in Reflex Response to Gastric Distension in Hypercapnic-Acidotic Rats



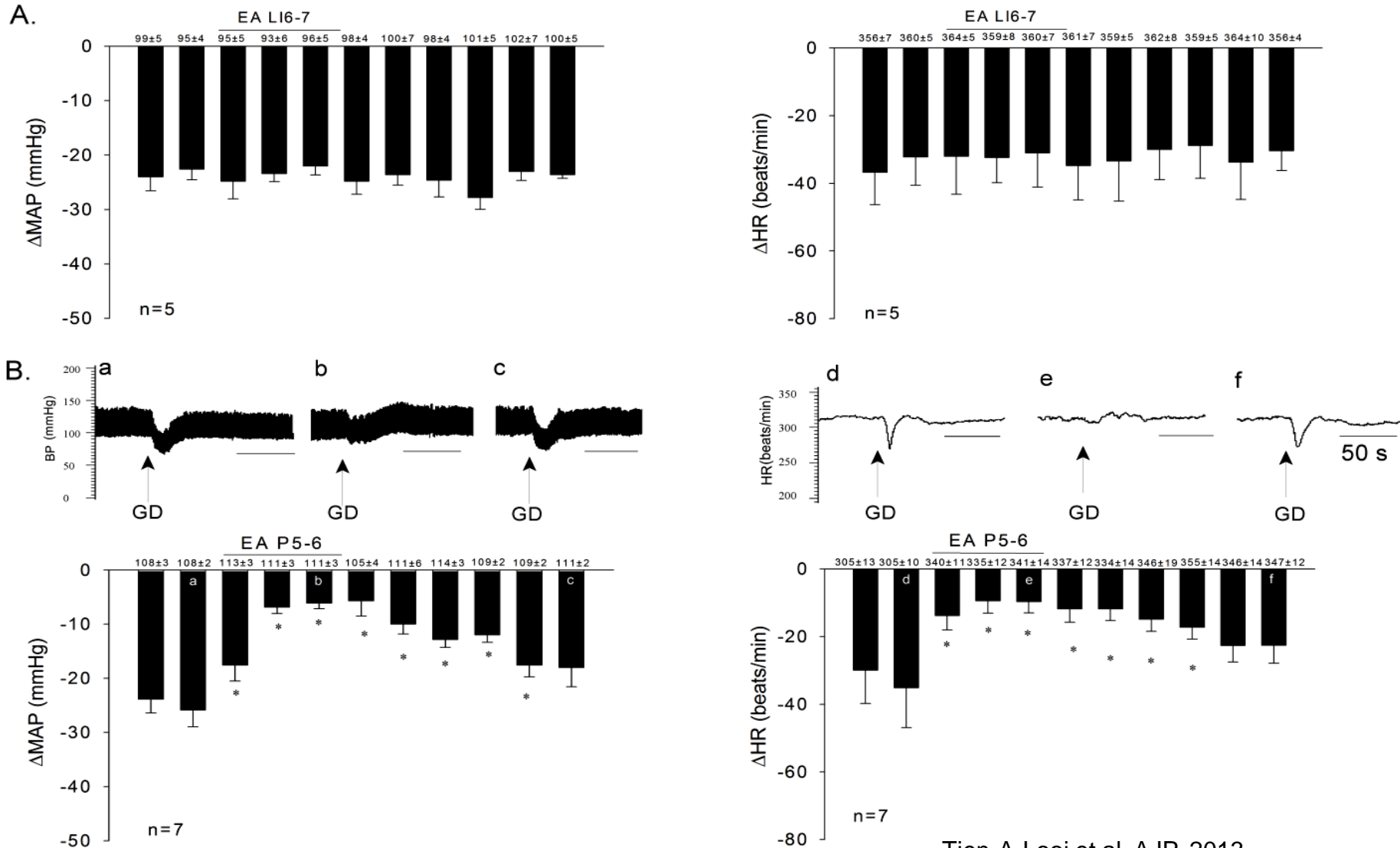
Distension-Induced Cardioinhibitory Responses: Roles of Parasympathetic and Sympathetic Outflows



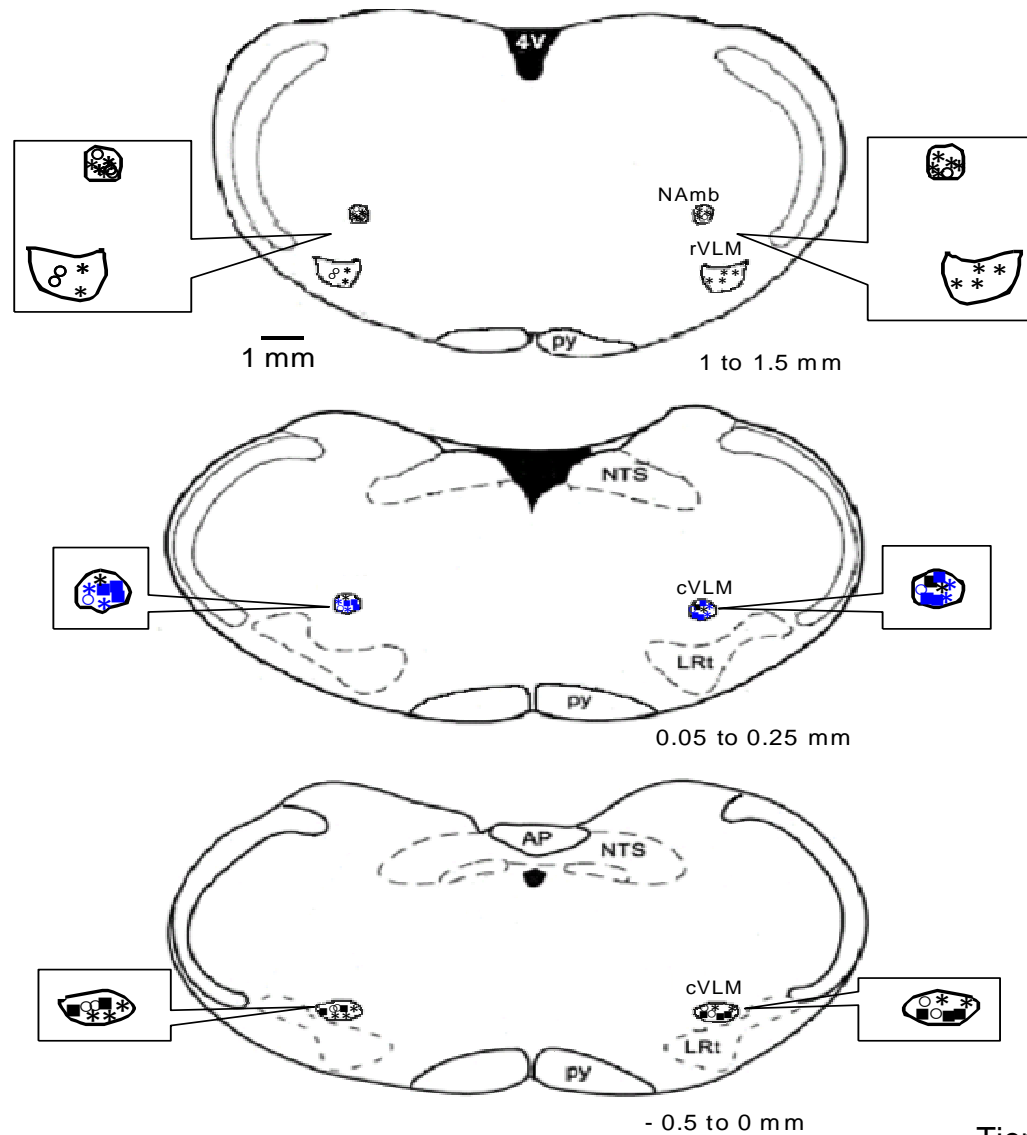
Prazosin



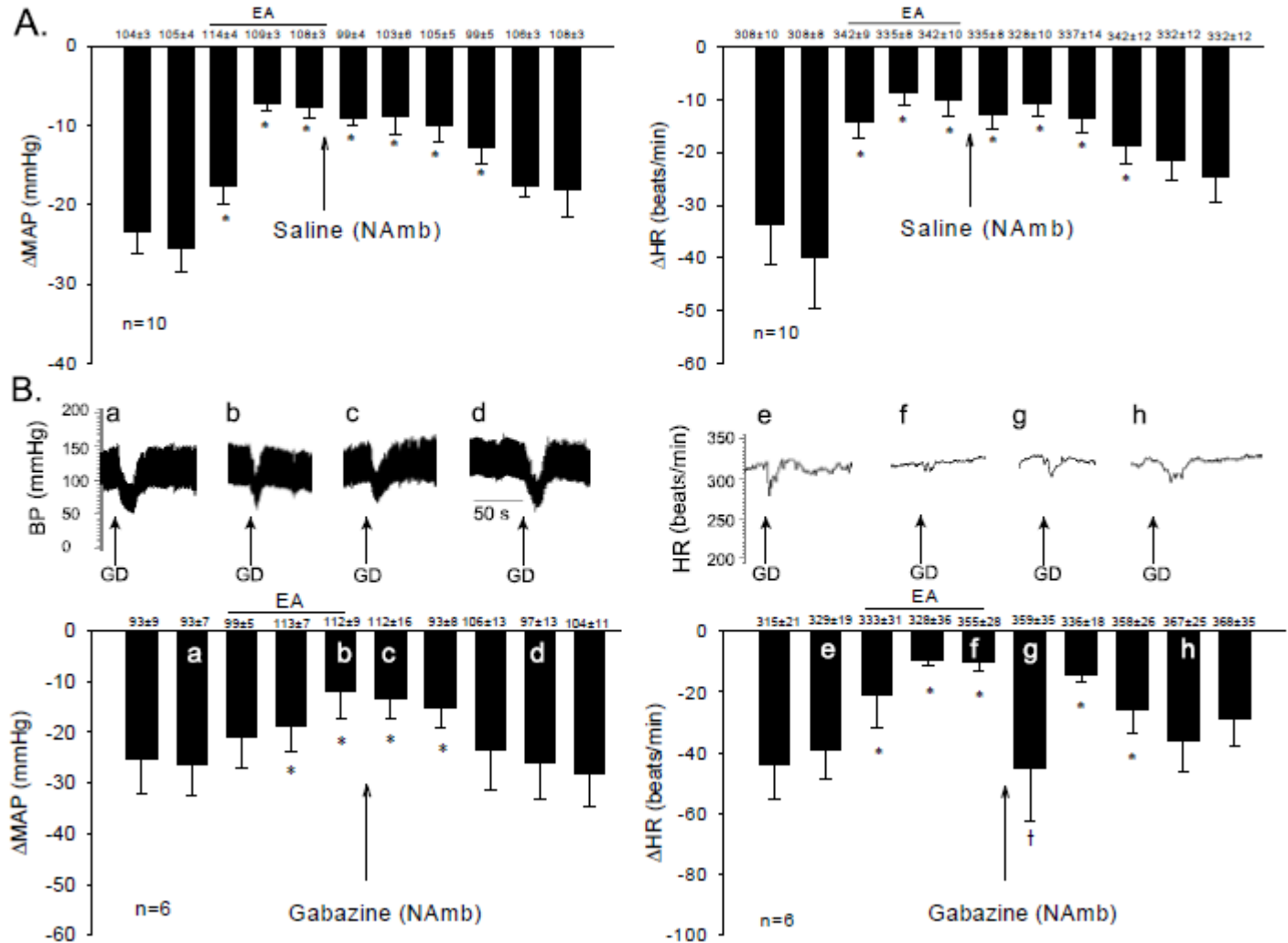
Point Specific Actions of EA on Inhibitory Cardiovascular Responses



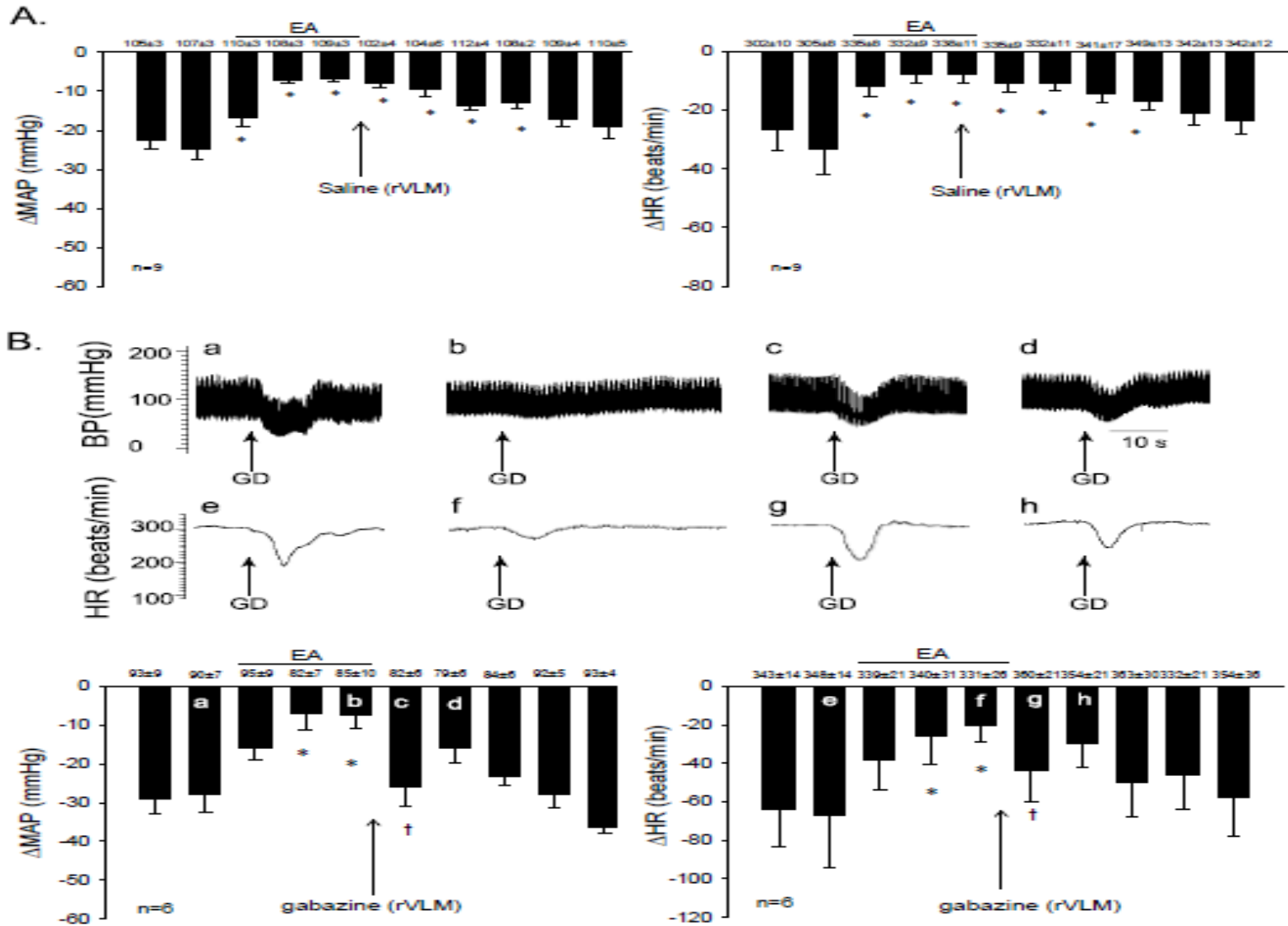
Brain Stem Anatomy in EA Modulation of Reflex Response to Gastric Distension in Hypercapnic-Acidotic Rats



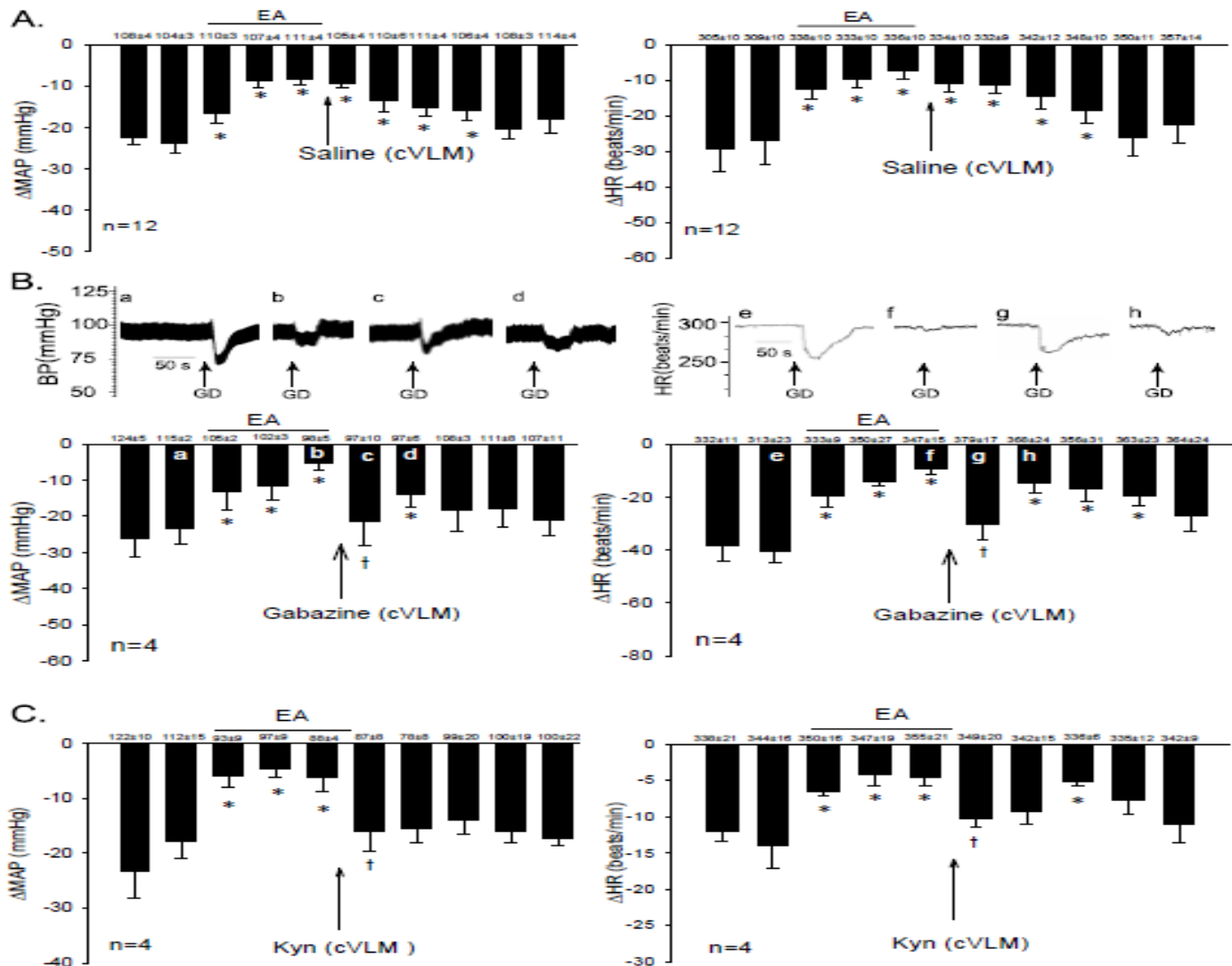
EA Reduces Bradycardia through GABA in Nucleus Ambiguus



EA Reduces Hypotensive and radycardia Responses through GABA in rVLM

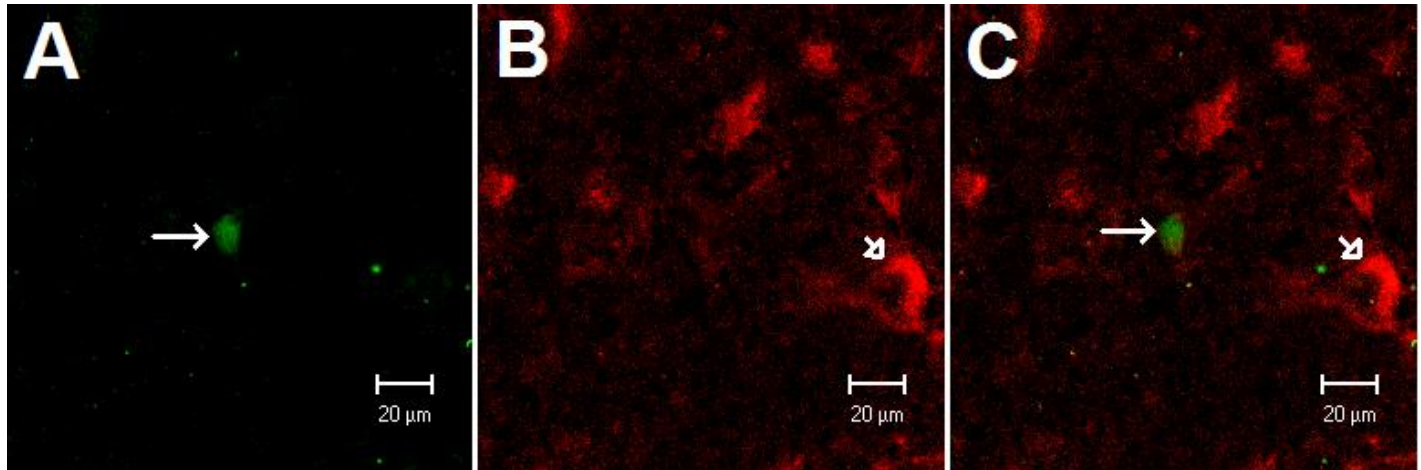


EA Reduces Cardiodepressor Responses through GABA and Glutamic Acid in cVLM

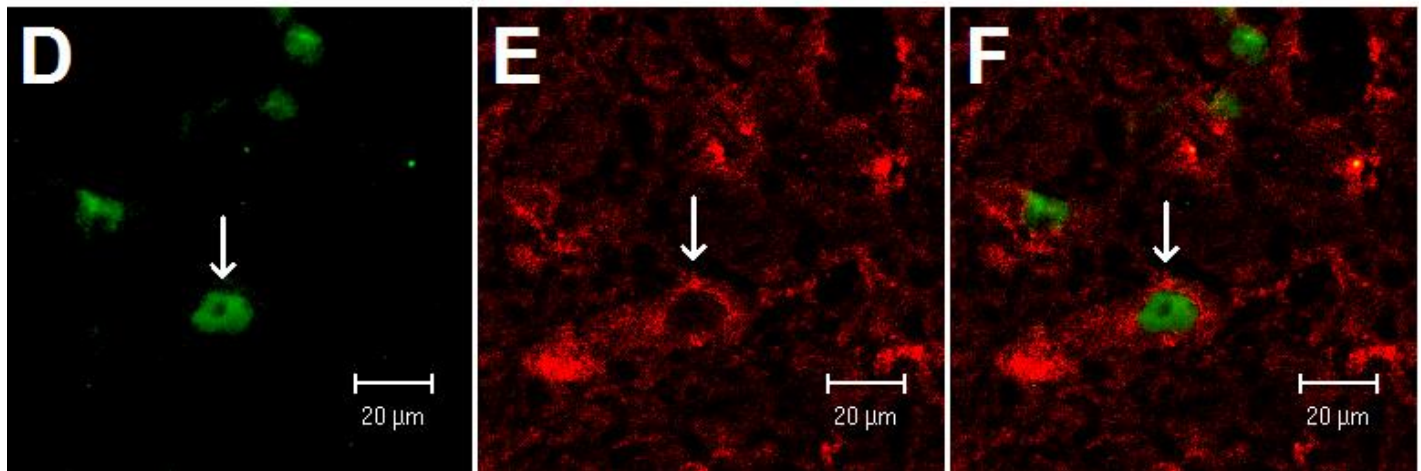


Co-localization of c-Fos and GAD67 (GABA) in cVLM

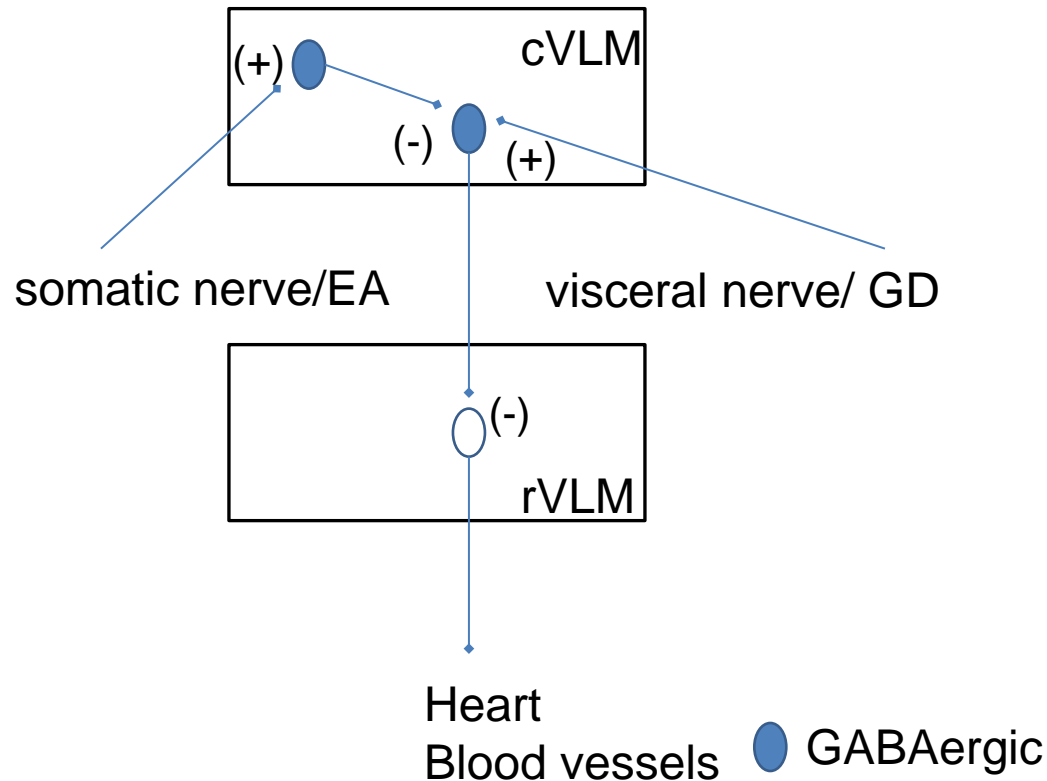
Control EA



EA



Electroacupuncture: Reduction/Disinhibition of Sympathetic Withdrawal → increase BP and HR

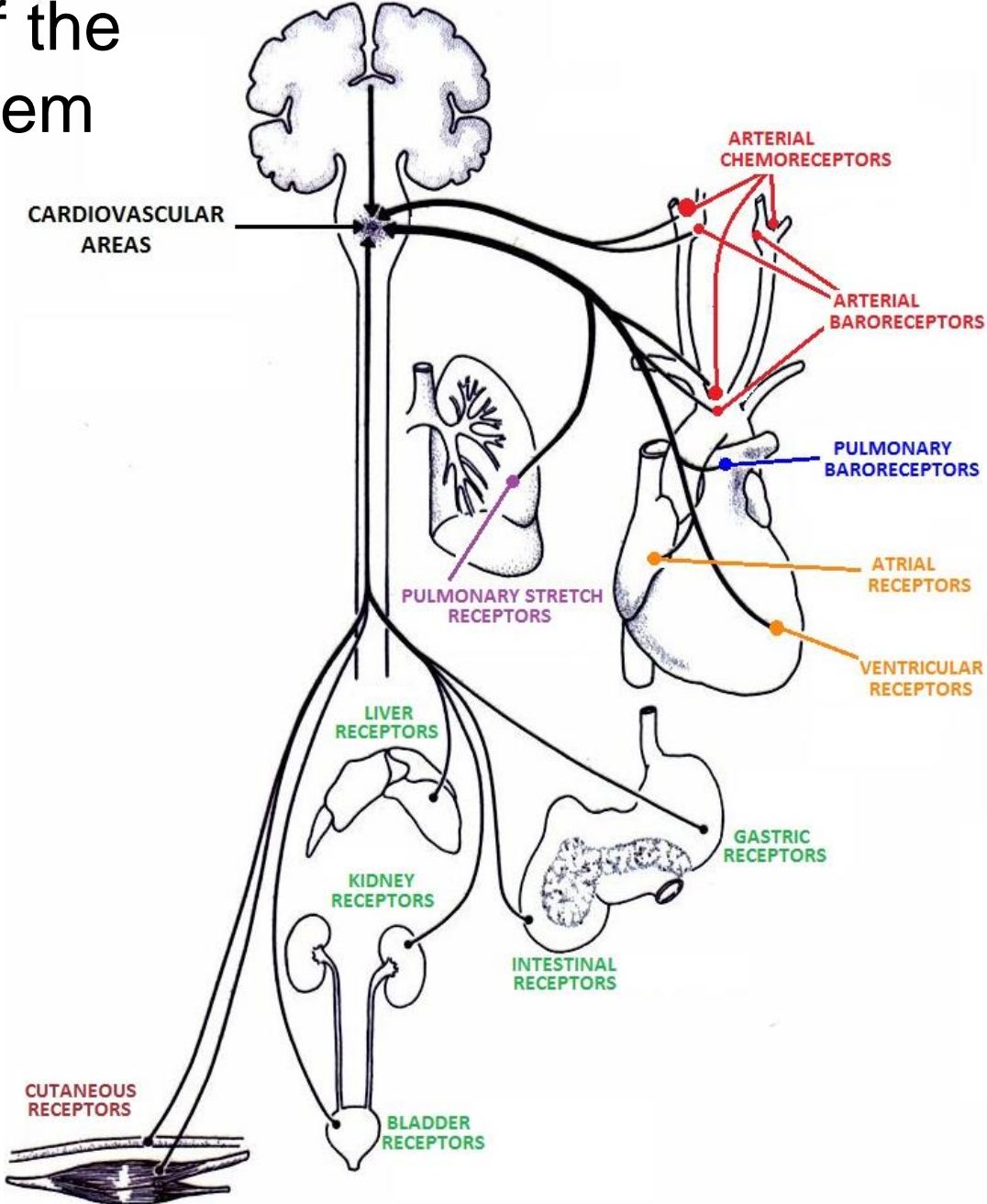


Distribution of Patients by Cause of Syncope: Summary of Recent Studies

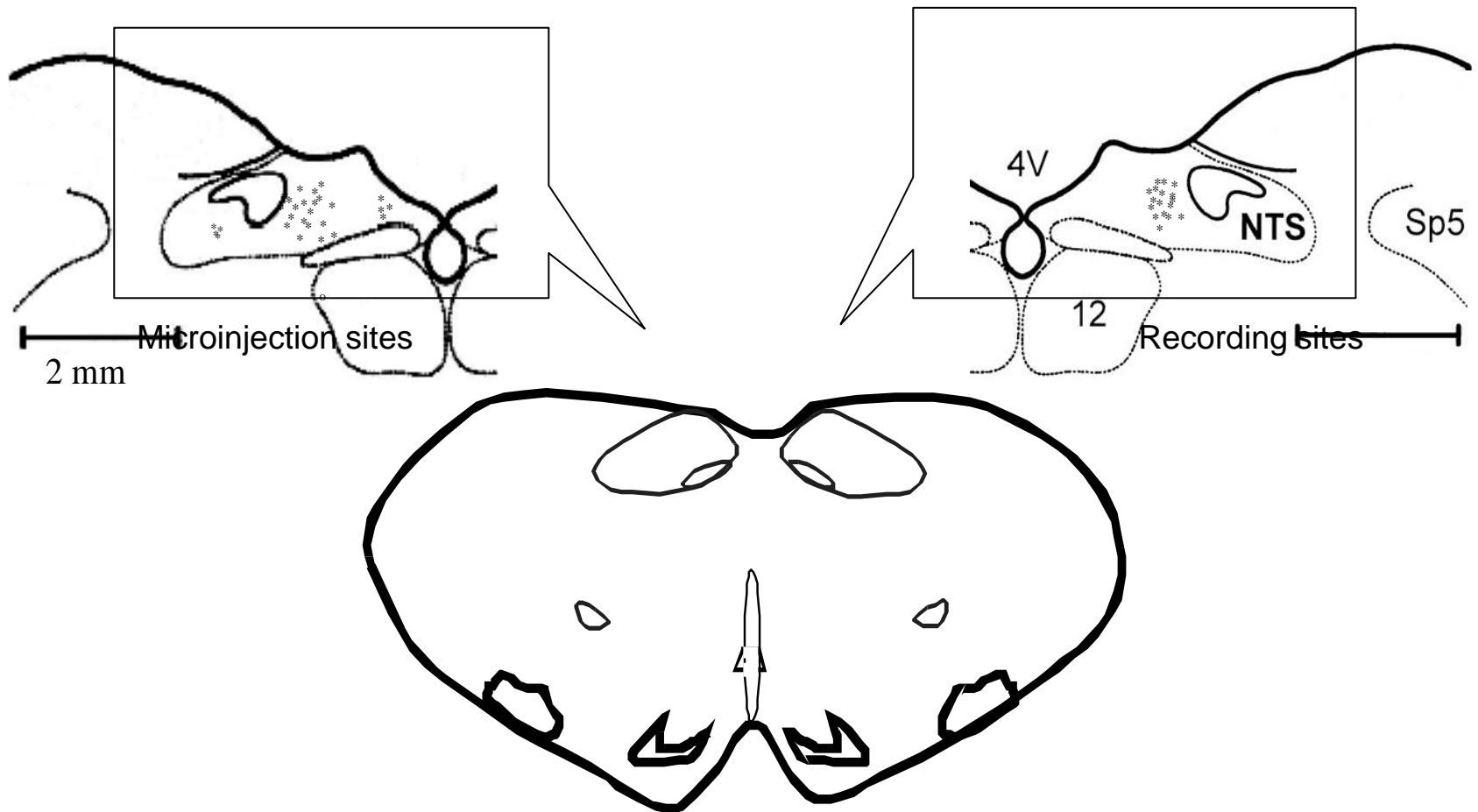
Syncope not associated with Cardiac Disease

	% All Patients n=1153	% ER Patients n=544
Vasodepressor (vasovagal faint)	20.0	33.8
Seizures	7.5	13.8
Orthostatic	6.4	4.6
Situational	4.0	1.7
Drugs/Ethanol	2.5	2.9
Cerebrovascular	1.5	0.9
Psychogenic	1.1	1.9
Carotid sinus	0.7	0.0
Hyperventilation, hypoglycemia	<0.7	<1.3
Gastrointestinal hemorrhage		
Migraine and neuralgia		

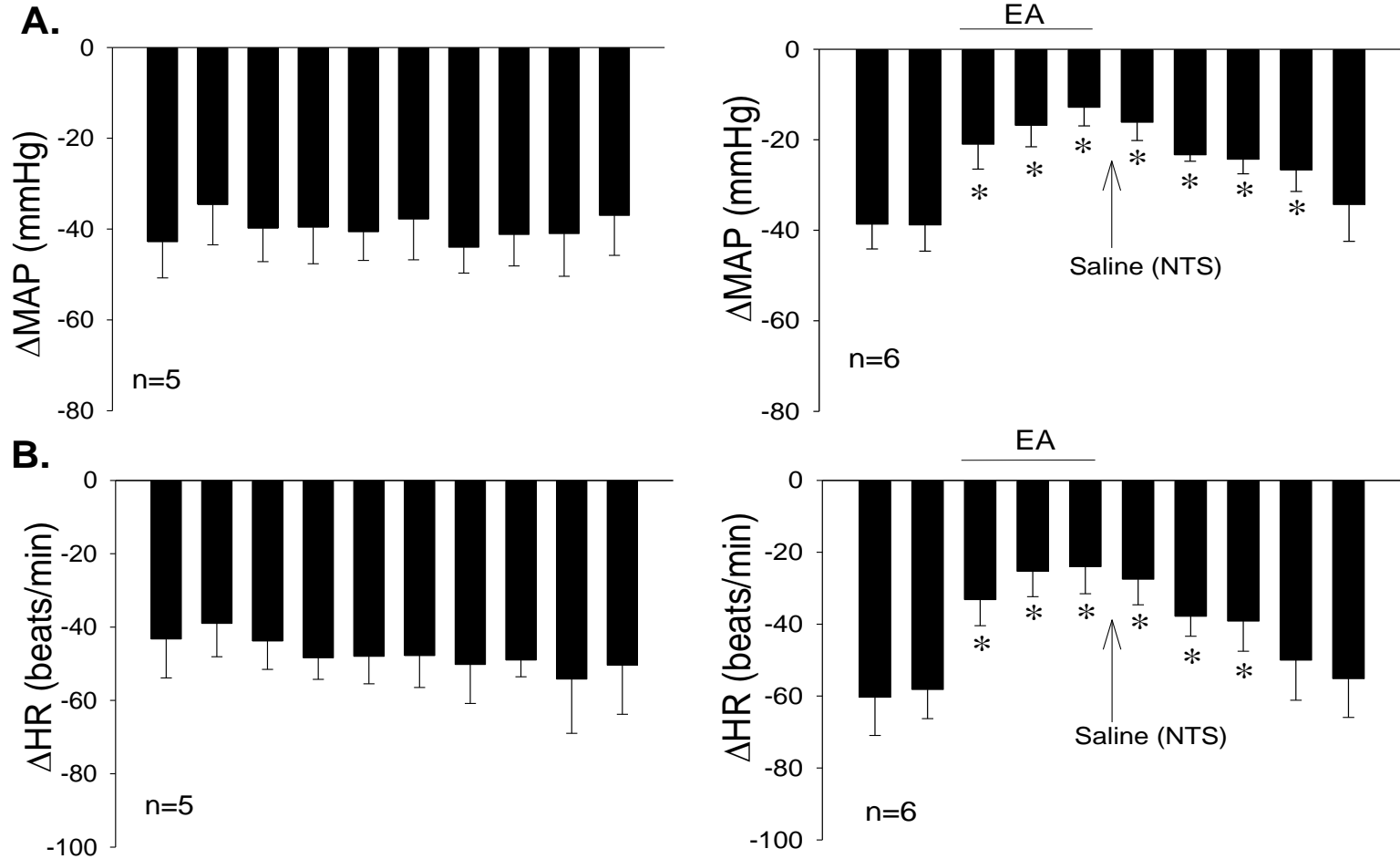
Reflex Regulation of the Cardiovascular System



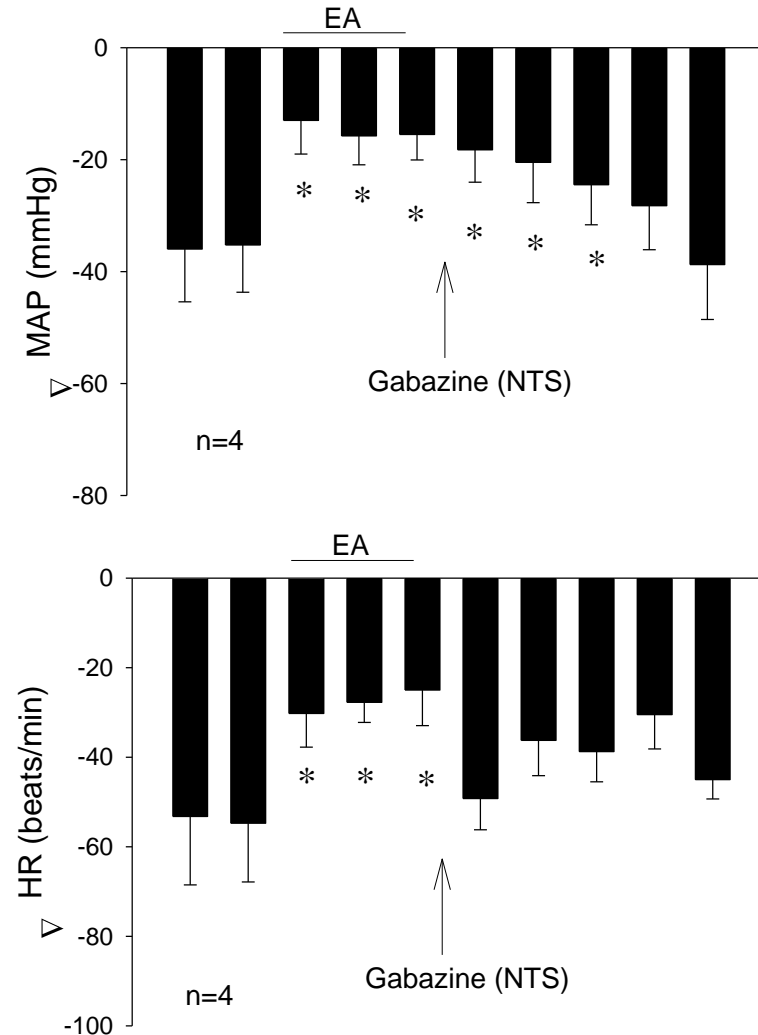
Anatomy of EA Input into Nucleus Tractus Solitarii



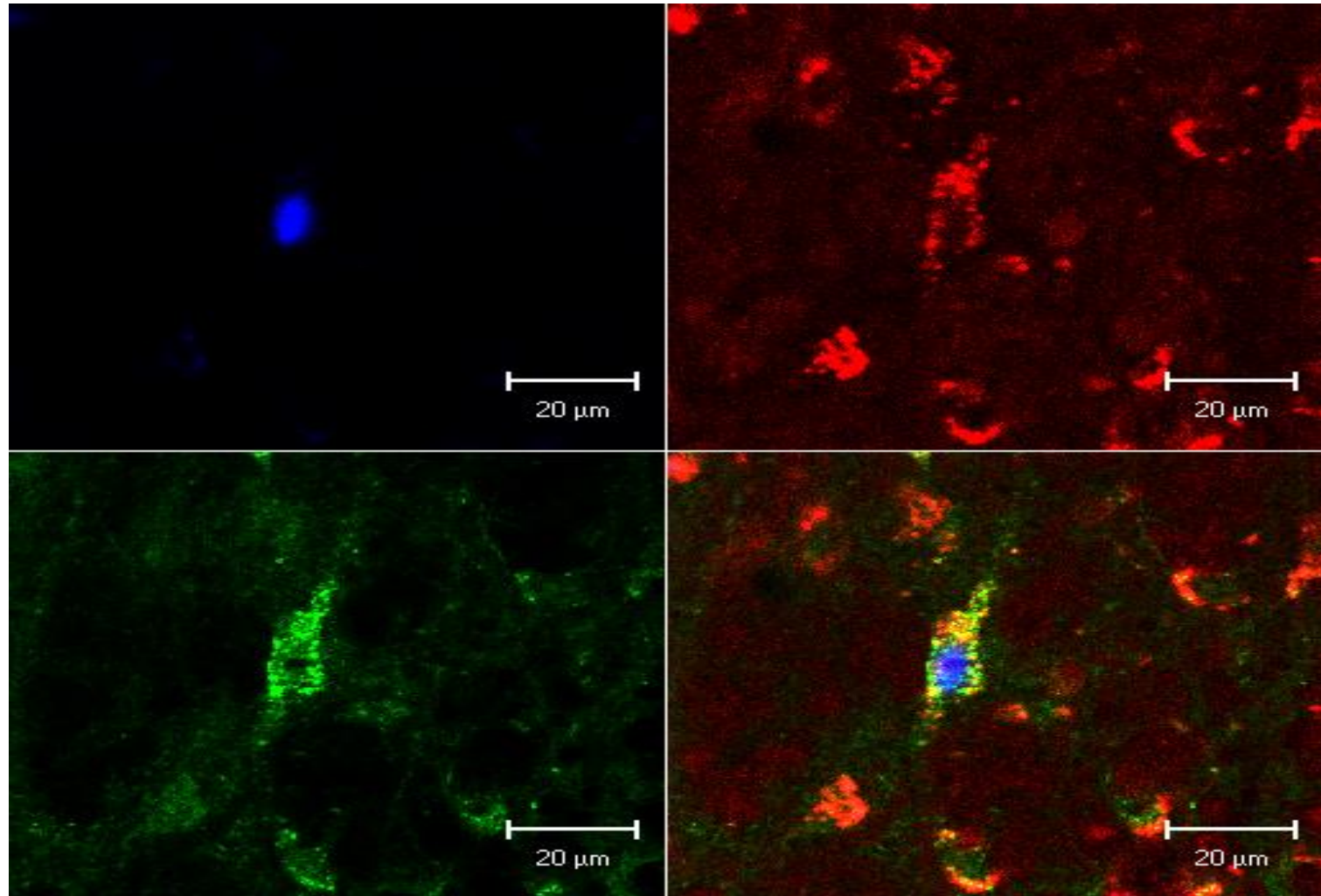
EA Inhibits Bezold-Jarisch (PBG) Reflex



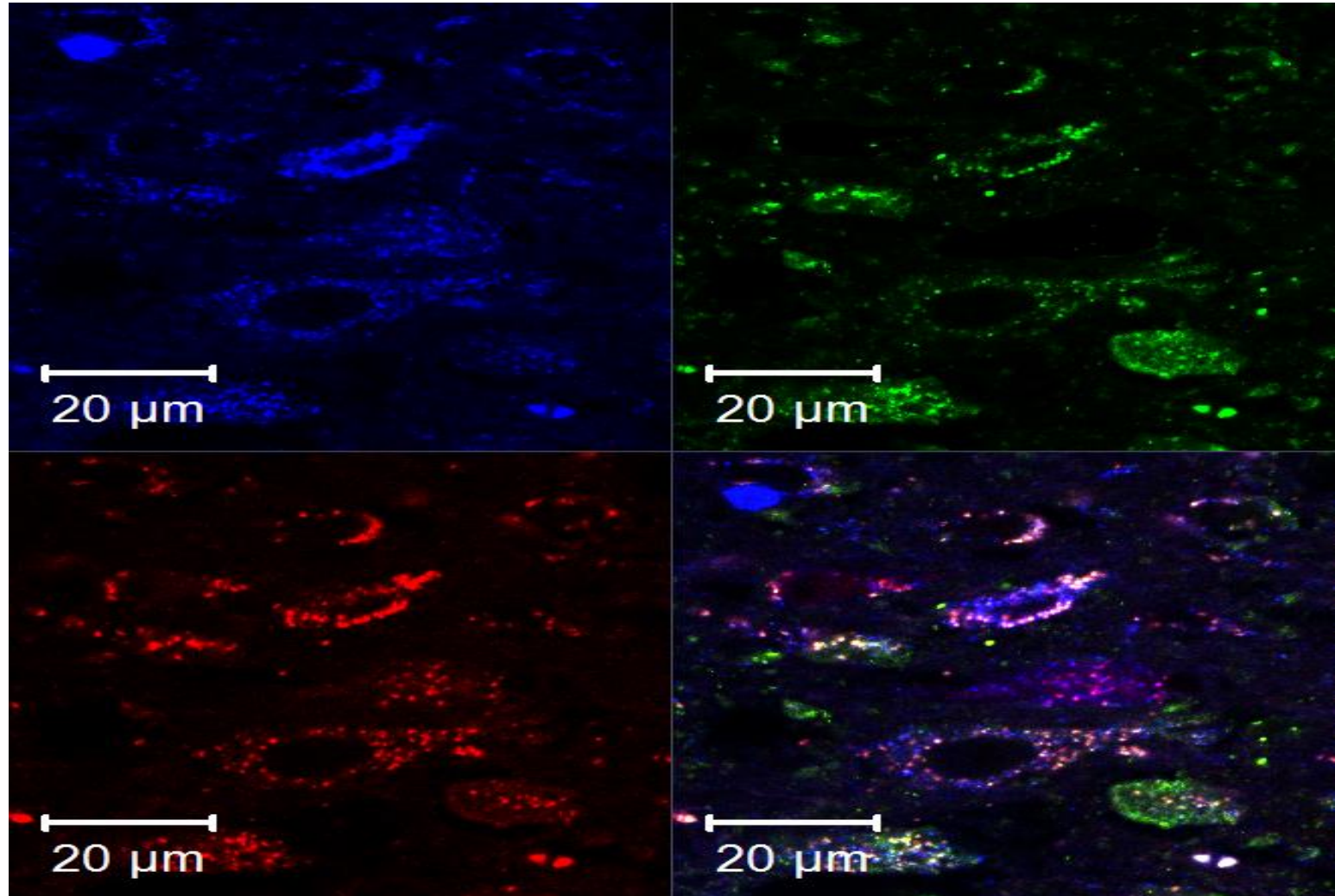
EA Modulates PBG-induced Bradycardia Reflex through GABAergic Mechanism in NTS



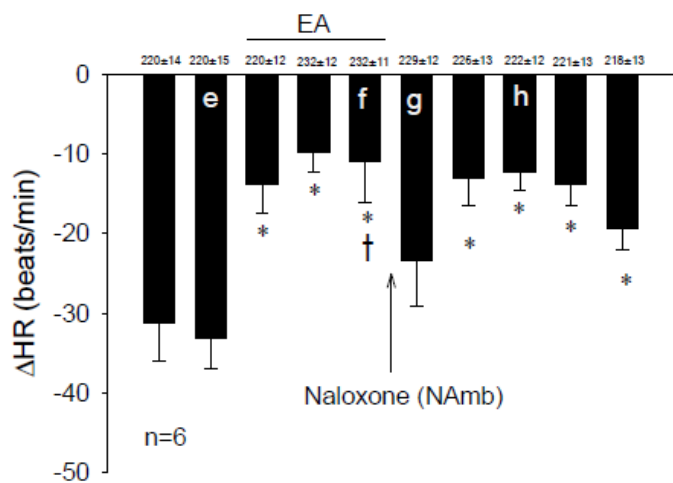
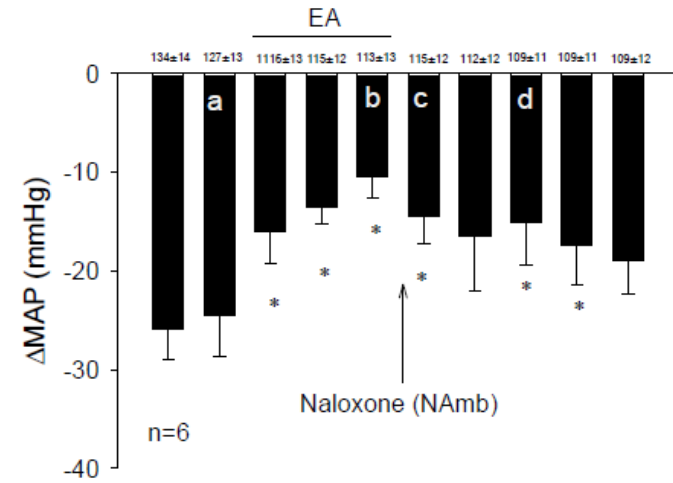
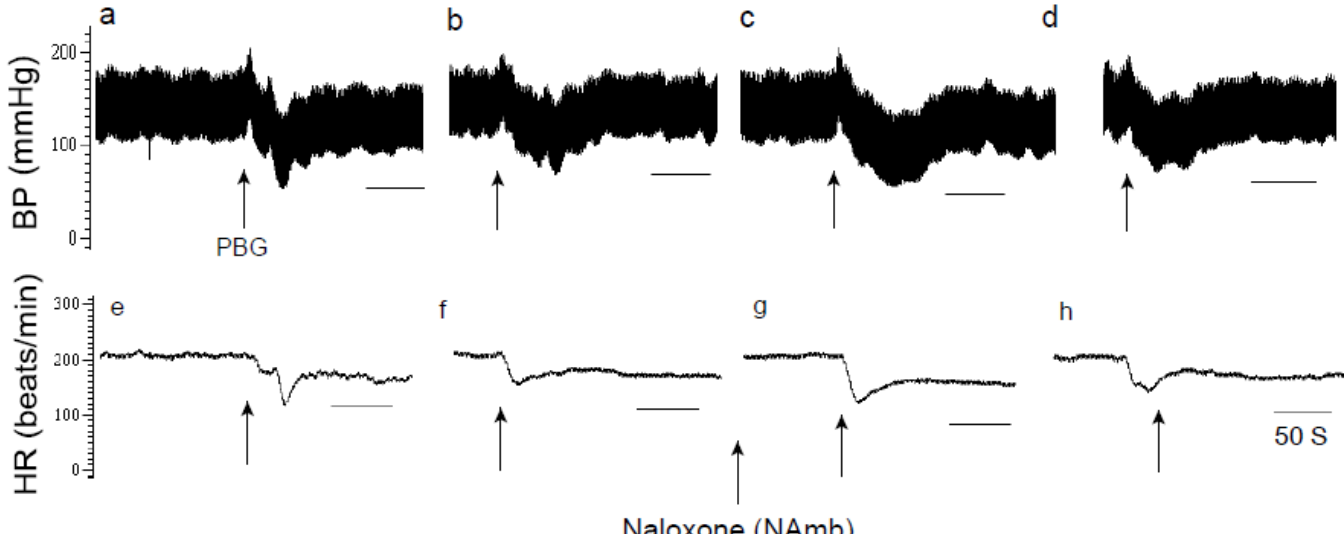
NTS Co-localization of EA-Induced c-Fos and Retrograde Tracer from Nucleus Ambiguus



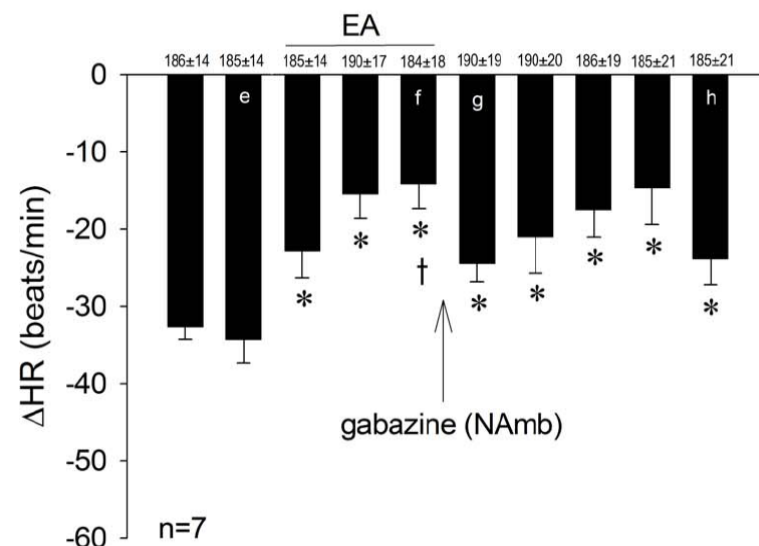
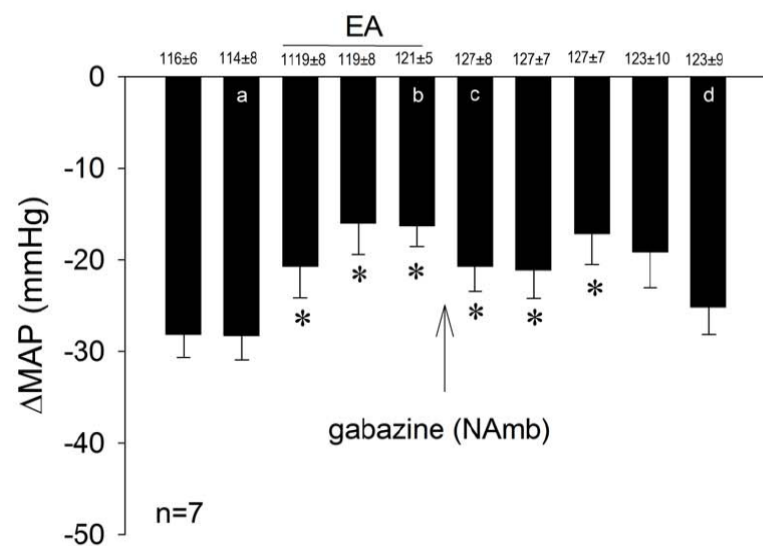
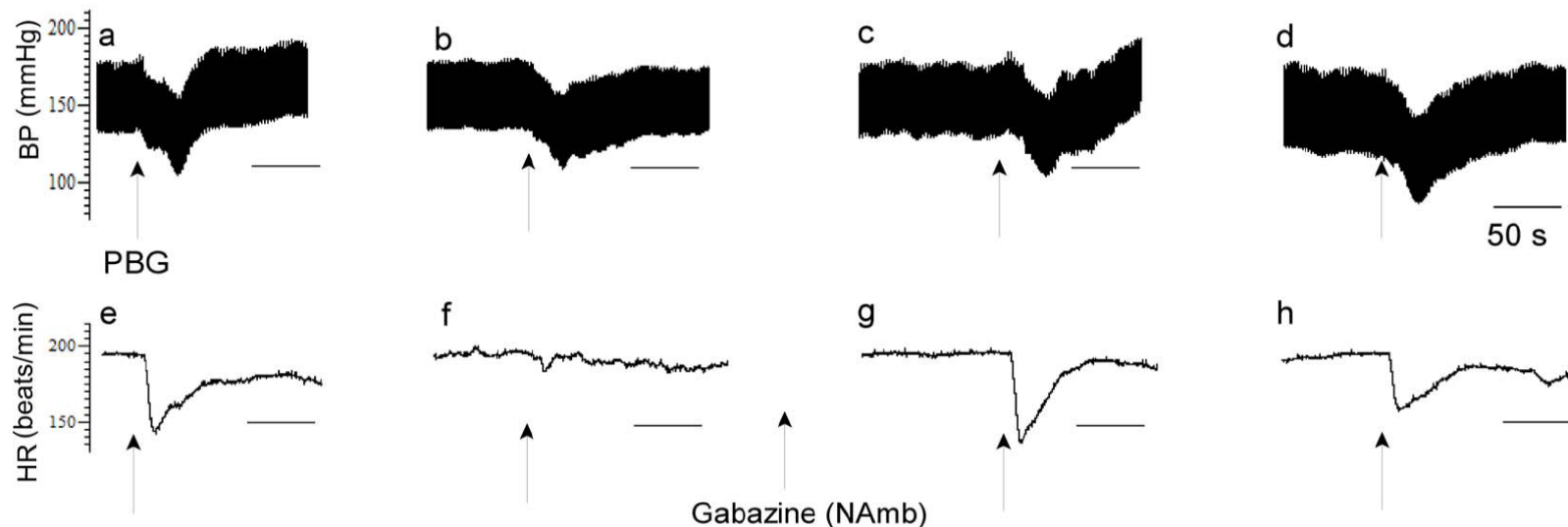
NTS Co-localization of GAD67 with Retrograde Tracer from Nucleus Ambiguus



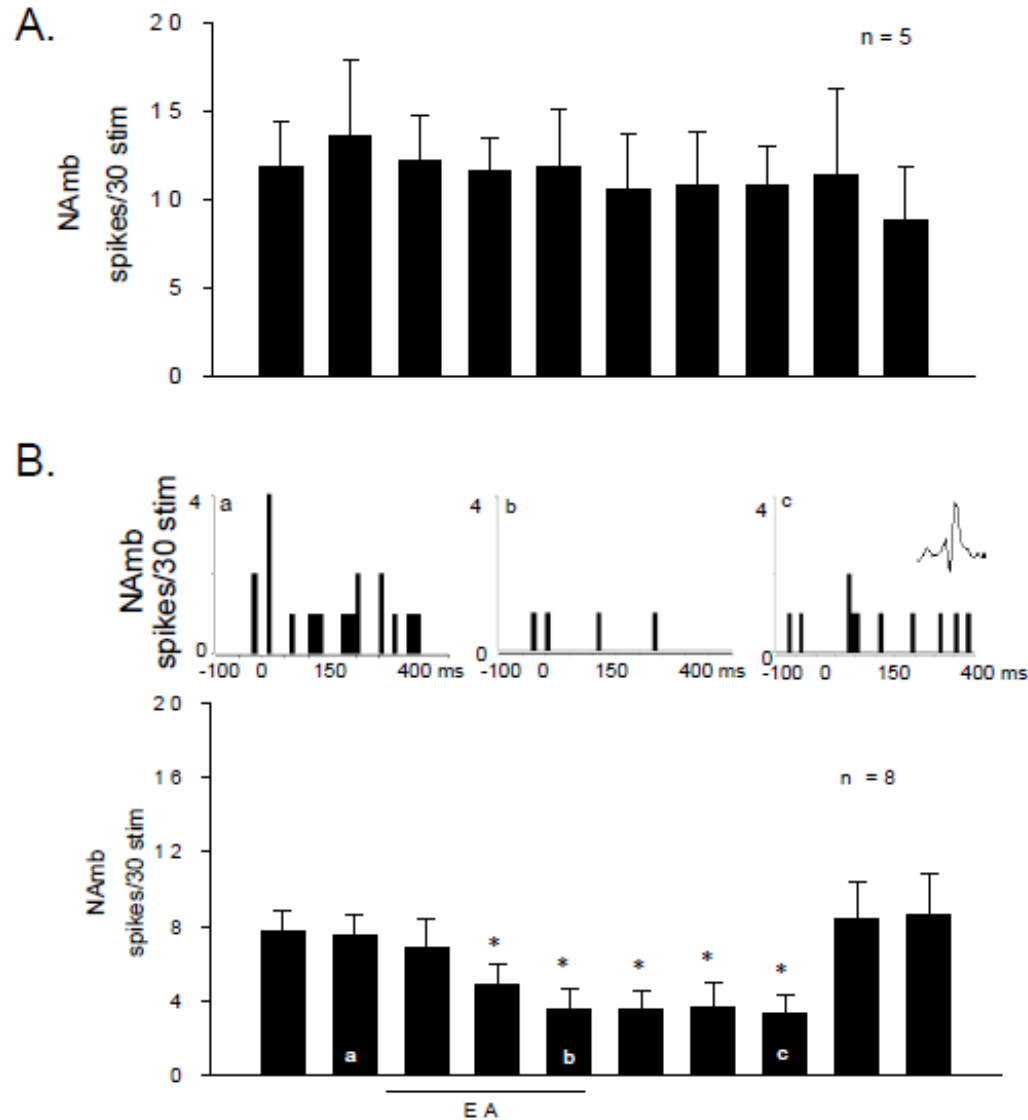
Naloxone in Nucleus Ambiguus Reverses EA Modulation of Cardiopulmonary Reflex Bradycardia



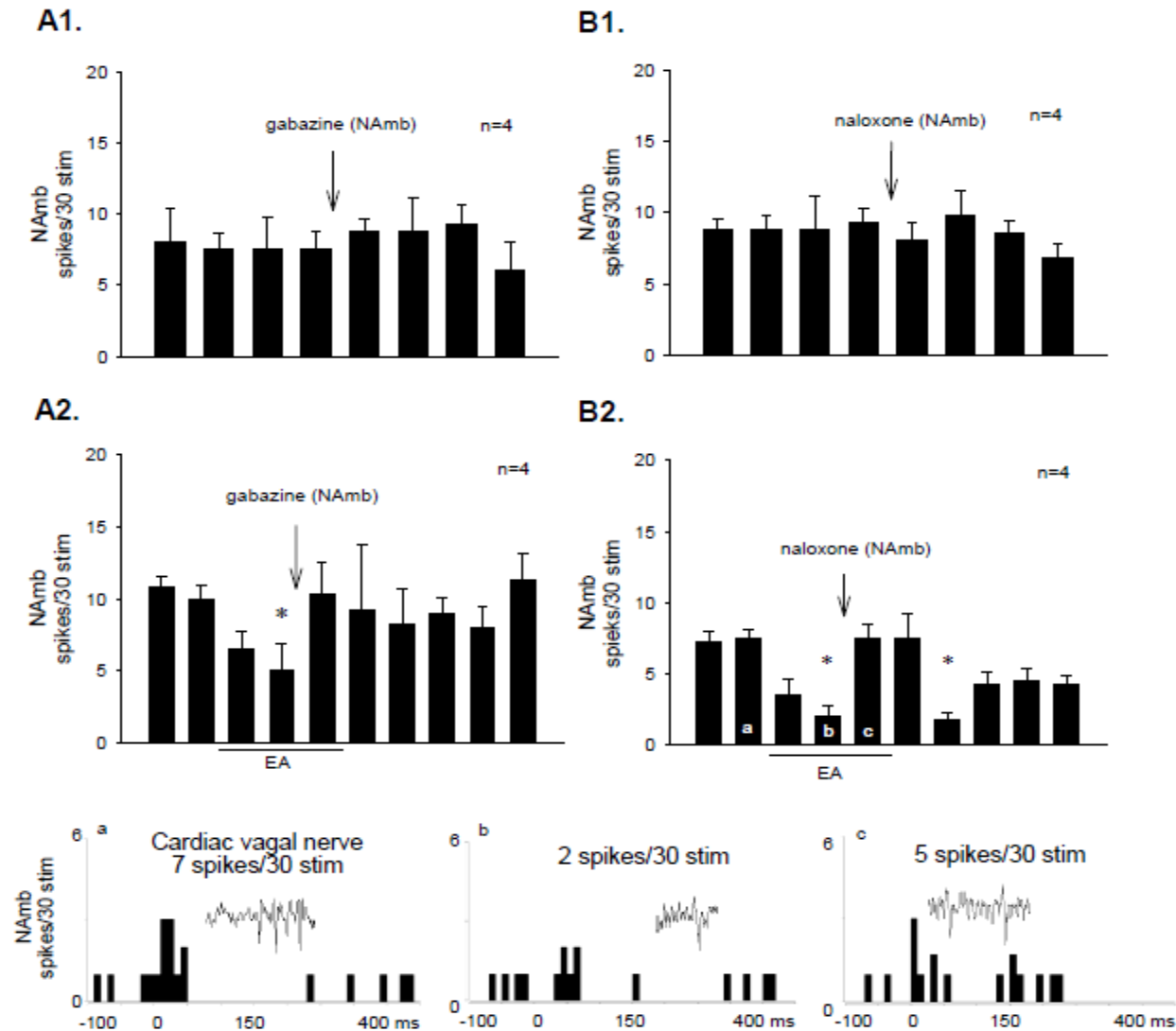
Gabazine in N Amb Reverses EA Modulation of PBG-induced Bradycardia and Hypotension



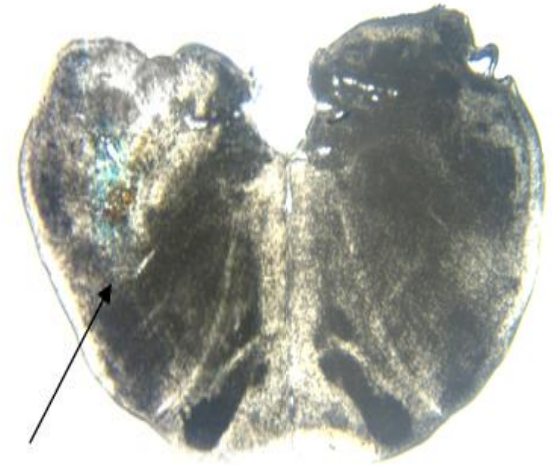
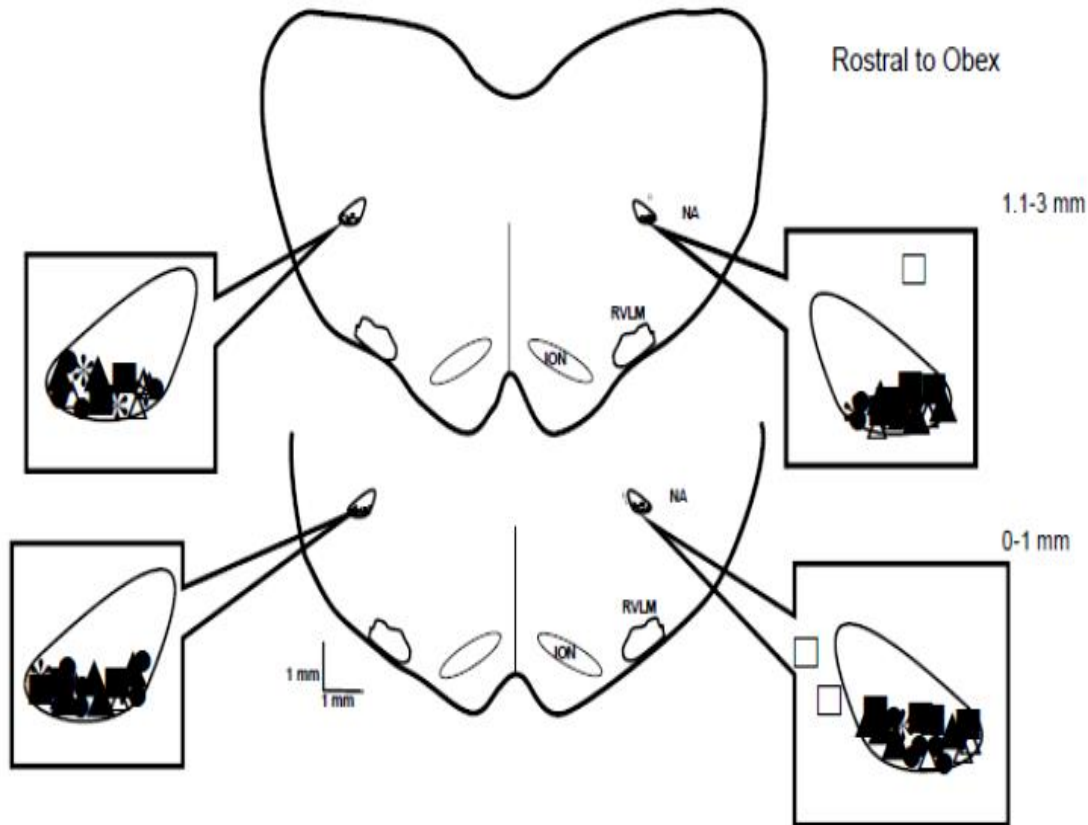
EA Inhibits Evoked Vagal Preganglionic Nucleus Ambiguous Neuronal Activation



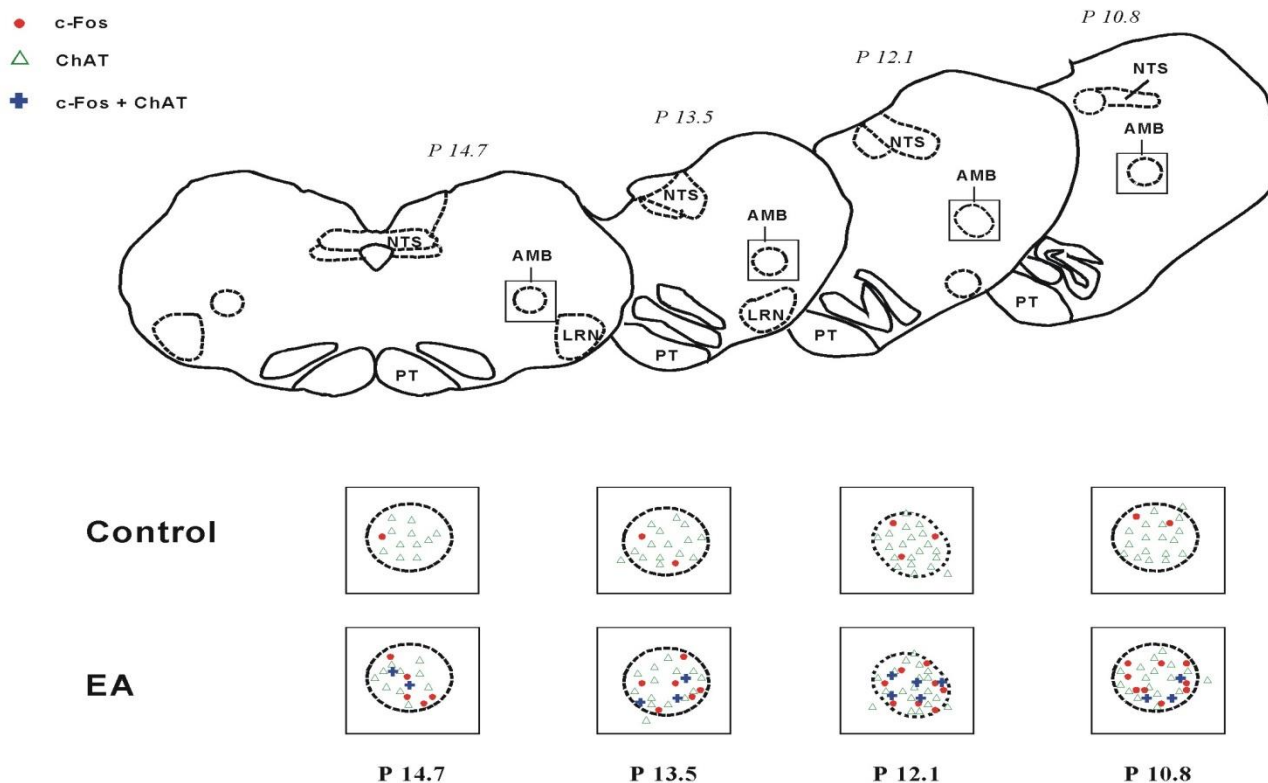
Opioids and GABA Mediate EA inhibition of Vagal Evoked Activity in Nucleus Ambiguus



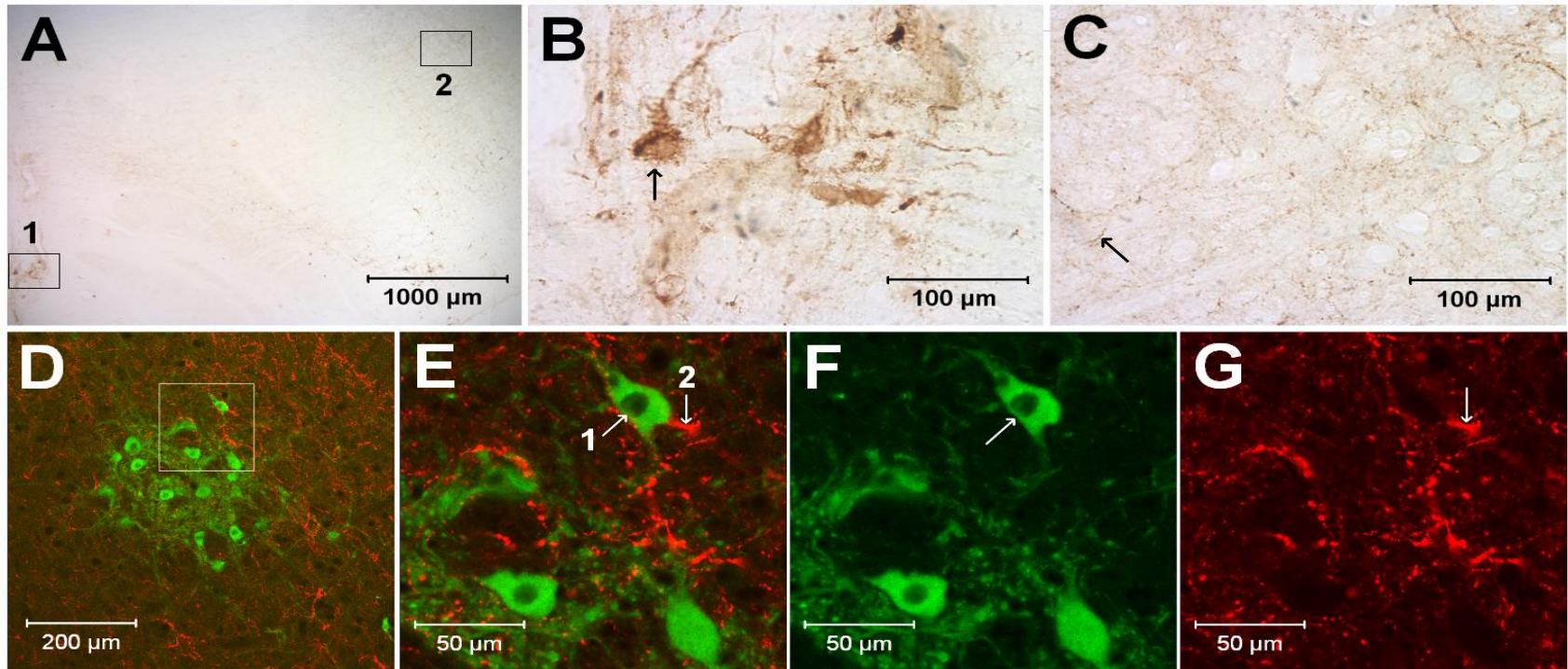
Anatomy of EA Action in Nucleus Ambiguus



EA Responsive Vagal Preganglionic Neurons in Nucleus Ambiguus

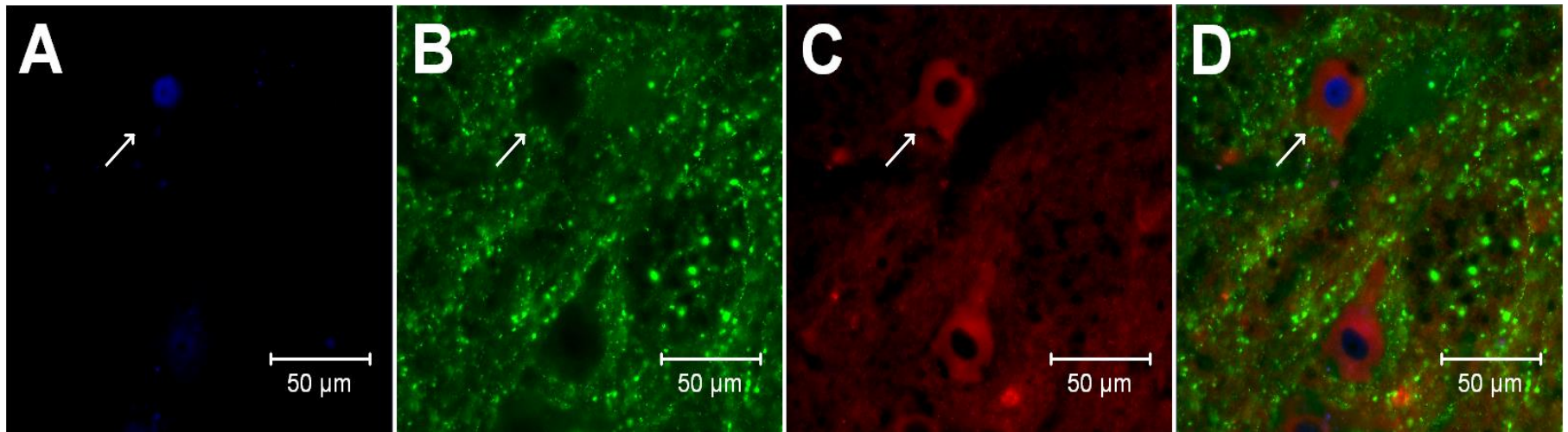


Enkephalinergetic Neurons in Nuclei Raphé Pallidus and Ambiguus Relationship to Vagal Preganglionic Neurons containing Choline Acetyltransferase

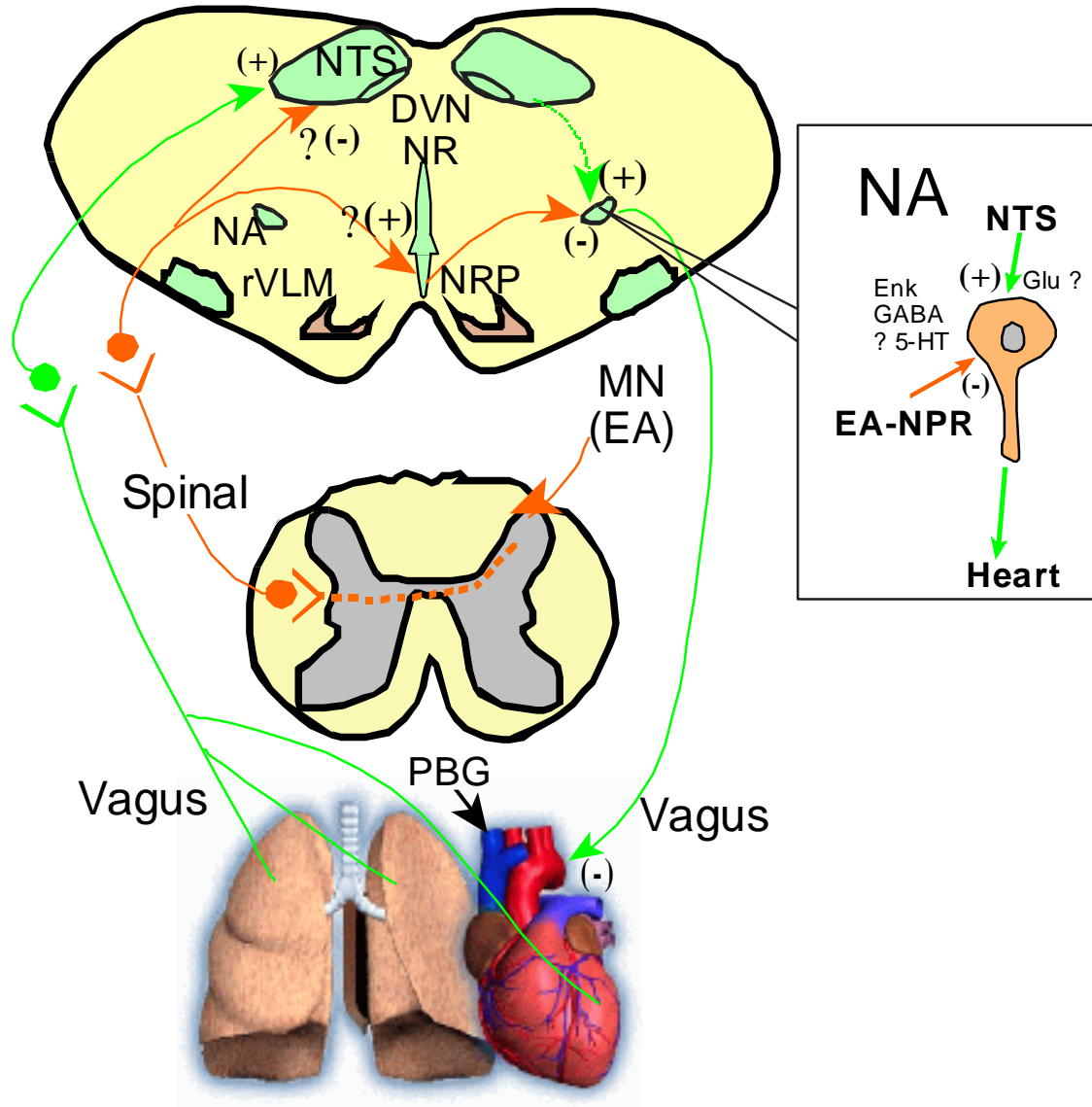


EA Responsive (Fos positive) Vagal Preganglionic (Choline Acetyltransferase) Neurons in Nucleus Ambiguus

Relationship to met/leu-Enkephalin

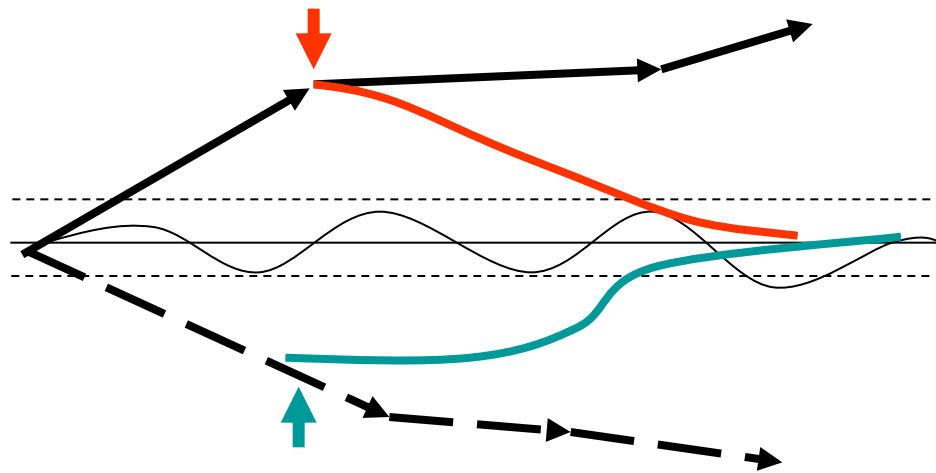


Acupuncture Restoration of Blood Pressure during Hypotension using Phenylbiguanide (PBG) to simulate Vasovagal Syncope



Acupuncture normalizes blood pressure

Promotes or resumes homeostasis



Contributors

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