



3rd Paris NASH Symposium

French-US Meetings

July 6 & 7, 2017

Institut Pasteur - Paris

Organized by
Arun Sanyal & Lawrence Serfaty

Virginia Commonwealth University School of Medicine, Richmond, Virginia, US
Hôpital Saint-Antoine, APHP, Inserm, Université Pierre & Marie Curie, Paris, France

With the partnership of



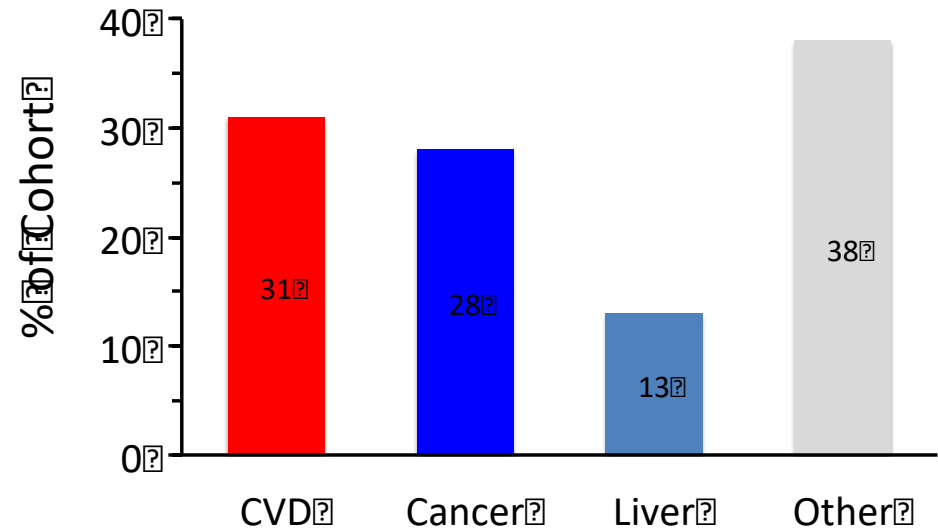
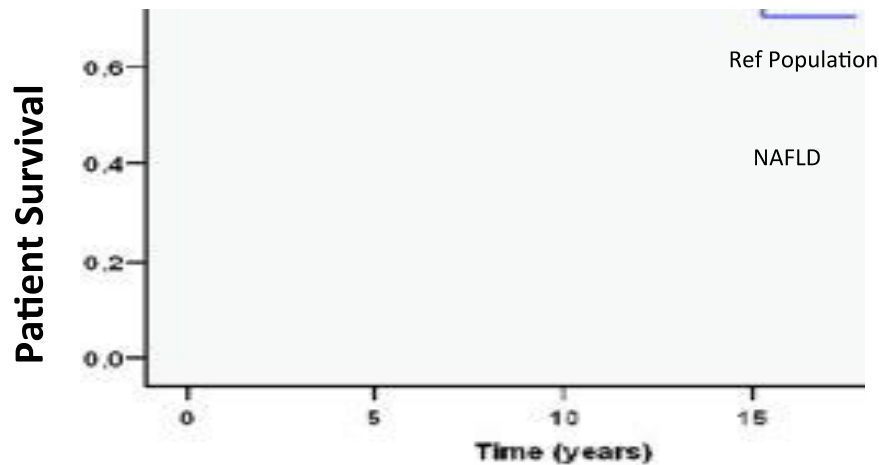
Myocardium in Nonalcoholic Fatty Liver Disease

M. Shadab Siddiqui, M.D.

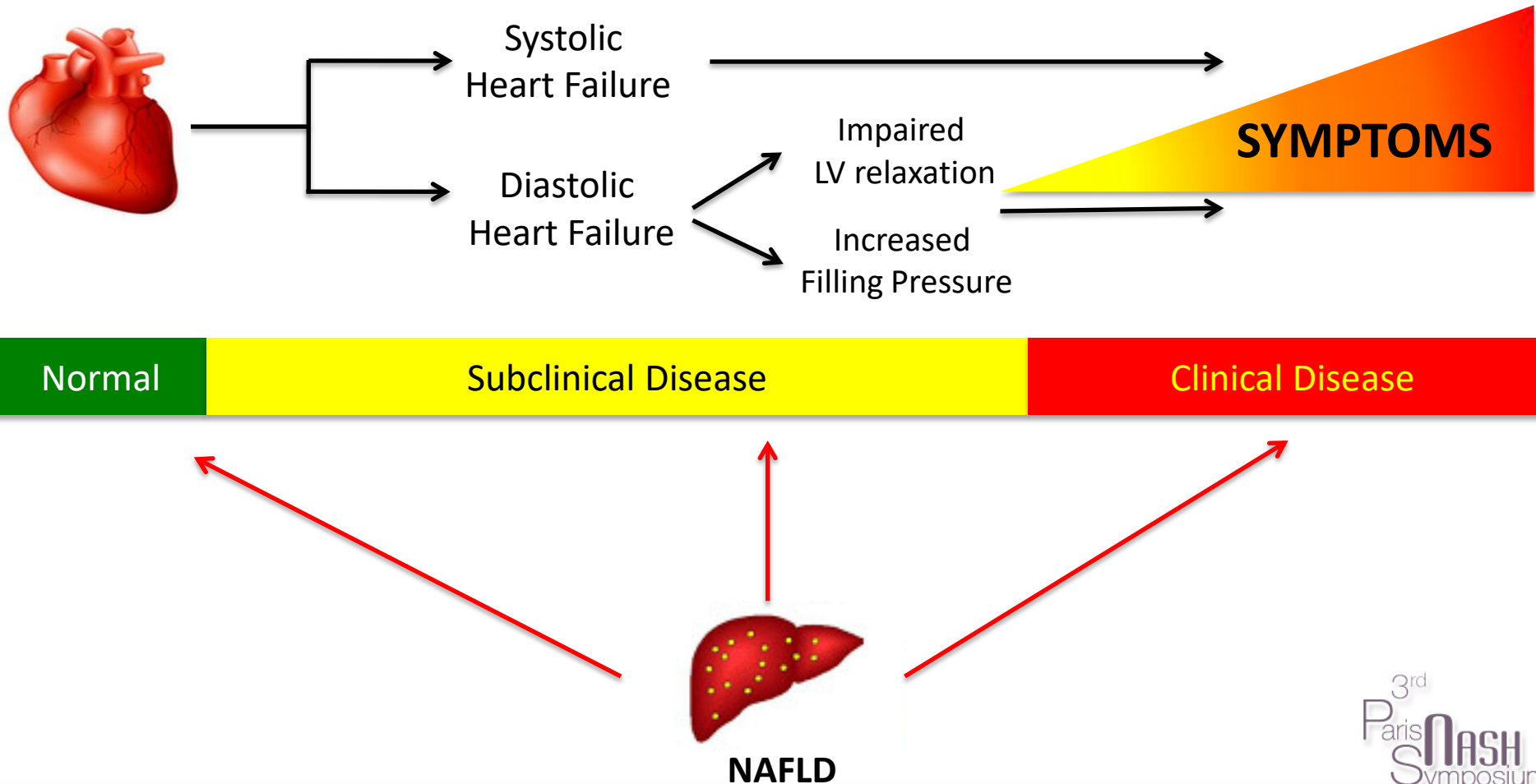
Virginia Commonwealth University



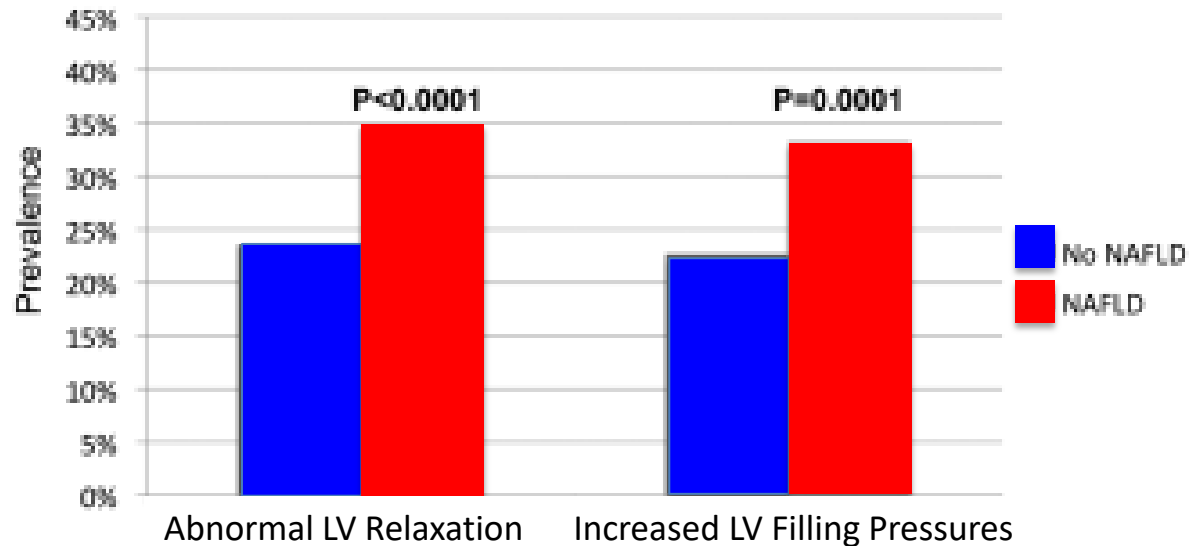
All Cause and Disease Specific Mortality in NAFLD



The Liver-Heart Axis



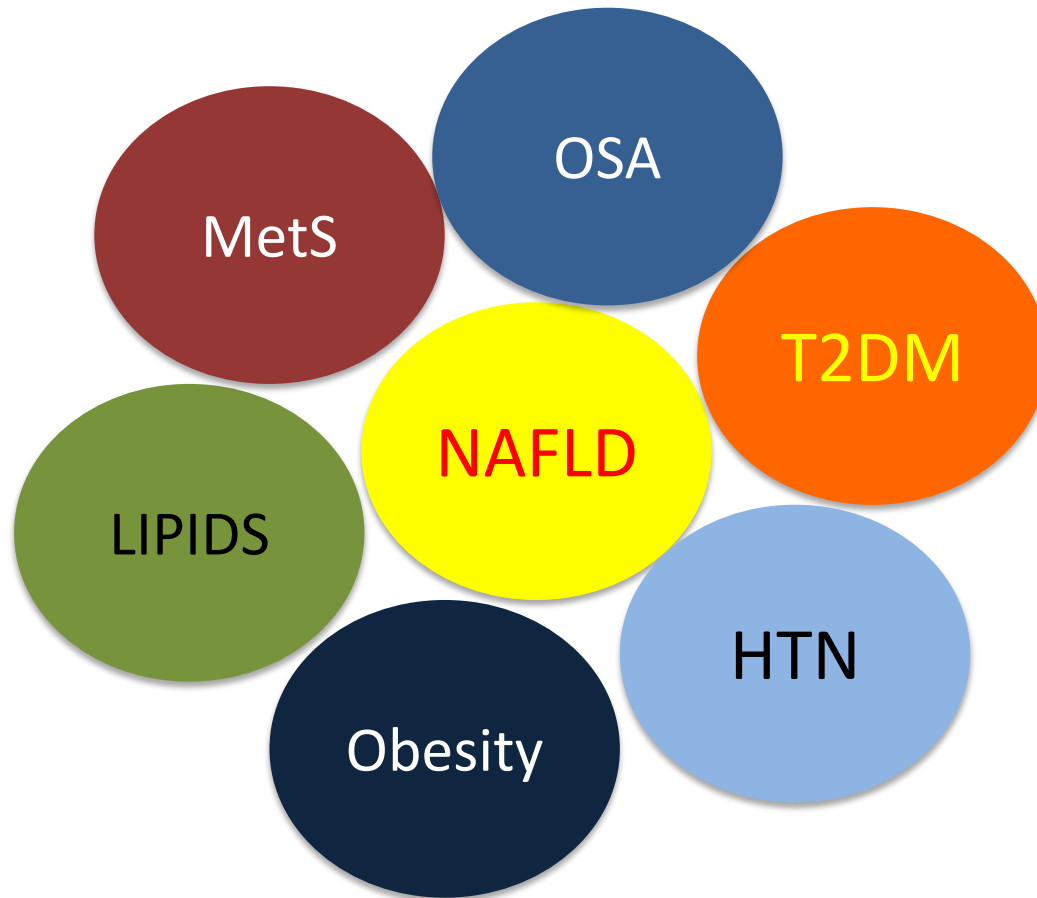
NAFLD Associated with Diastolic Dysfunction



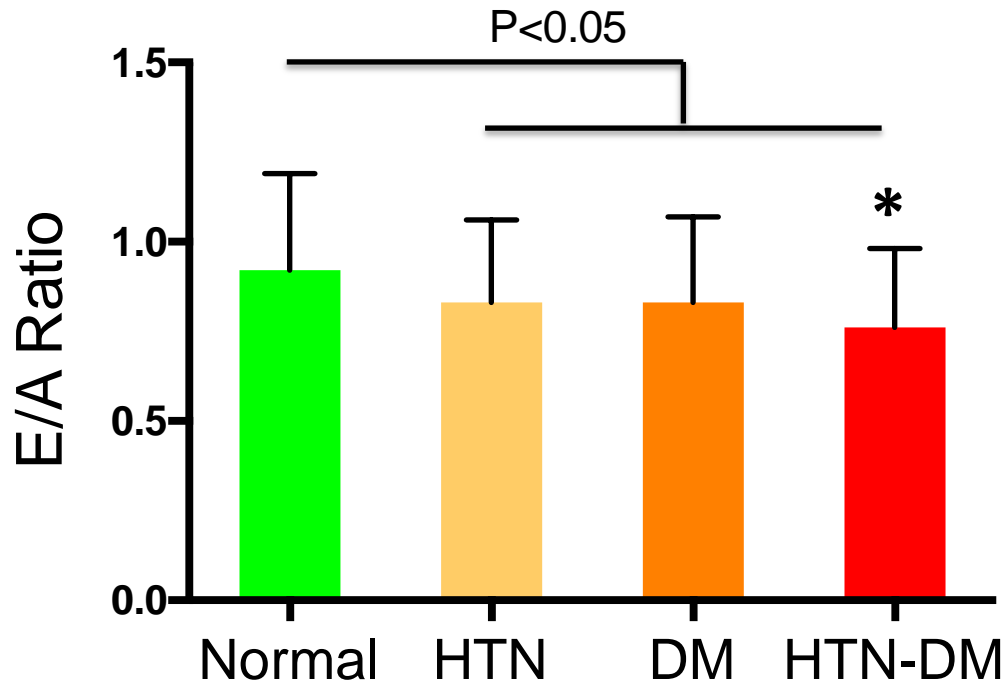
ECHO Parameters of Diastolic Dysfunction

ECHO Parameter	ANALYSIS	Value in DD
Peak E-wave velocity (cm/s)	Peak velocity in early diastole (Passive filling)	↓
Peak A-wave velocity (cm/s)	Peak velocity in late diastole (Active filling)	↑
E/A Ratio	E velocity divided by A-wave velocity	Variable
TDI e' velocity	Peak modal velocity in early diastole (abnormal LV relaxation)	↓
E/e'	E velocity divided by mitral annular e' velocity (Increased LV pressure)	↑
Left atrial volume index (LAVI)	Left atrial volume (increased LV pressure)	↑

NAFLD is a Multisystem Disease

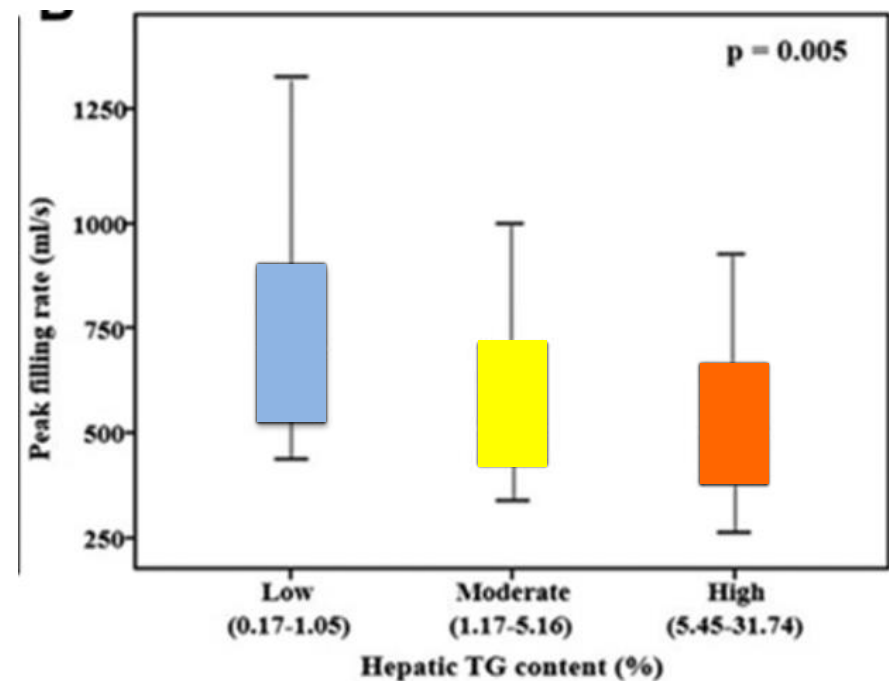
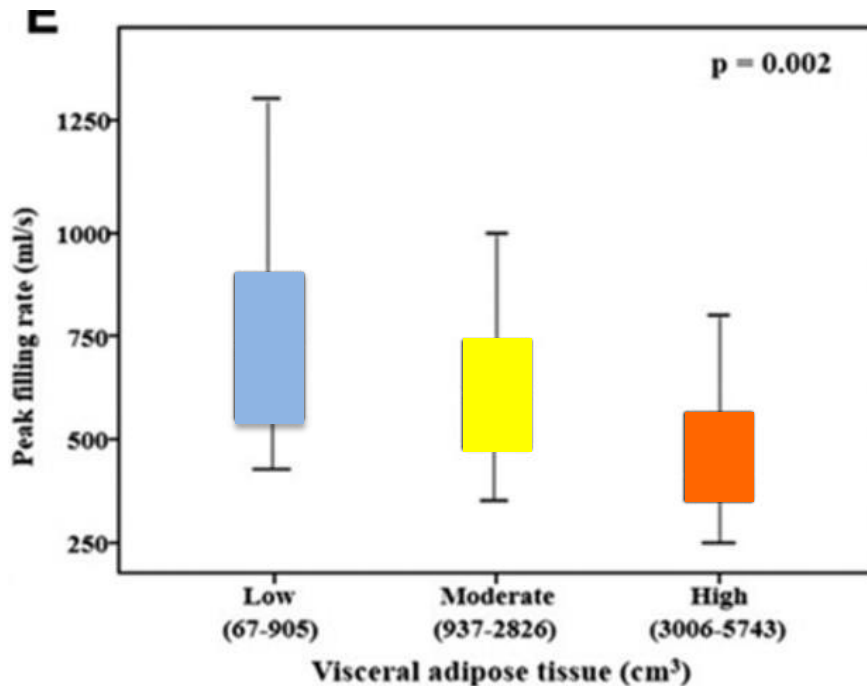


Diabetes and Hypertension Are Associated with Abnormal LV Relaxation

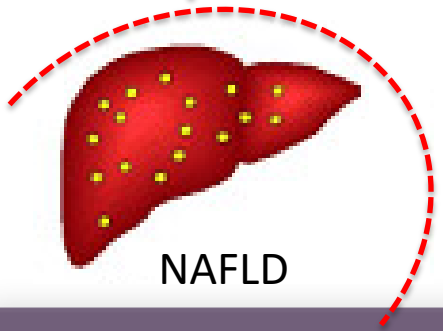
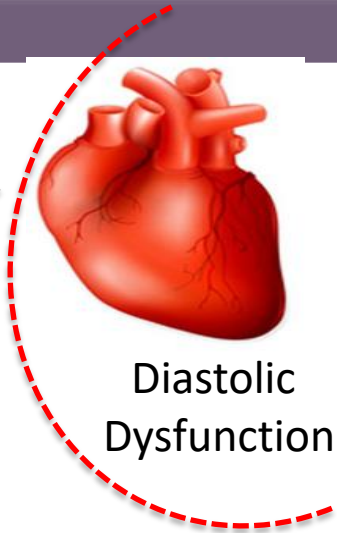


*P<0.05: HTN-DM vs. HTN/DM alone

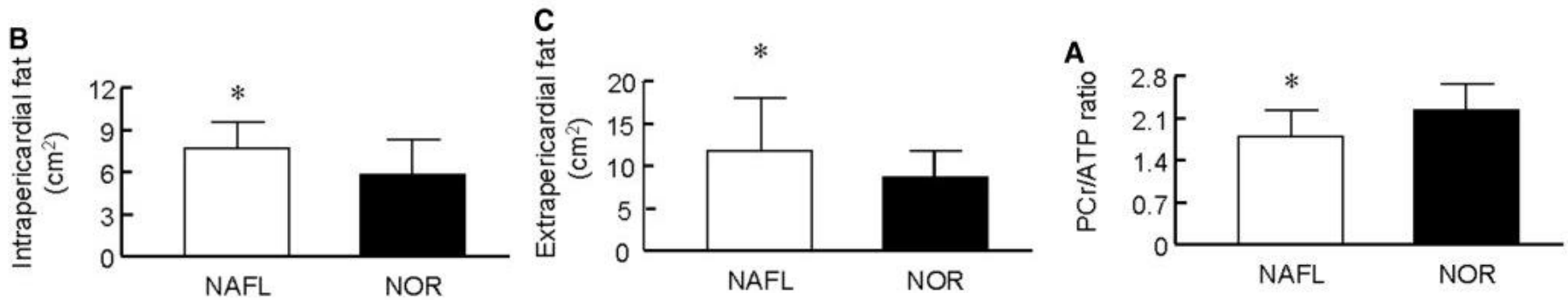
Visceral Fat and Hepatic Fat Are Associated with Abnormal LV Structure and Function



Diabetes
Hypertension
Obesity

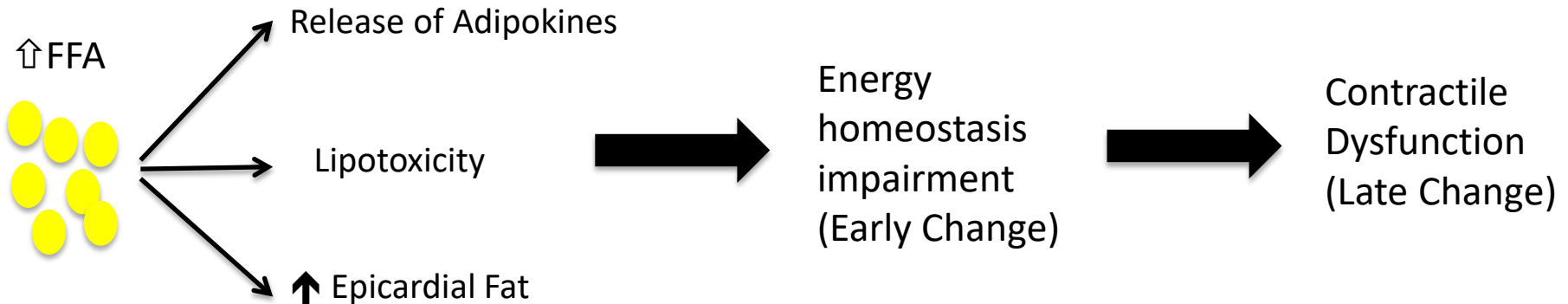


Metabolic Defects Maybe An Early Alteration in LV of Patients with NAFLD



Normal LV Morphology
Normal Systolic and Diastolic Function

Mechanistic Link Between NAFLD and Diastolic Dysfunction

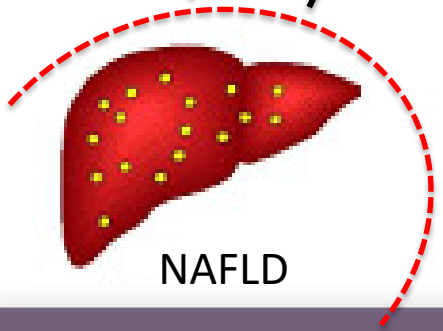


Diabetes
Hypertension
Obesity

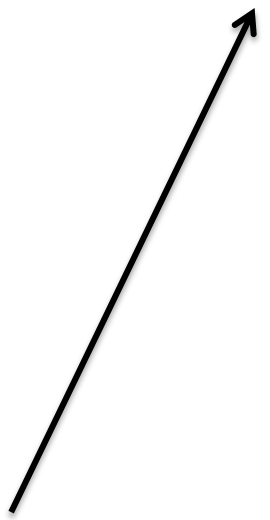
Lipotoxicity
Low-grade
inflammation



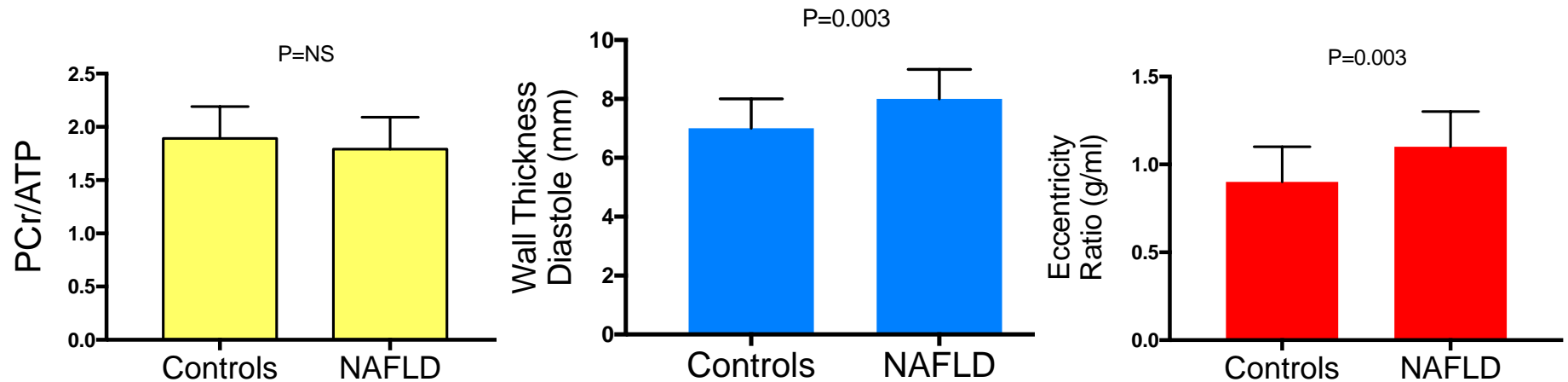
Diastolic
Dysfunction



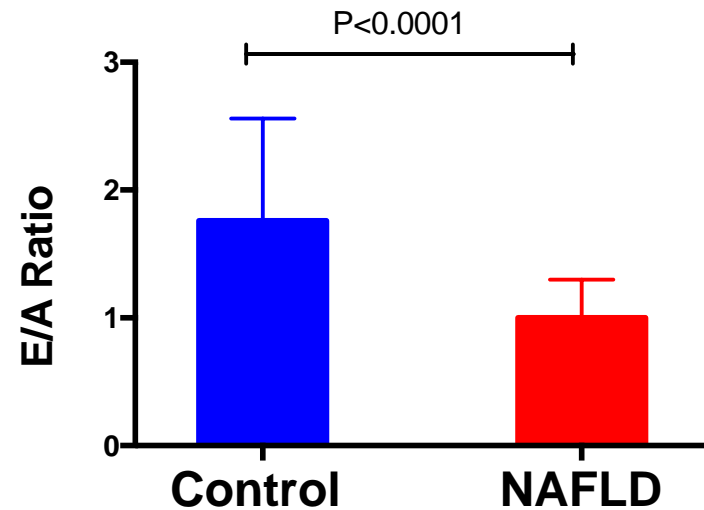
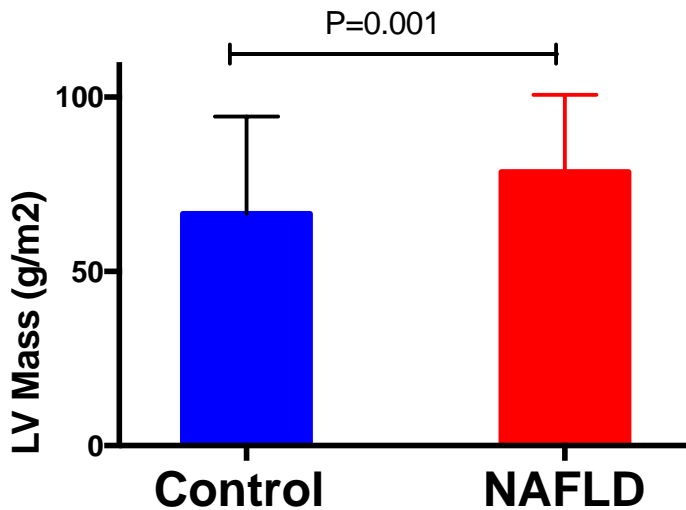
NAFLD



Alterations in LV Morphology Without Changes in Cardiac Metabolism



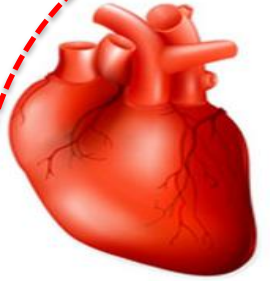
NAFLD Associated with Altered LV Geometry and Early Diastolic Dysfunction



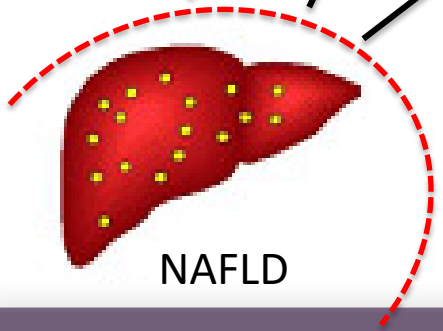
Diabetes
Hypertension
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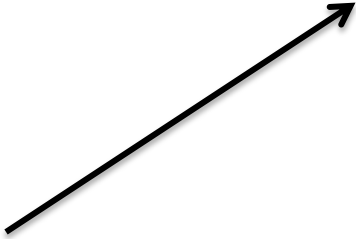
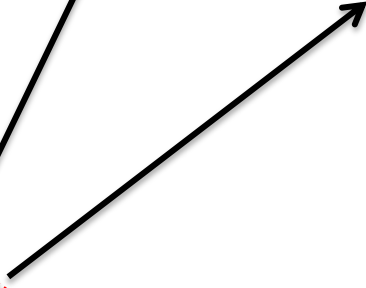
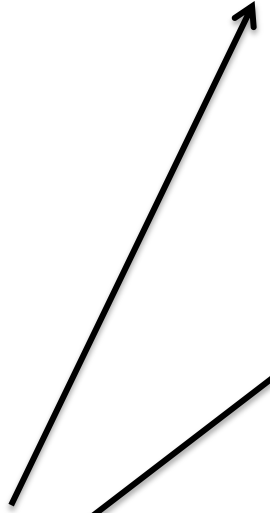
Cardiac Structure and
Function
(Independent of
Metabolism)



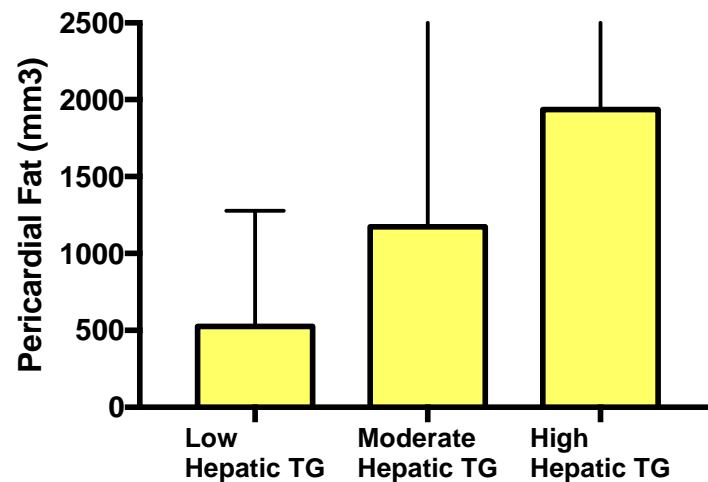
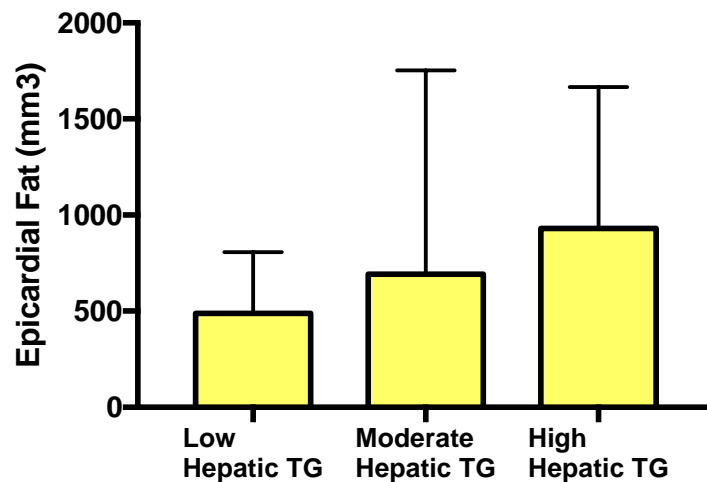
Diastolic
Dysfunction



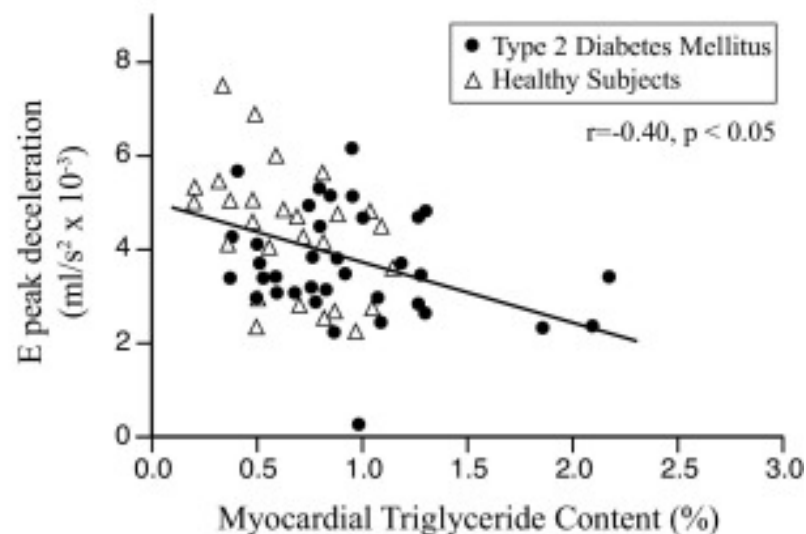
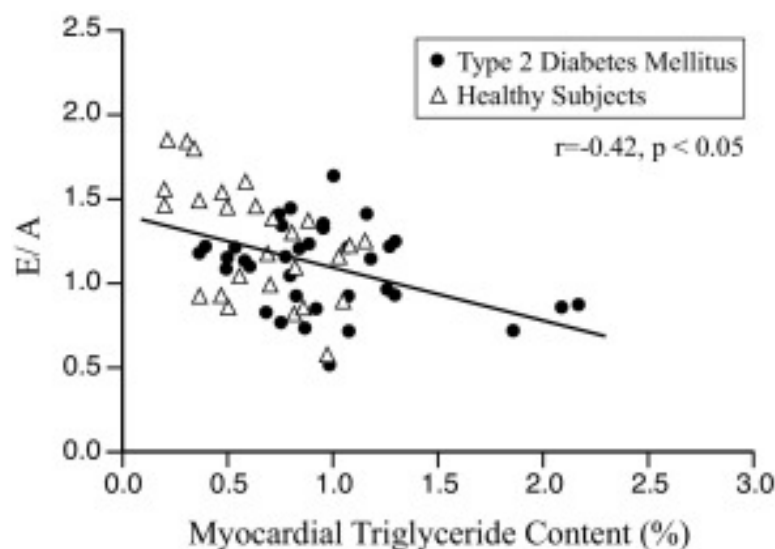
NAFLD



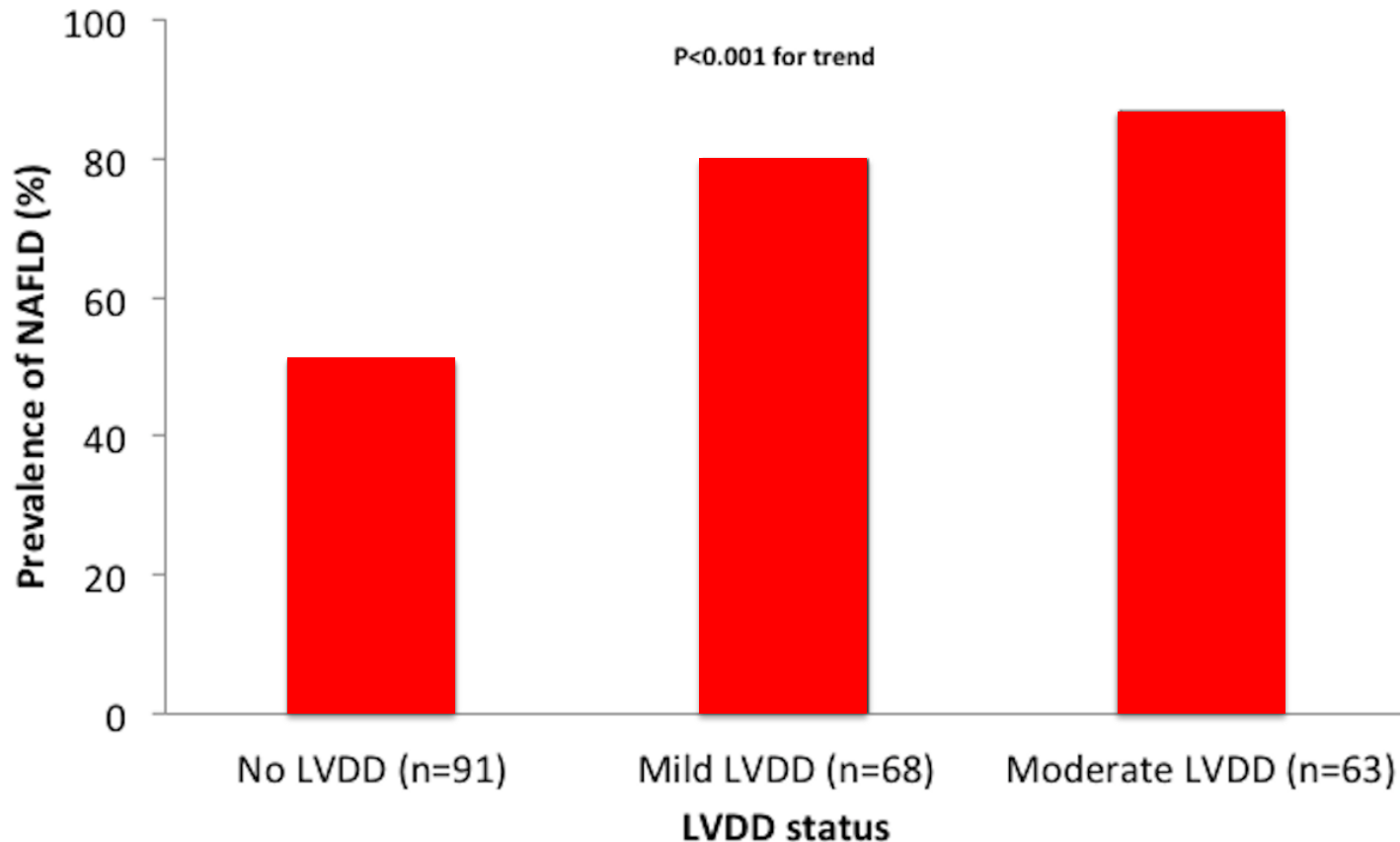
Hepatic Steatosis Linked to Epicardial and Pericardial Fat



Myocardial Triglyceride Content is Linked to Diastolic Dysfunction

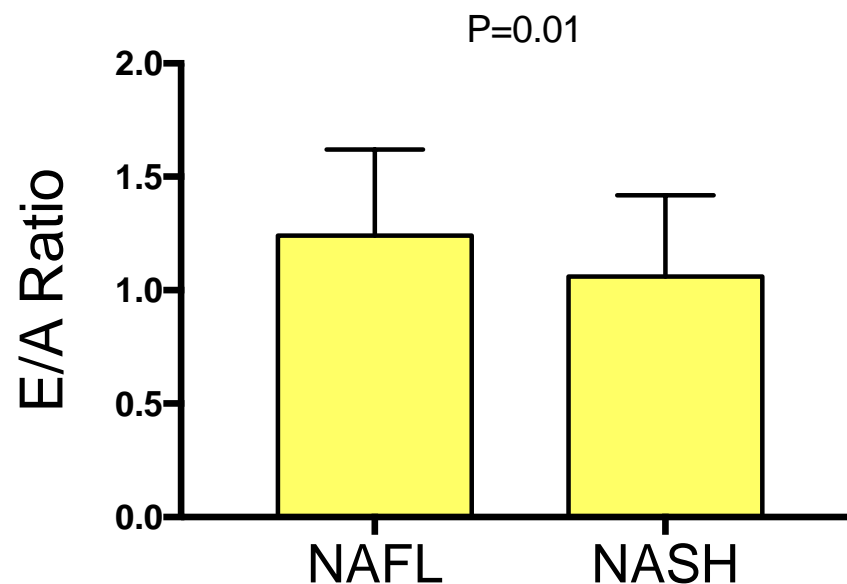


Association between NAFLD and DD is Independent of Traditional Risk Factors

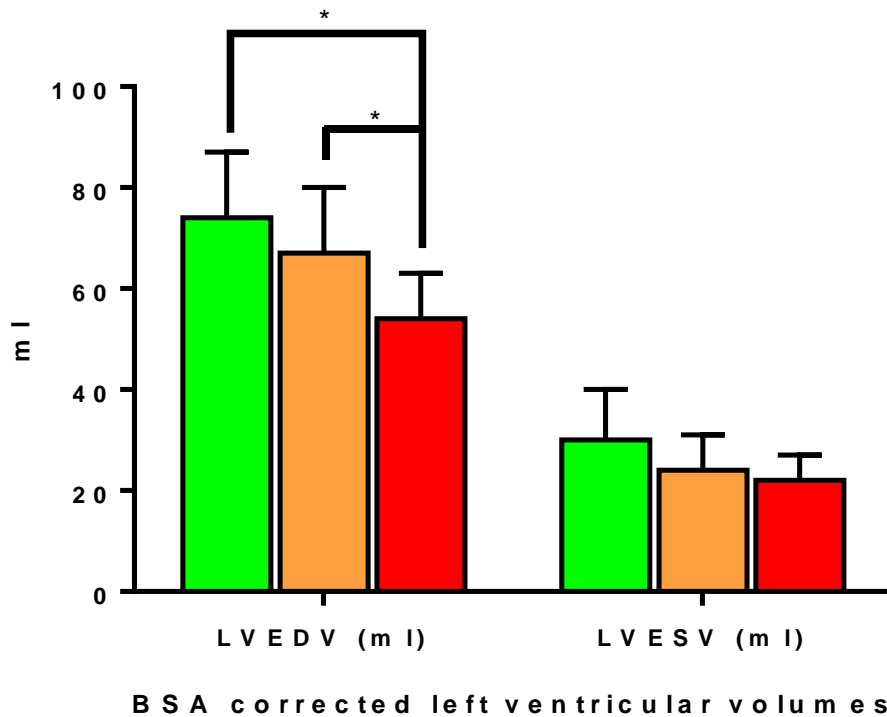


Relationship between NAFLD and DD independent of: Age, Sex, BMI, Duration of DM, HbA1c, HTN, and eGFR

Greater Diastolic Dysfunction in Patients with NASH



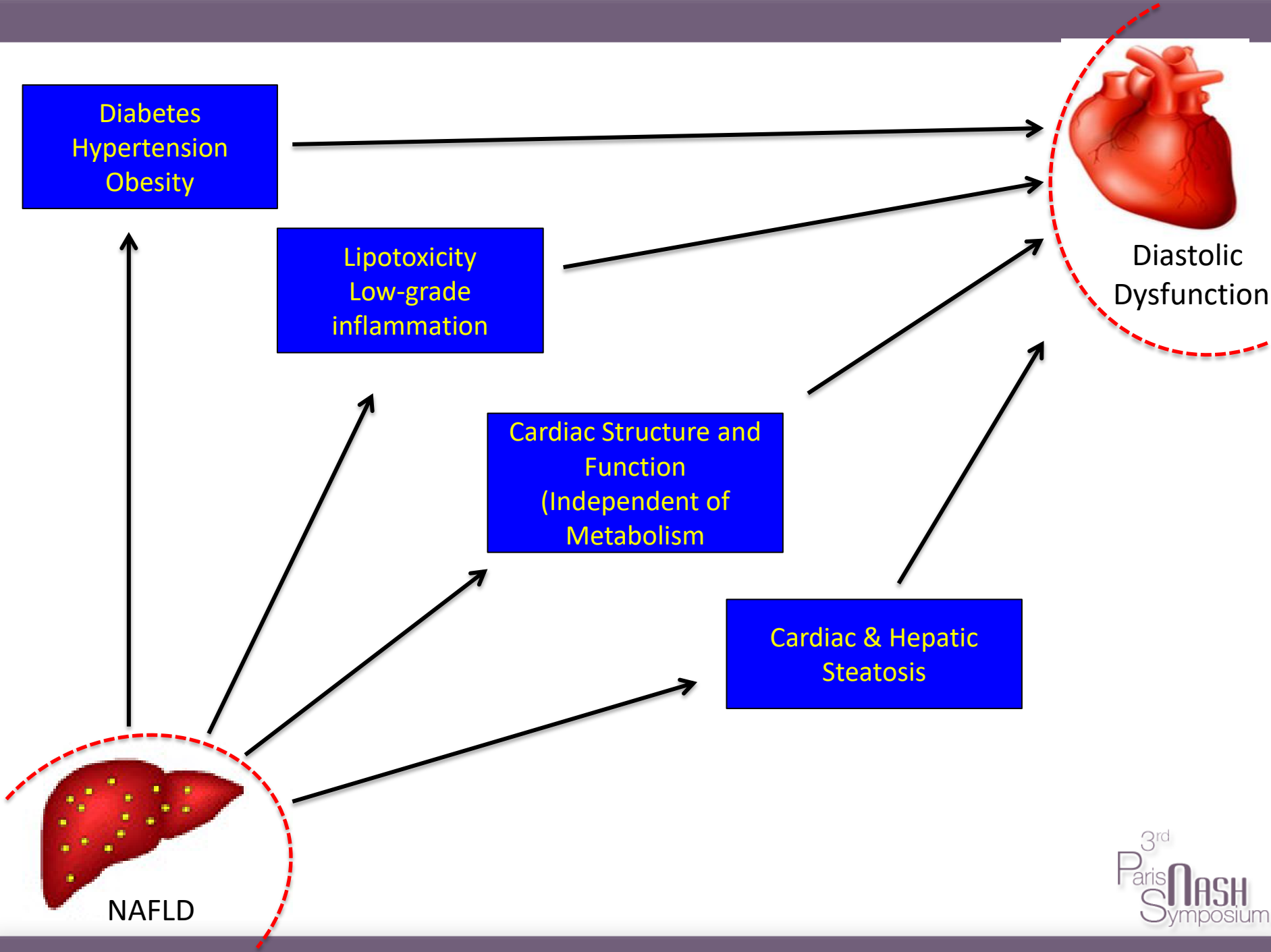
Decline in Diastolic Dysfunction Associated with NAFLD



■ controls
■ NAFL
■ NASH

Parameter	β -Coefficient	P
Age	-0.03	ns
Diabetes	-2.1	ns
Hypertension	0.7	ns
NASH vs NAFL	-14	< 0.007

* $p < 0.04$ for both

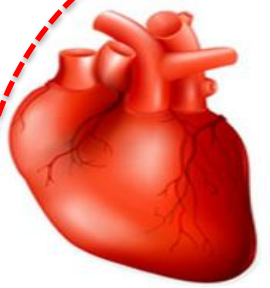
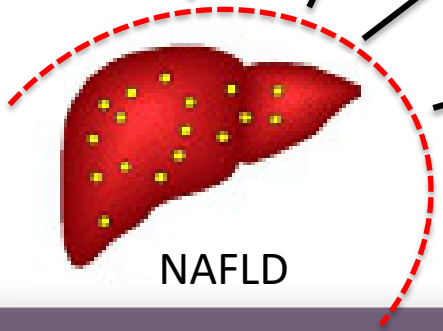


Diabetes
Hypertension
Obesity

Lipotoxicity
Low-grade
inflammation

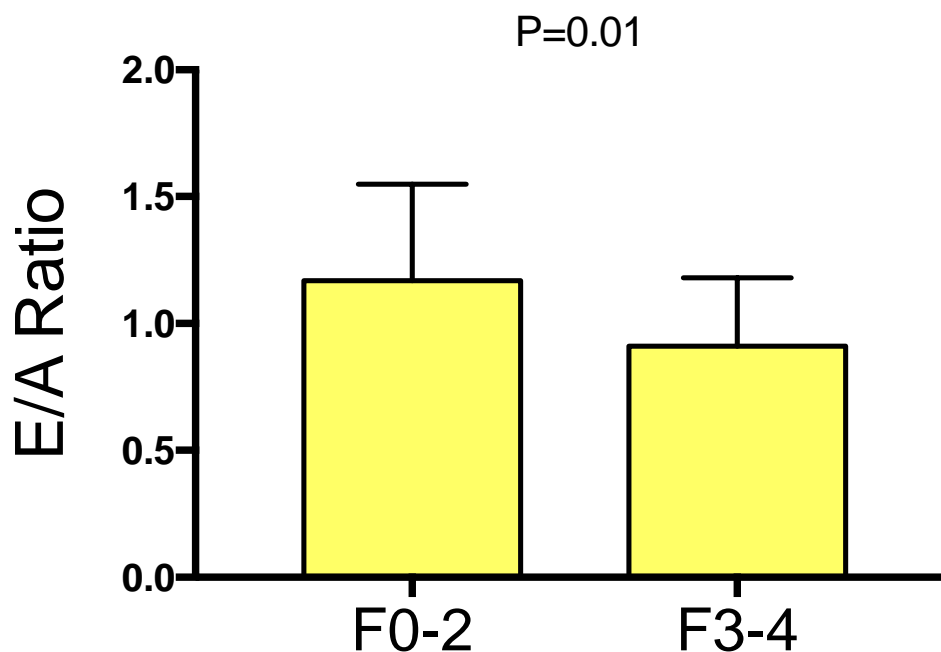
Cardiac Structure and
Function
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Cardiac & Hepatic
Steatosis



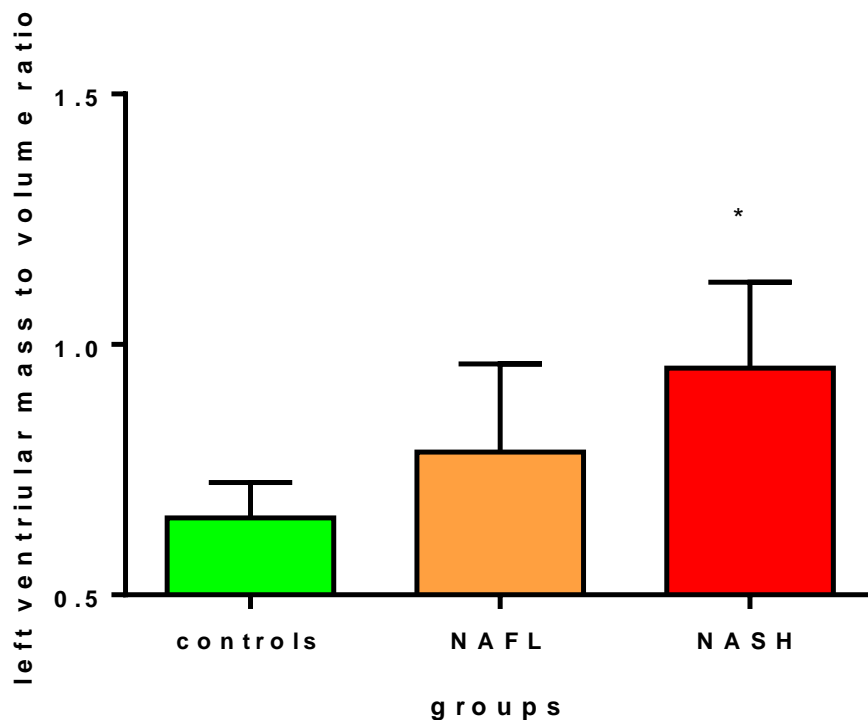
Diastolic
Dysfunction

Hepatic Fibrosis is Linked to Epicardial Fat and Diastolic Dysfunction



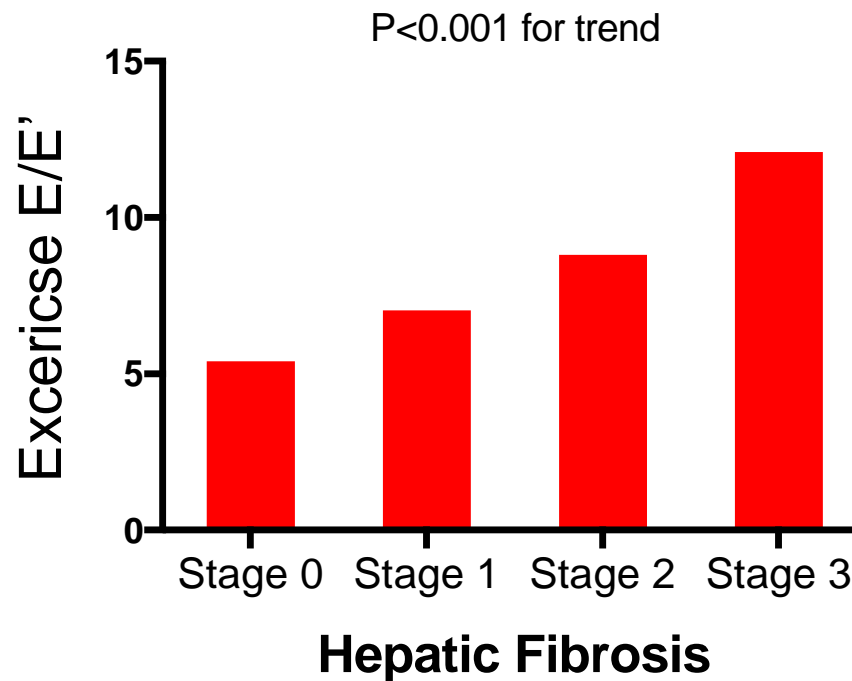
Relationship between Fibrosis & DD independent: age >50 yrs, gender, visceral adiposity, hypertension, IFG/Diabetes, statin use, epicardial fat

LV Mass For Given Cardiac Volume Increases Progressively From Controls to NASH

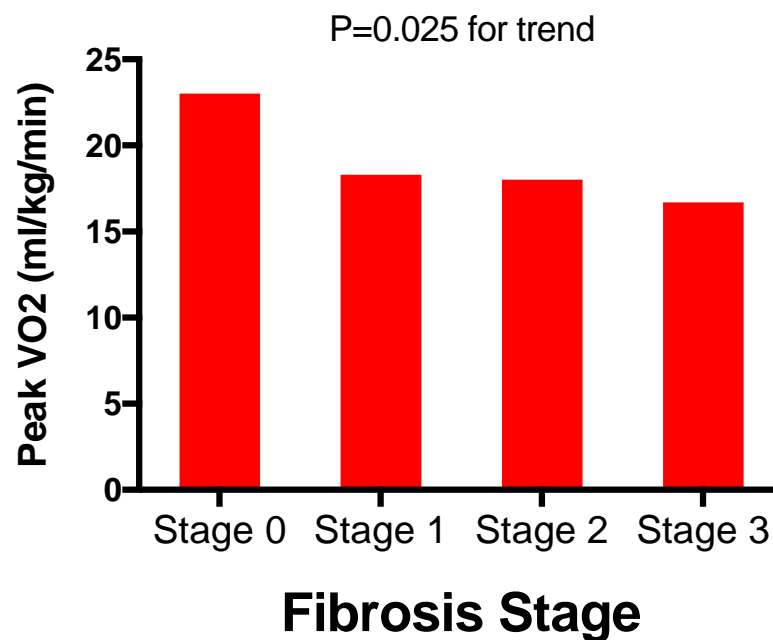
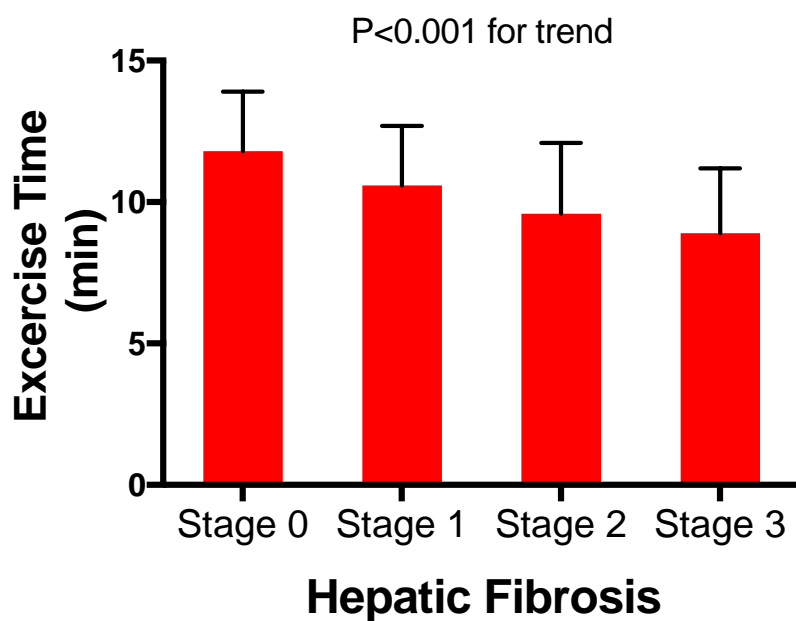


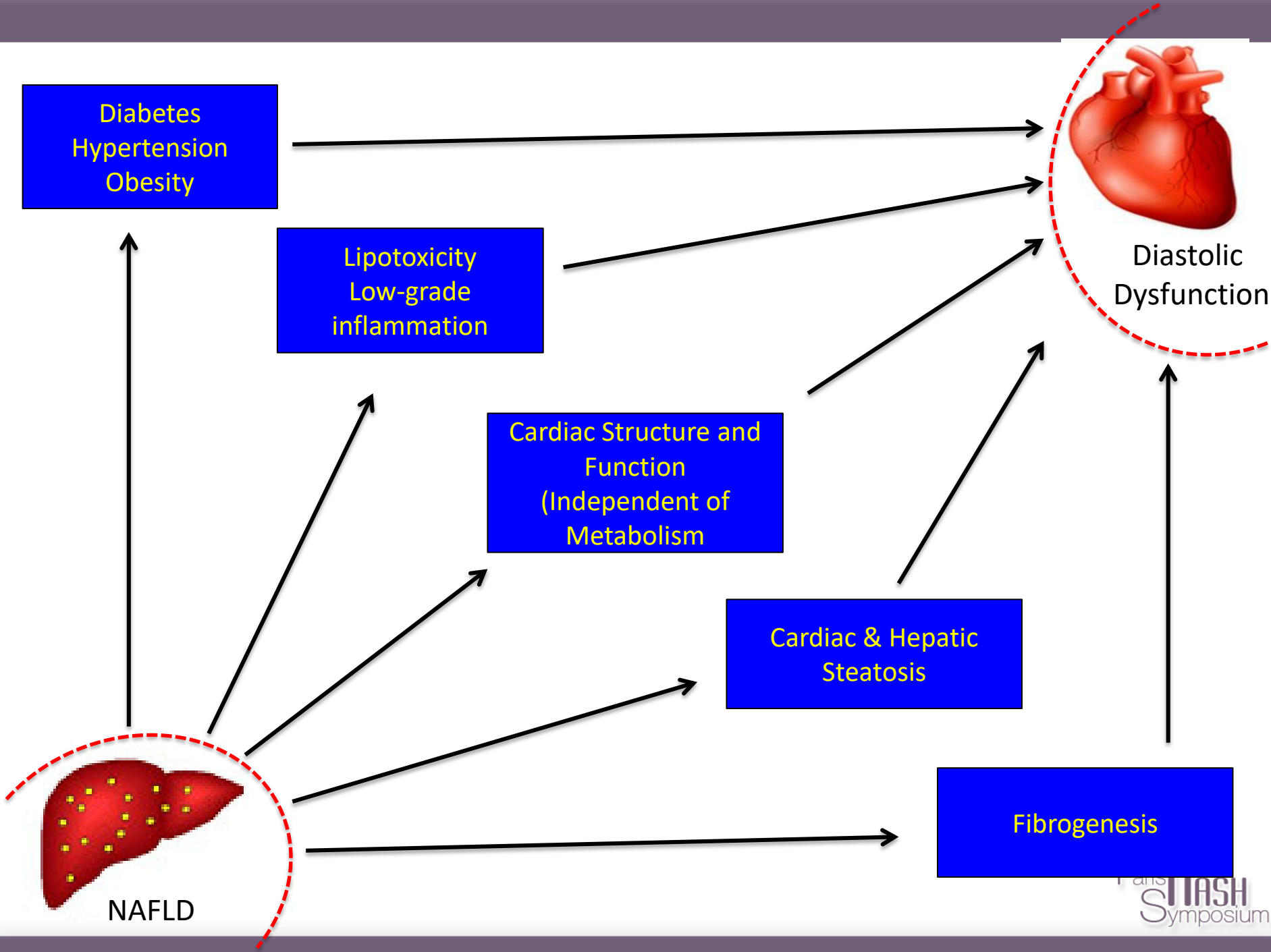
Parameter	β -Coefficient	P
Steatosis	3.3	ns
Fibrosis	5.6	0.02
Inflammation	1.03	n.s

Hepatic Fibrosis Linked to Diastolic Dysfunction



Fibrosis Linked to Exercise Time and Peak VO₂ Consumption





Diabetes
Hypertension
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Low-grade
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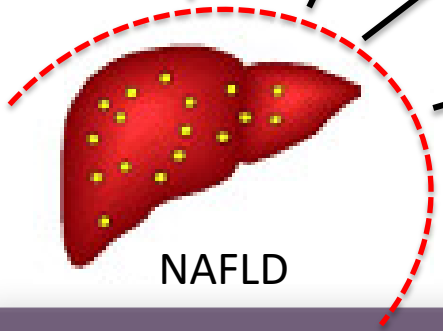
Cardiac Structure and
Function
(Independent of
Metabolism)

Cardiac & Hepatic
Steatosis

Fibrogenesis

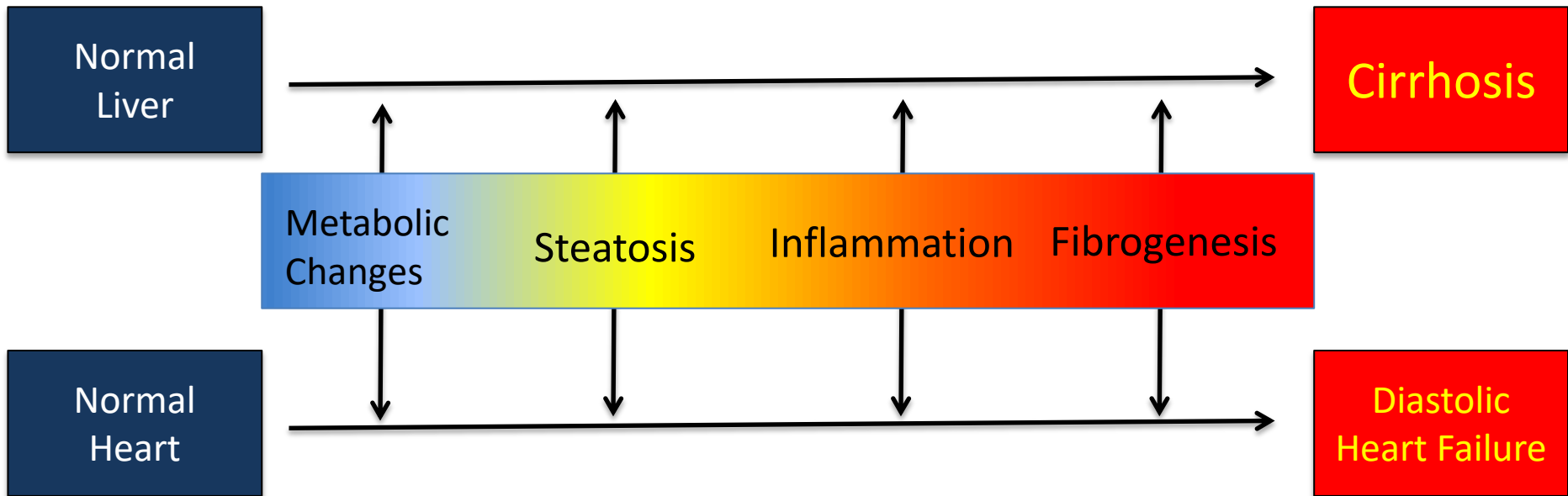


Diastolic
Dysfunction



NAFLD

The Liver Heart Axis: Summary



Acknowledgements

Virginia Commonwealth University:

NAFLD Research Team:

- Arun Sanyal, M.D.
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