



RNase1 as a potential mediator of remote ischemic preconditioning for cardioprotection

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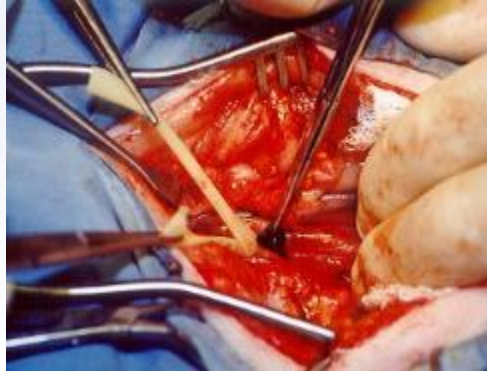
Dec 13, 2014

Natural Appearance of Endogenous Extracellular RNA: **ALARM AND DANGER SIGNALS OF OUR BODY**

Tissue Trauma



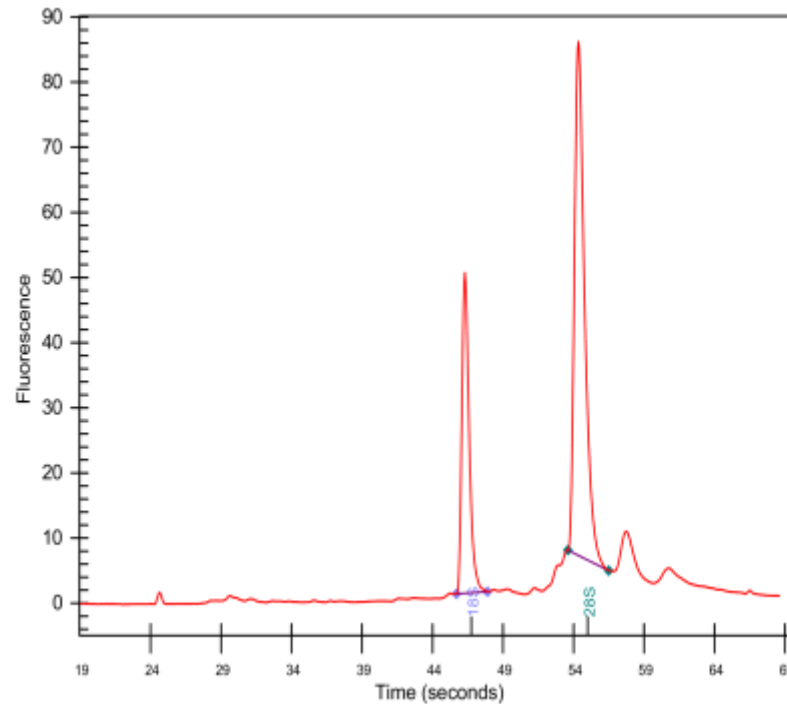
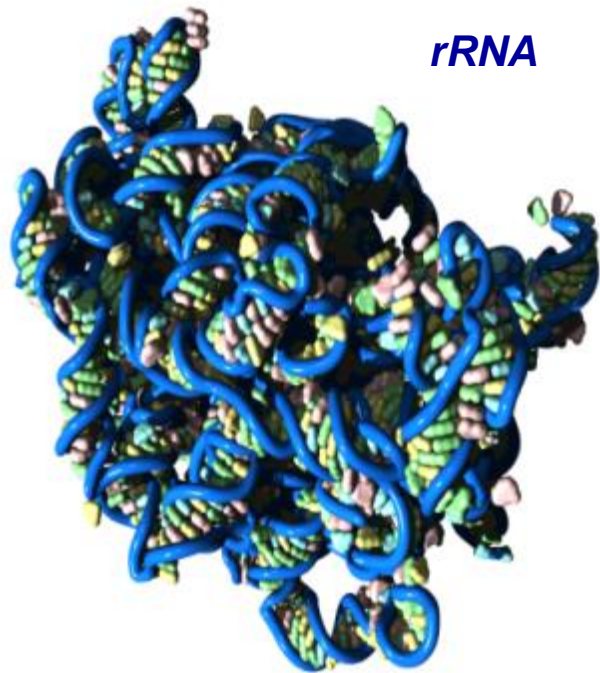
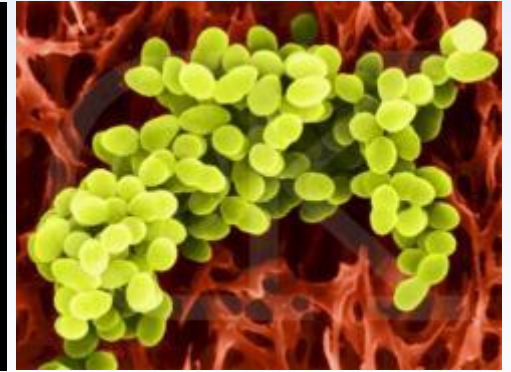
Vascular Injury



Tumor



Bacterial Infection

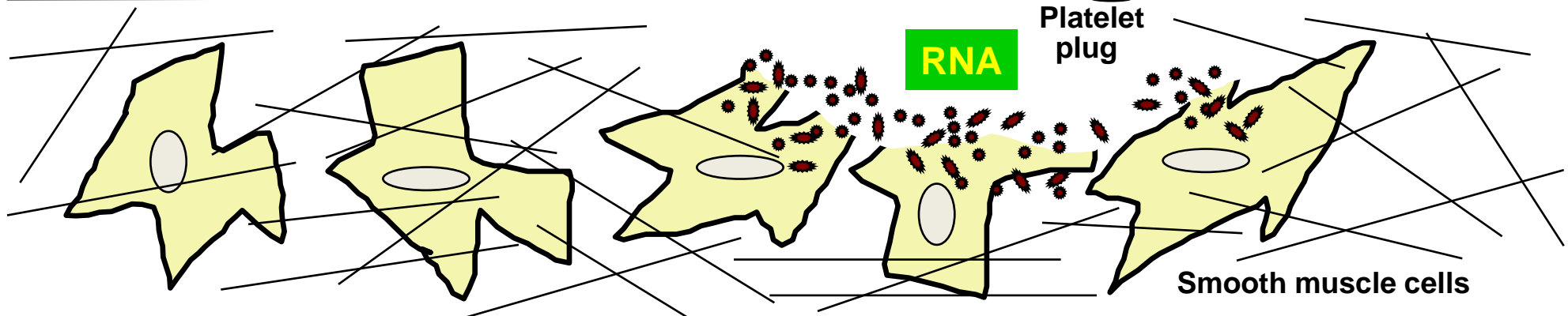
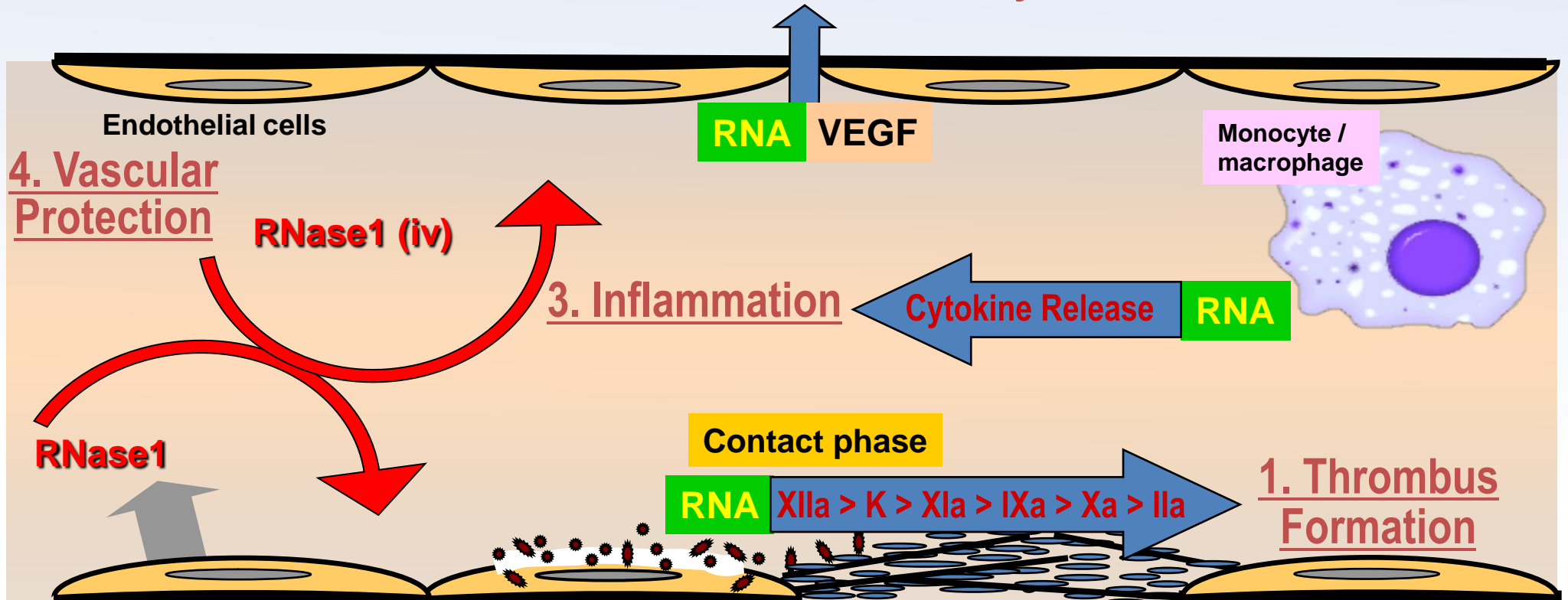


< 28S rRNA

< 18S rRNA

Multiple Functions of Extracellular Nucleic Acids

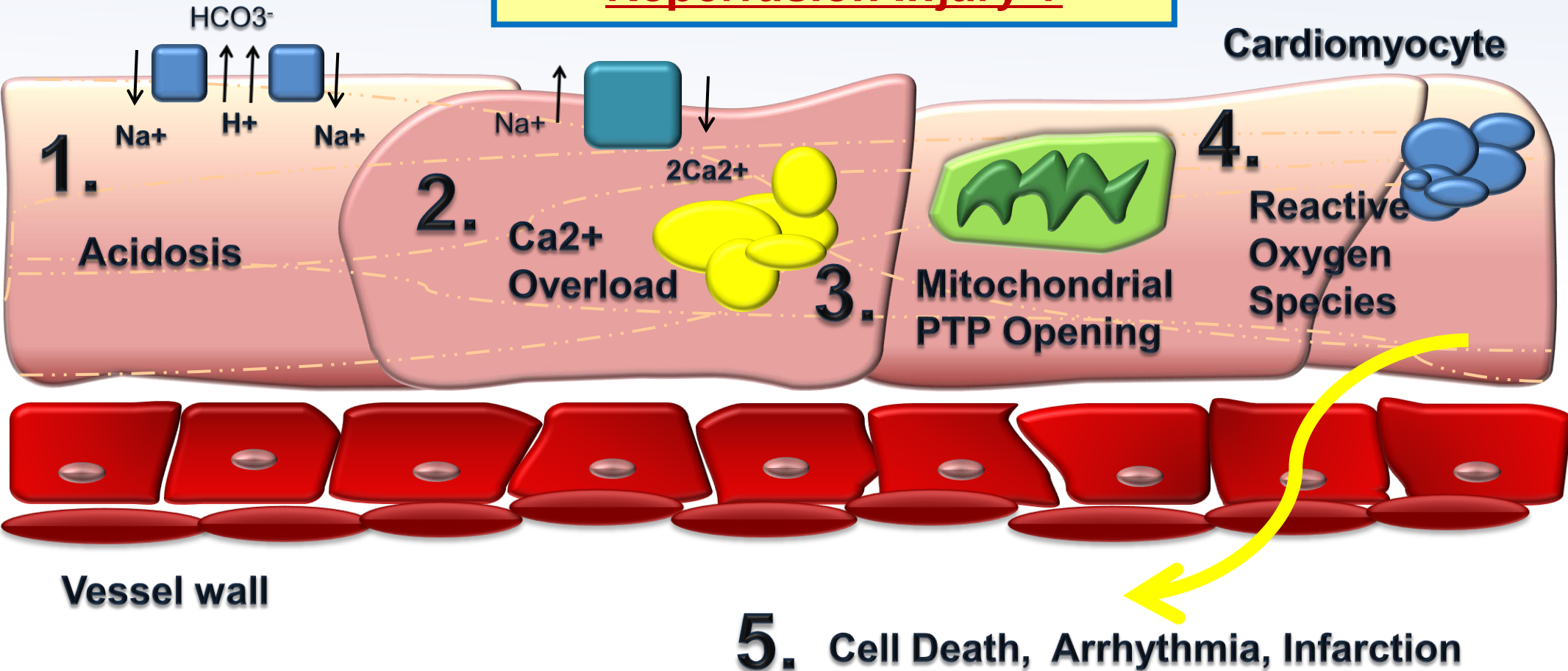
2. Vascular Permeability



Mechanisms of Cardiac Ischemia/Reperfusion Injury

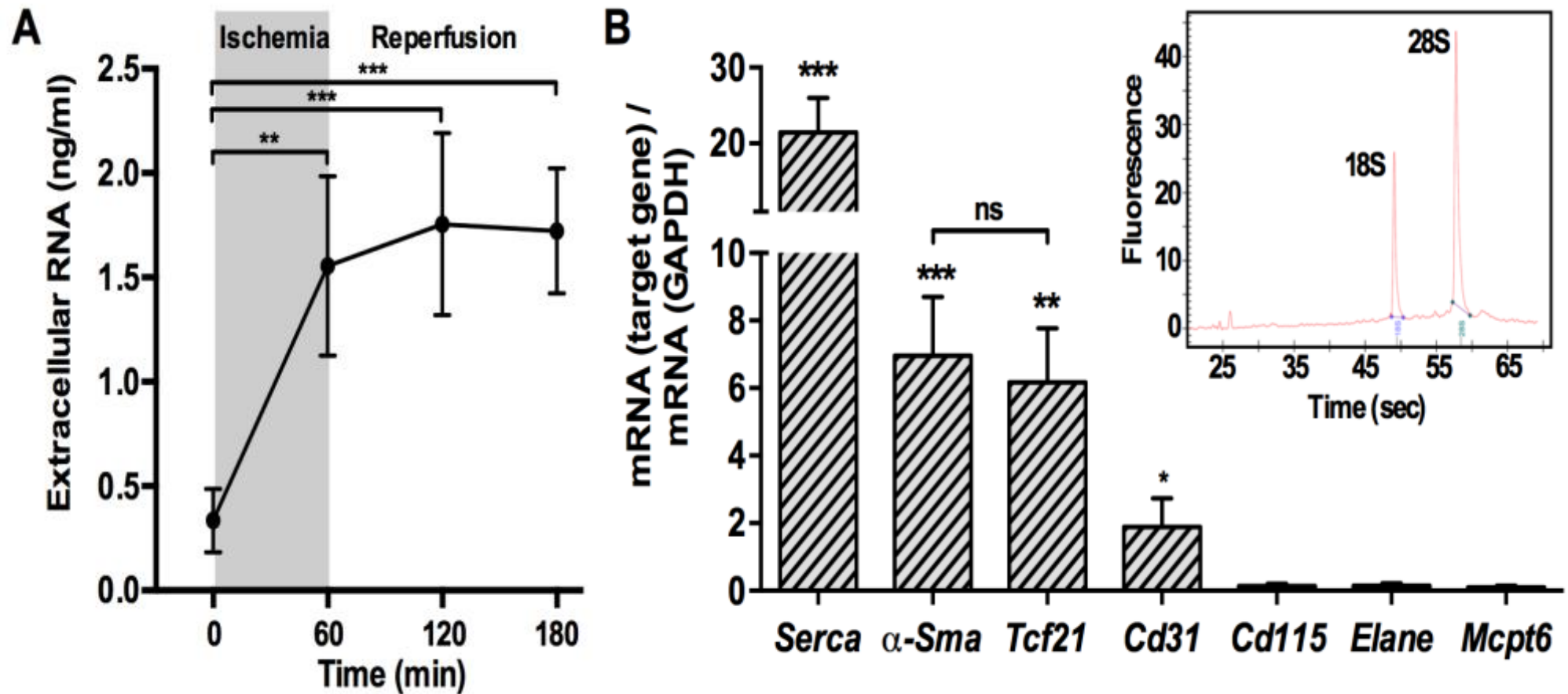
**Ischemia >
Nutrient Depletion**

**Does Extracellular RNA
Contribute to Ischemia-
Reperfusion Injury ?**



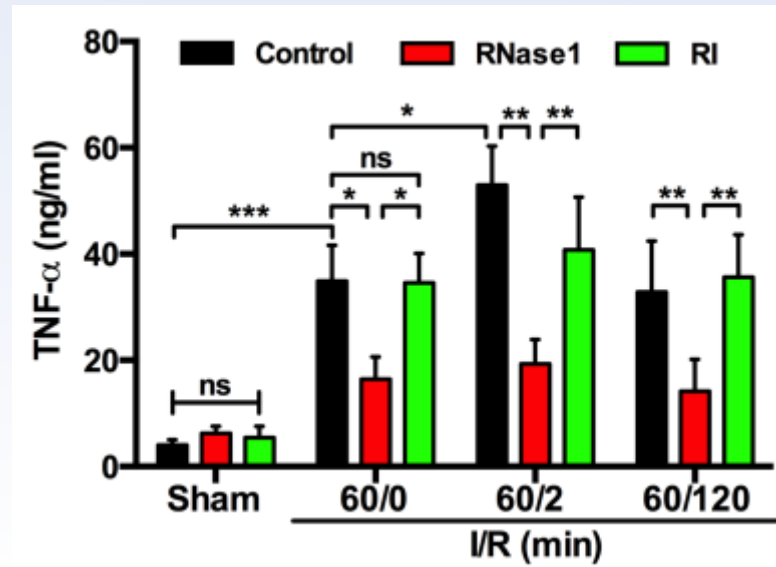


In vivo Release of eRNA During Myocardial Infarction Following I/R.



eRNA is derived mainly from cardiomyocytes

RNase1 Reduces the Release/Production of TNF- α in the Heart



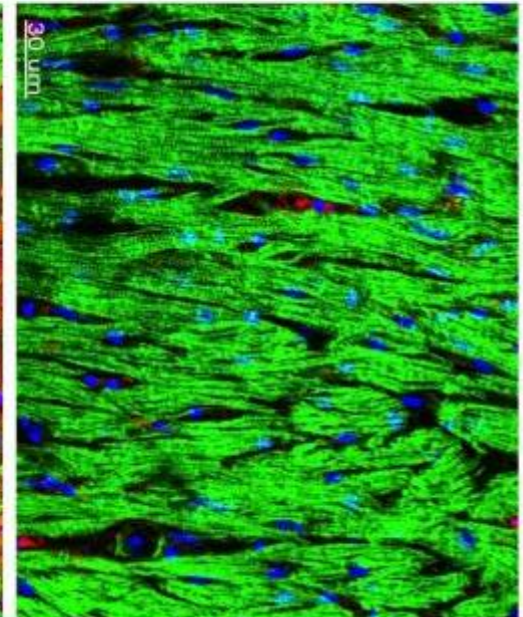
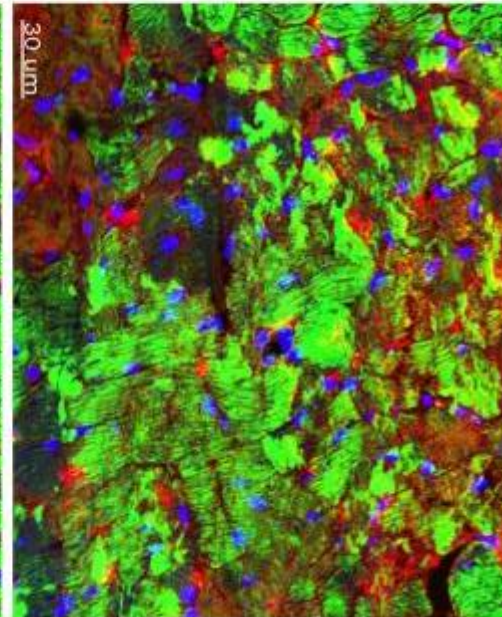
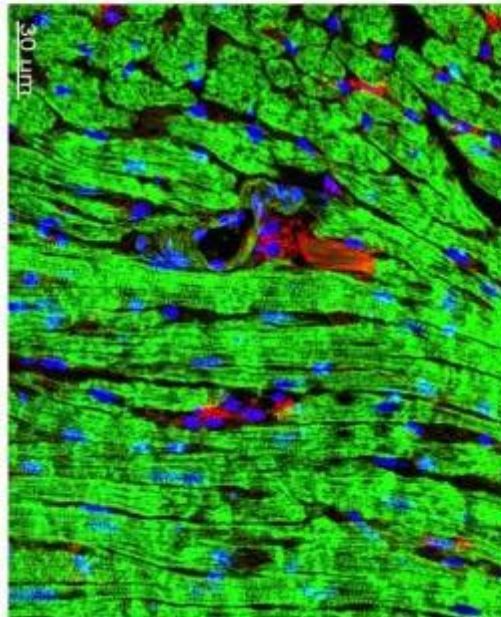
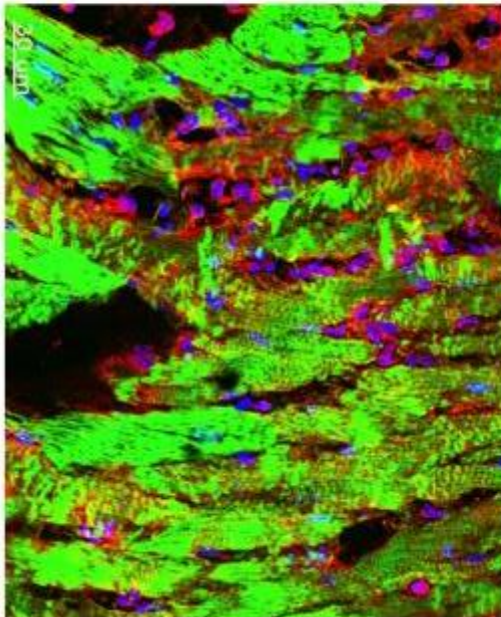
Ischemia 60 min / Reperfusion 120 min

RI

RNase1

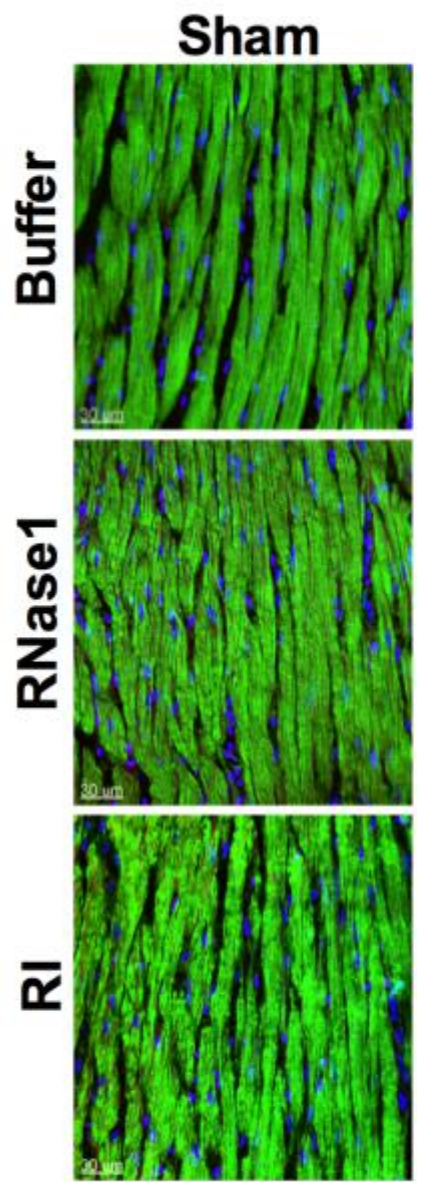
Buffer

Sham (Buffer)

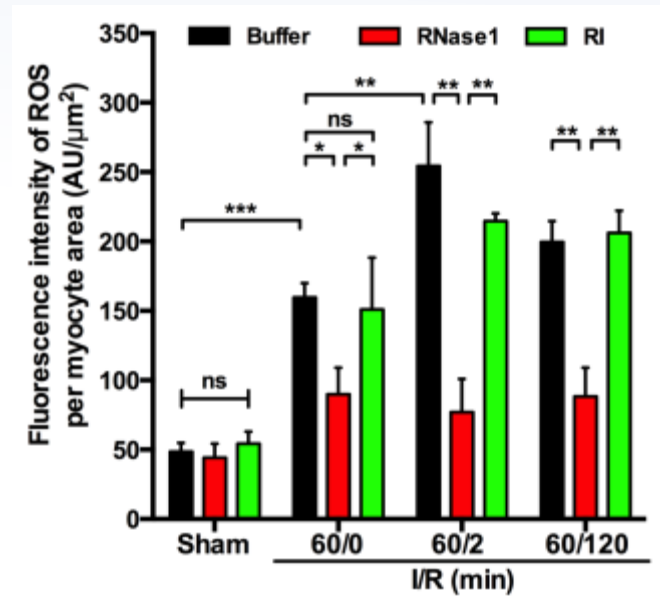


TNF- α / F-actin / DAPI

RNase1 Prevents/Reduces the Production of ROS in the Heart Tissue



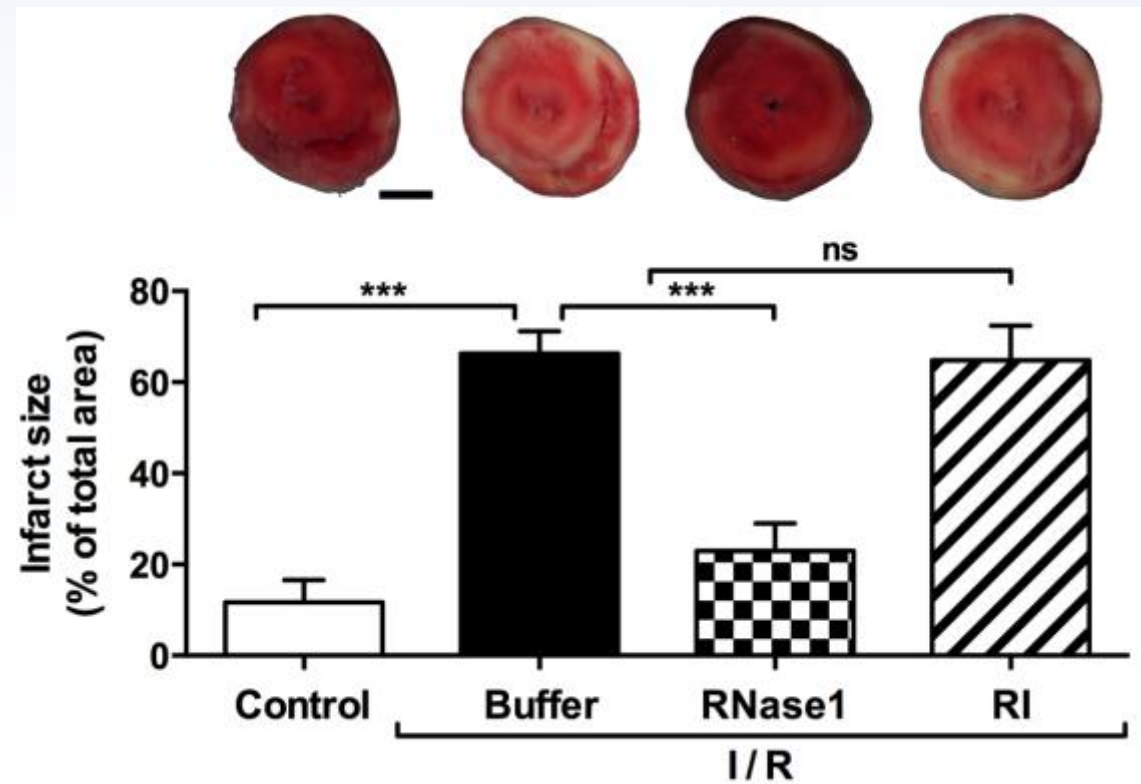
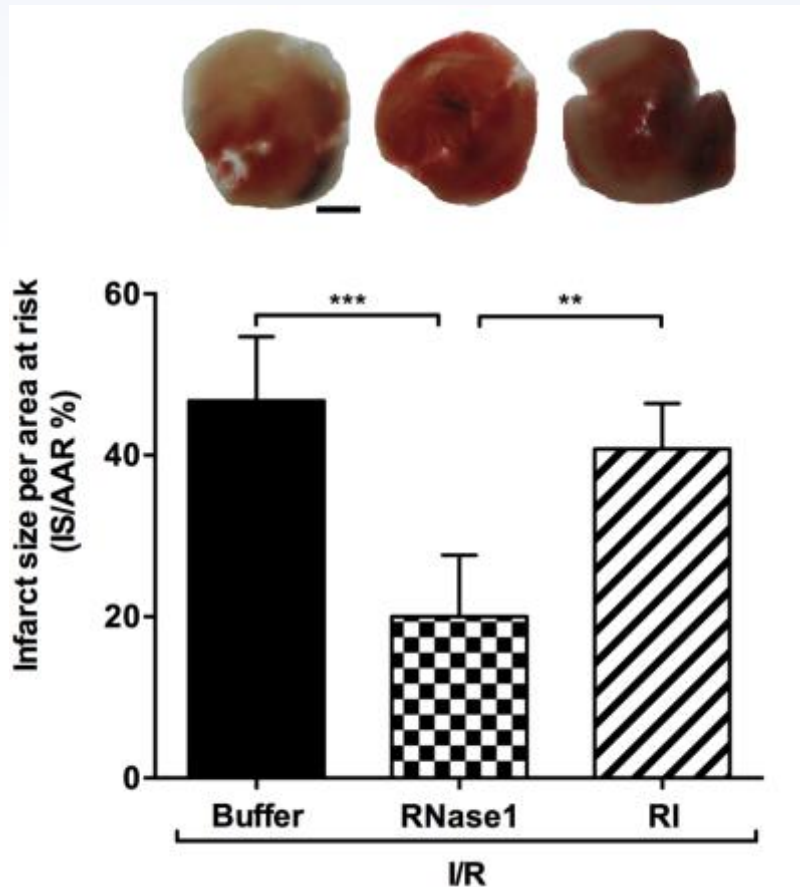
ROS / F-actin / DAPI



ROS – dihydroethidium labelling

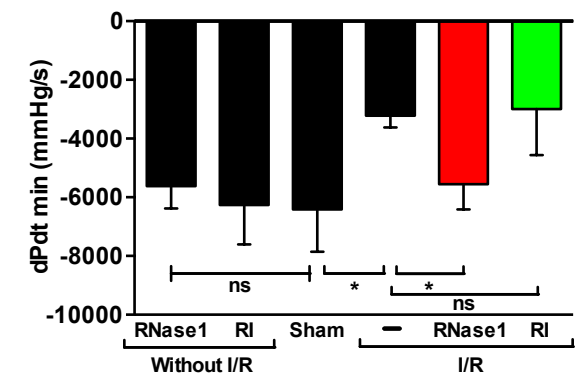
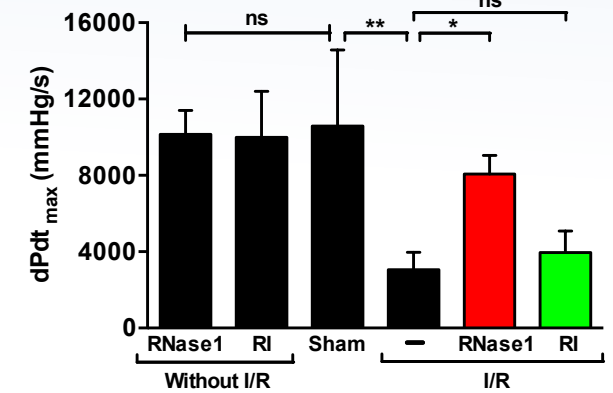
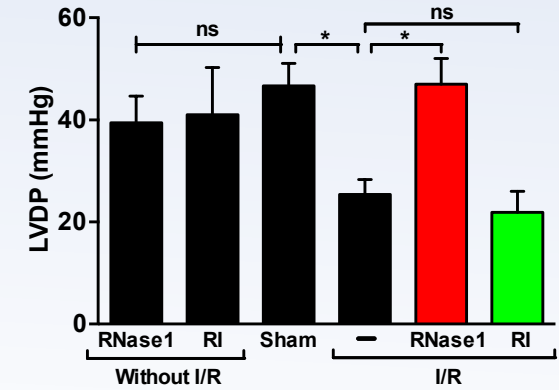
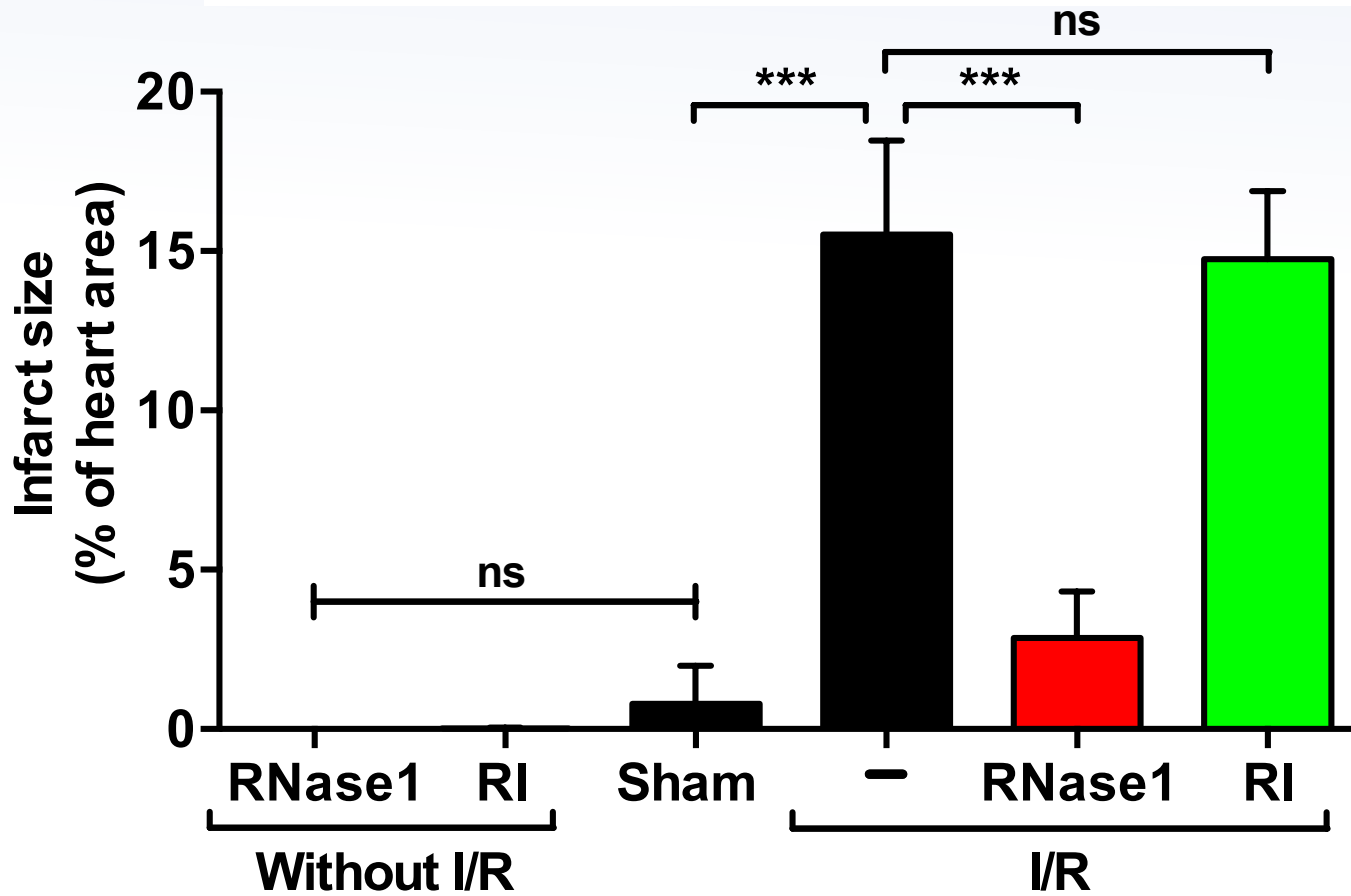


RNase1 *in vivo* and *ex vivo* Reduces Infarct Size during Acute Myocardial Infarction

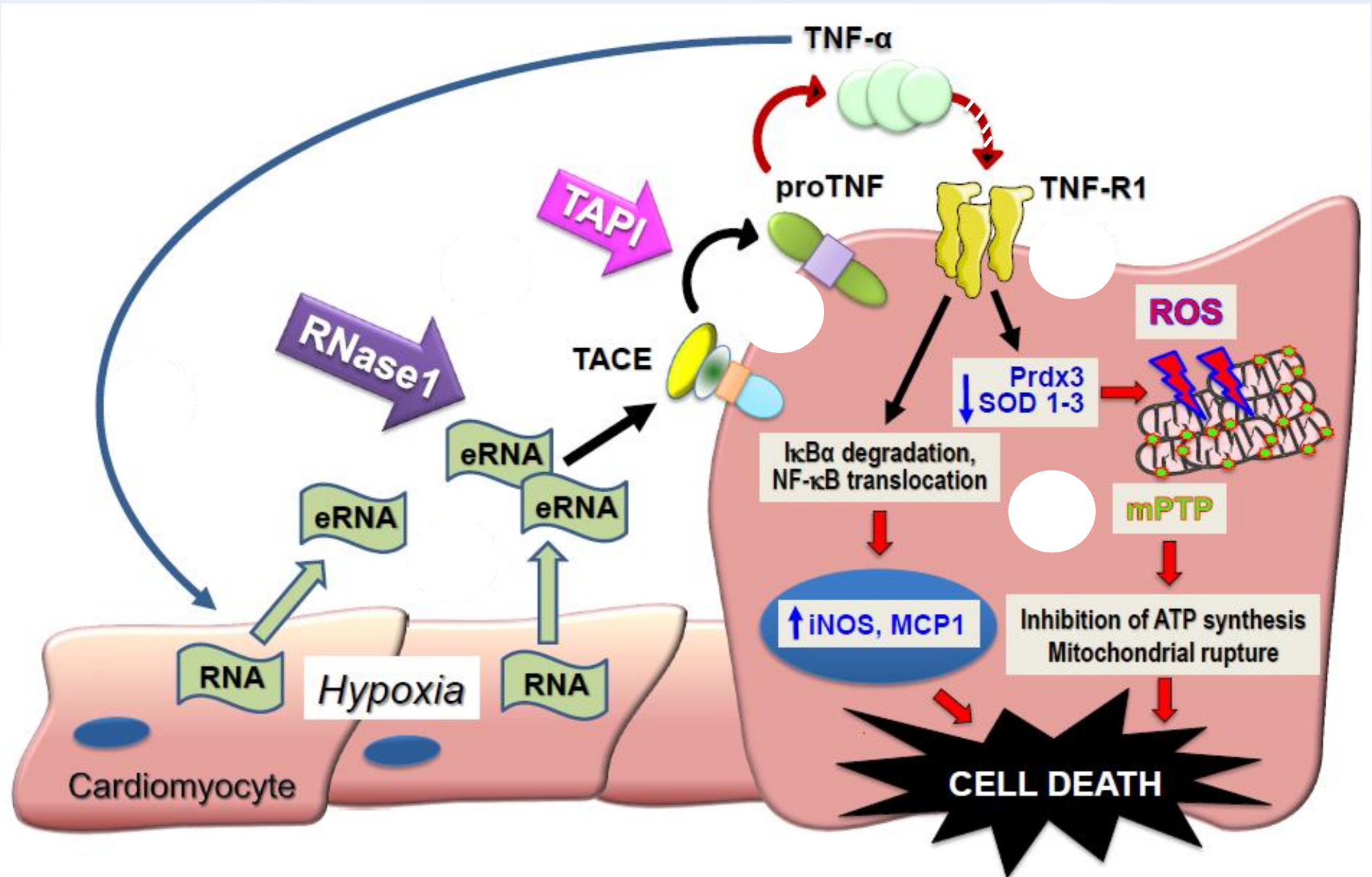




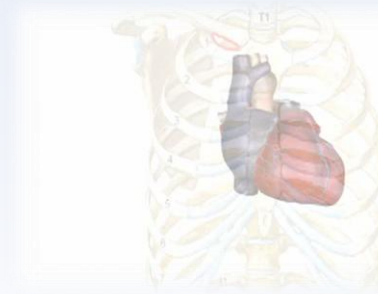
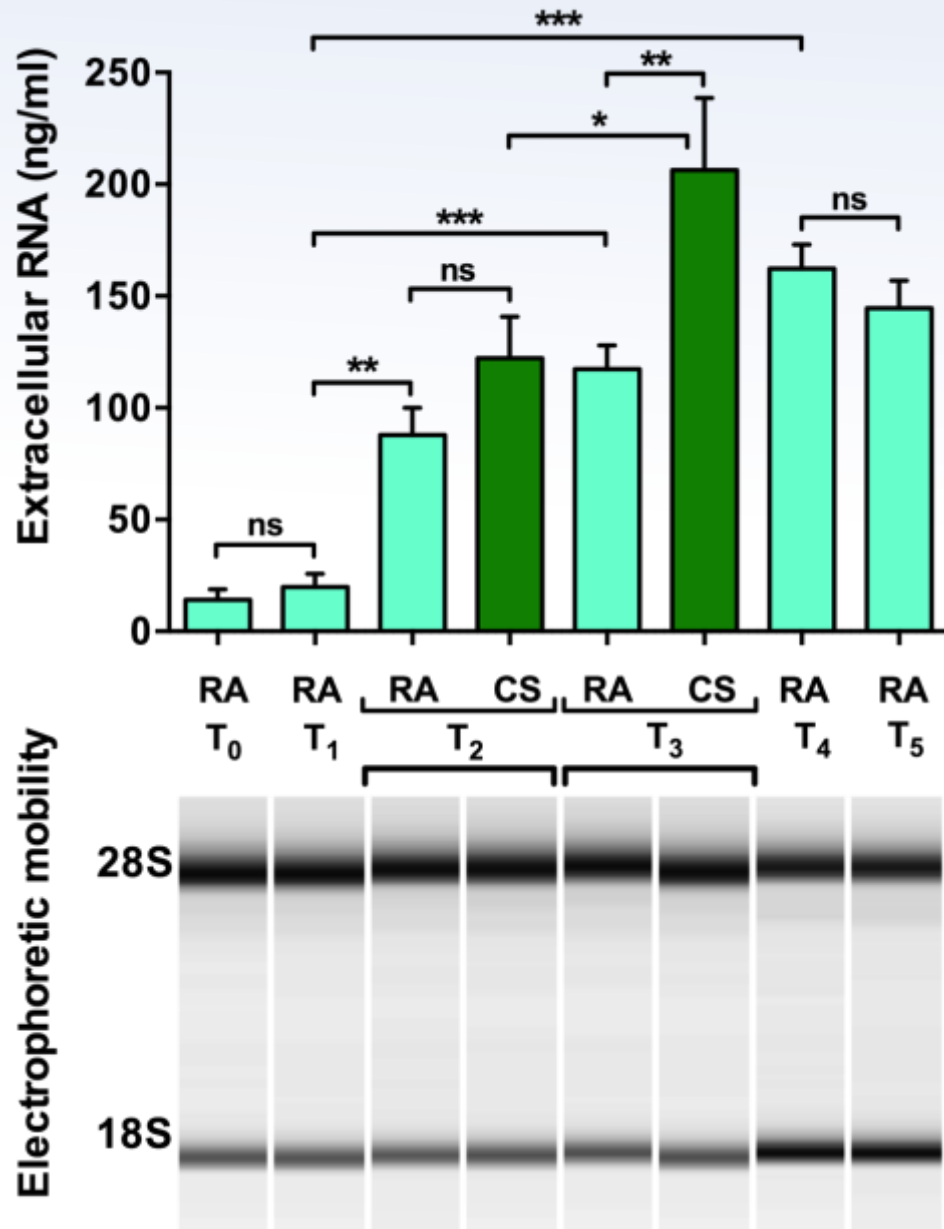
RNase1 *in vivo* Improves Ventricular Recovery by Reducing Infarct Size in Longterm MI Model



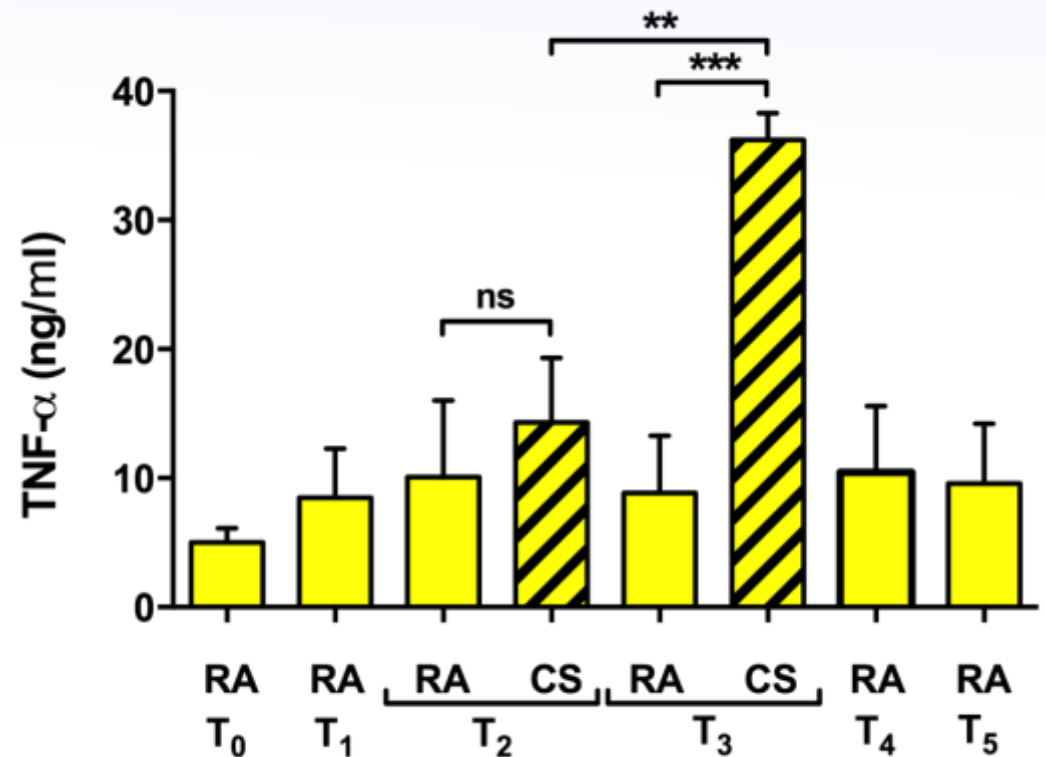
Extracellular RNA and Cardiovascular Disease



Association between extracellular RNA and TNF- α in myocardial ischemia/reperfusion injury during cardiac surgery.

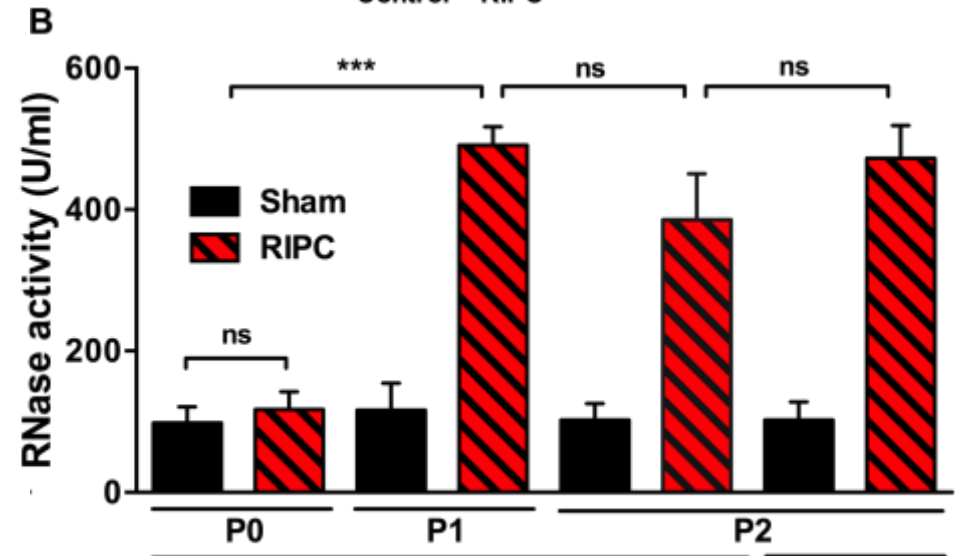
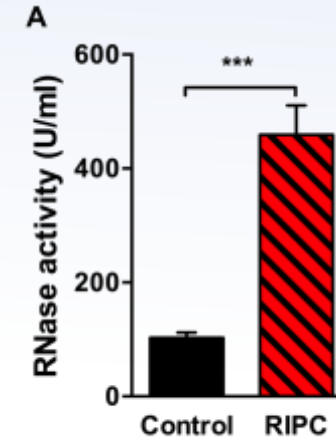
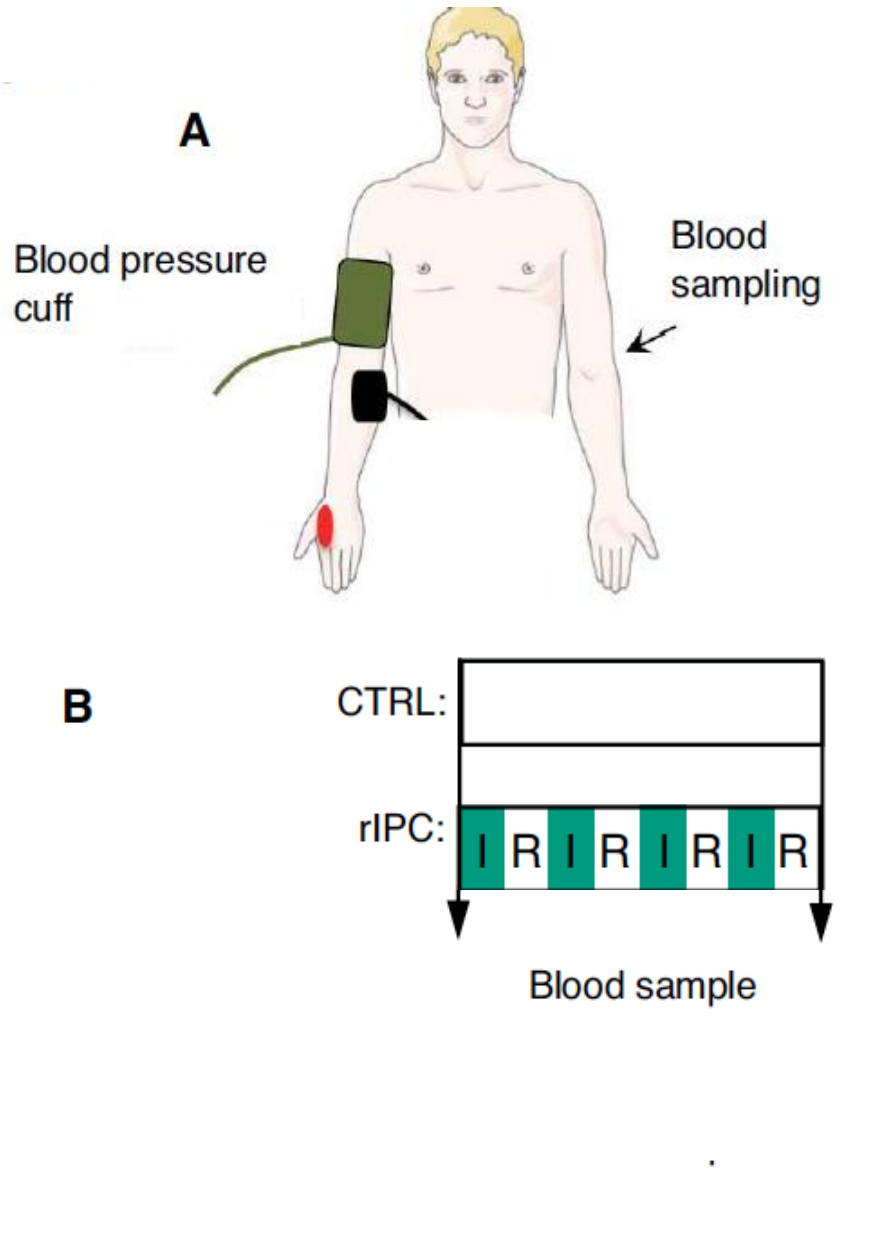


T₀ (anesthesia induction – basal level)
 T₁ (thoracotomy)
 T₂ (before aortic clamping)
 T₃ (after aortic unclamping)
 T₄ (15 min after aortic unclamping)
 T₅ (30 min after aortic unclamping)
 RA (Radial Artery)
 CS (Coronary Sinus)

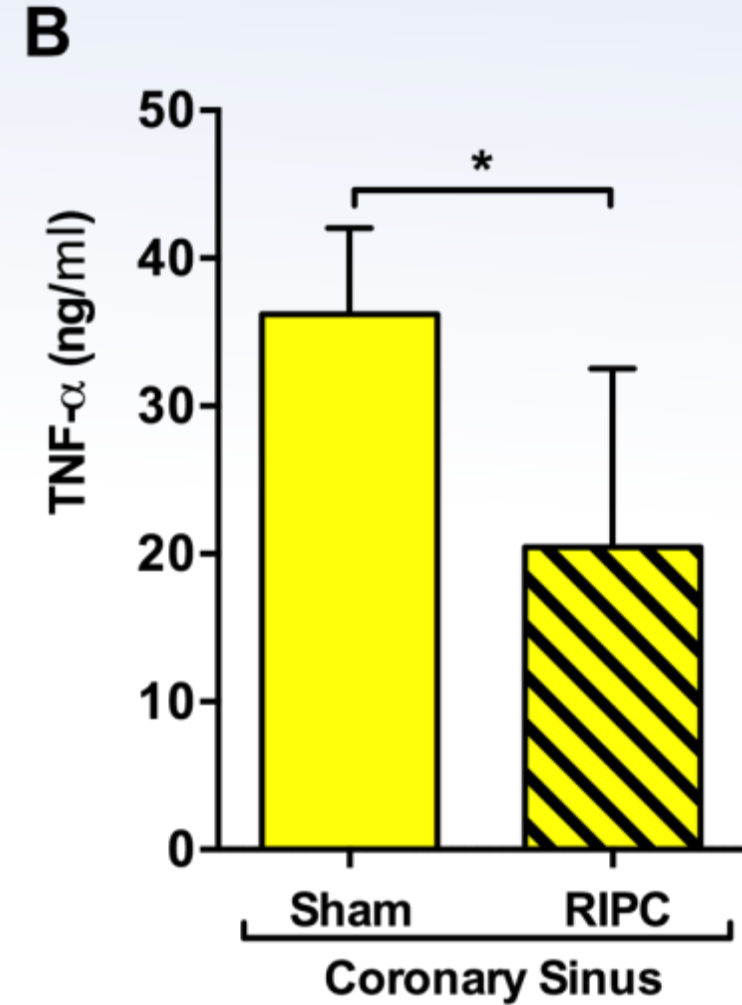
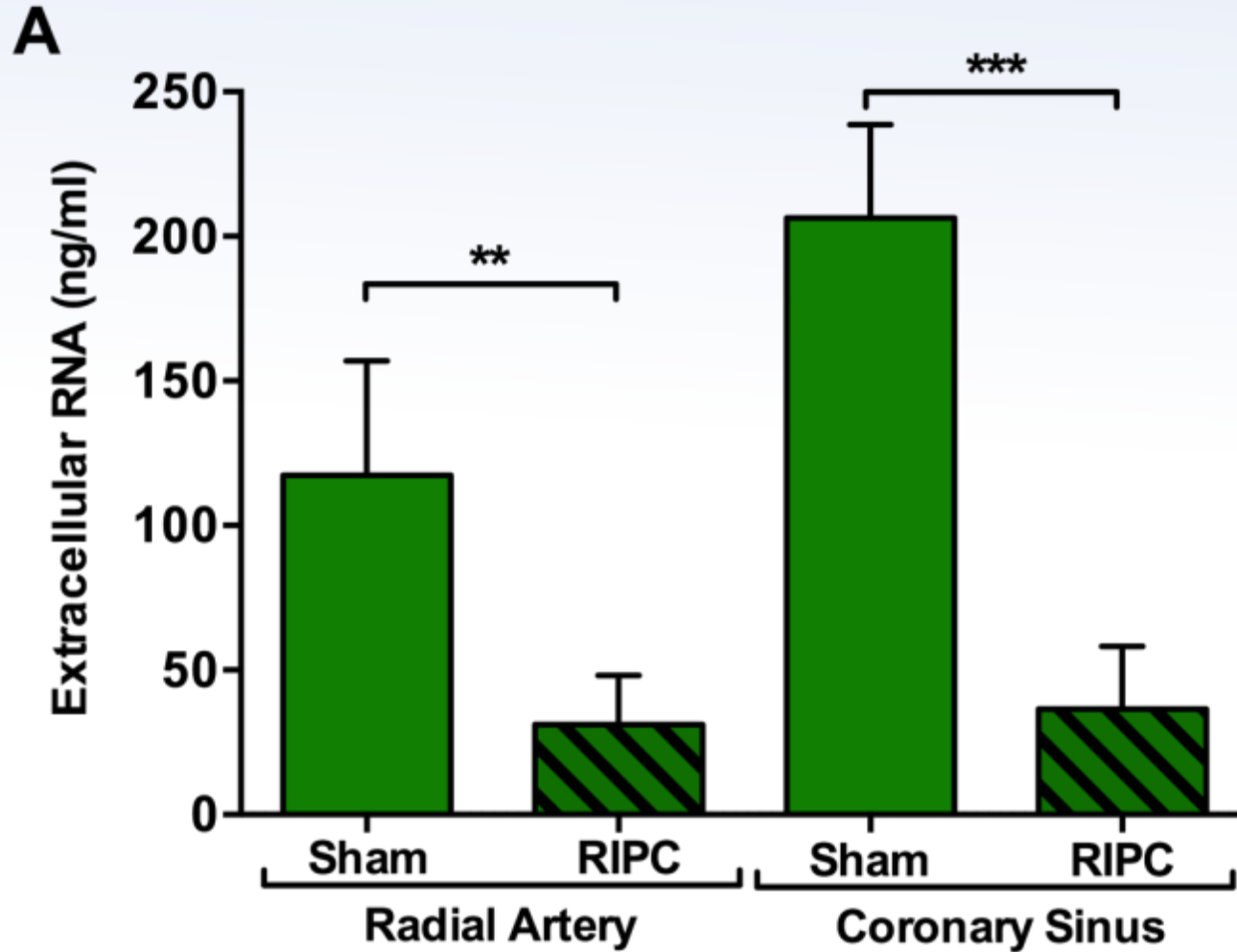


Remote Ischemic Preconditioning (rIPC): A Simple Way of Cardio-Protection

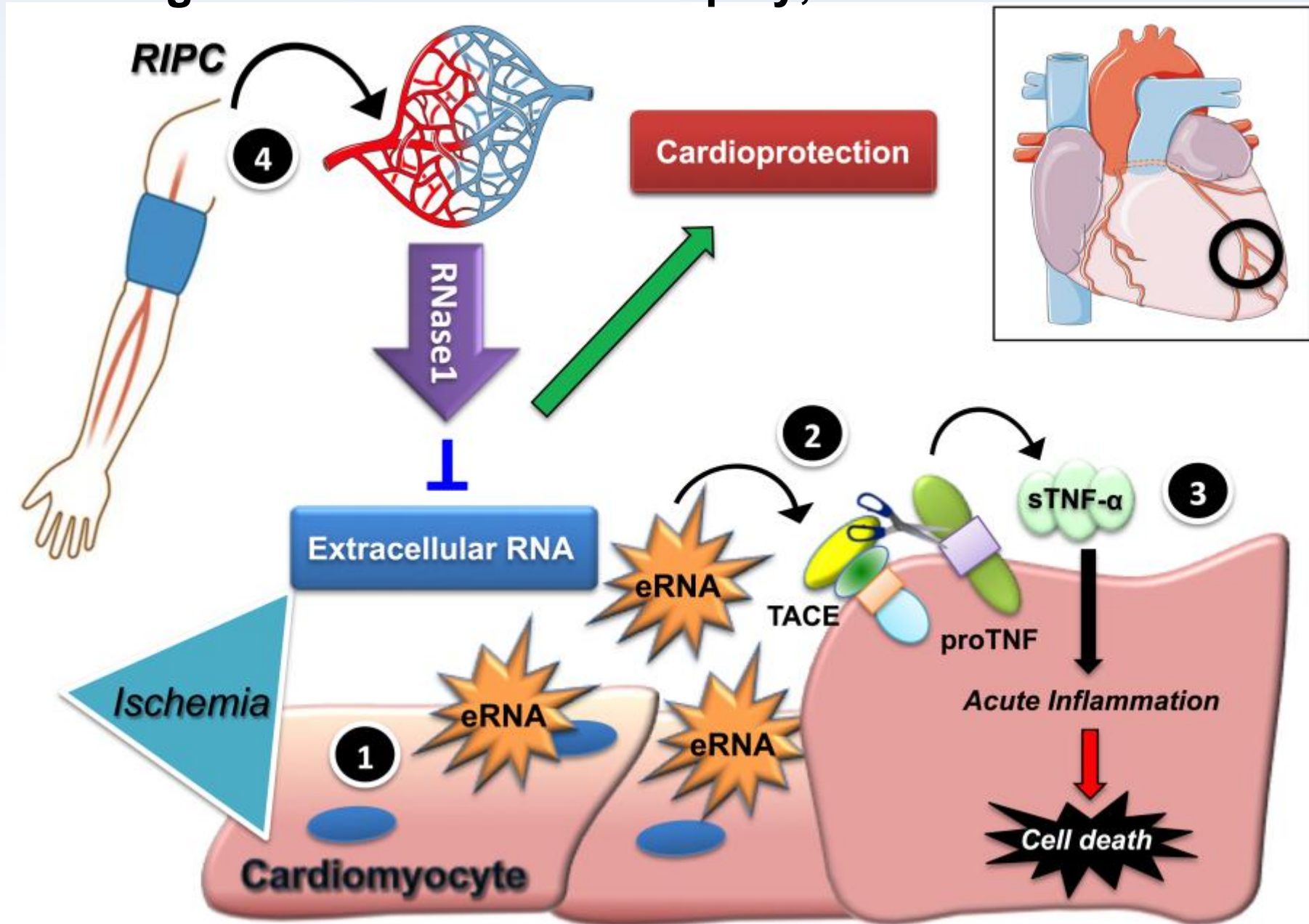
Vascular RNase1 release induced by RIPC



RIPC reduces levels of eRNA and TNF- α in coronary sinus



Mechanism of RIPC-induced cardioprotection against eRNA-TNF- α interplay; Role of RNase1.





Perspectives

- ✓ eRNA Serves as Universal Alarm and Damage Signal
- ✓ RNase1 and TACE-inhibitors Promote Vessel and Organ Protection

Thank you!

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