CMHC
PEDIATRIC MASTERCLASS

Addressing Cardiometabolic Risk in Children and Adolescents:

CHALLENGES AND SOLUTIONS

September 2, 2022

Educationally Partnered with FCAAP Florida Chapter of the American Academy of Pediatrics

Welcome

Elaine M. Urbina M.D., M.S.
Director Preventive Cardiology
Cincinnati Children's Hospital Medical Center
Cincinnati, Ohio, USA

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Presented at the FCAAP FUTURE of PEDIATRIC PRACTICE 2022

CHMC Master Class September 2, 2022

- Jessica G. Woo, MHSA, PhD, is Professor of Pediatrics at the Cincinnati Children's Hospital Medical Center: **The Big Picture of Obesity and Metabolic Syndrome in the Pediatric Population**,
- Carissa Baker-Smith MD, MPH is Director of Pediatric Preventive Cardiology at Nemours' Alfred I duPont Hospital for Children: **Prevention of Pediatric Obesity.**
- Jessica G. Woo: **Food Availability & Obesogenic Environments as Contributors to Overweight and Obesity in Children**
- Aaron Kelly, PhD is Professor of Pediatrics, at the University of Minnesota Medical School: **Tackling Pediatric Obesity: Utilizing the Full Spectrum of Available Tools.**

CHMC Master Class

- Shani H.Cunningham, DO, M.Ed, a Pediatric Hospitalist at AdventHealth for Children: **The Pressure is Rising: Hypertension in Children and Adolescents.**
- Amy L. Peterson, MD, Director of Pediatric Preventive Cardiology at the University of Wisconsin School of Medicine and Public Health: **Pediatric Dyslipidemia.**
- Jay Shubrook, DO, Director of Diabetes Services at Touro University California: **Type 2 Diabetes in Children and Adolescents: Screening, Diagnosis, and Management.**

CHMC Master Class

- Stavra Xanthakos, MD, MS is Director of Steatohepatitis Center and Medical Director, Surgical Weight Loss Program for Teens at CCHMC: **Pediatric NAFLD: Assessment and Management.**
- Stephen Daniels, MD, PhD, is Professor and Chair of the Department of Pediatrics at the University of Colorado School of Medicine: **Target Organ Damage Related to Cardiometabolic Disease.**
- Eden M. Miller, DO: **Use of Technology for Managing Obesity & Cardiometabolic Risk: Challenges, Advances & Perspectives**

What? Is CardioMetabolic Burden

- **Gerald Reaven (1928-2018) endocriniologist at Stanford** gave the *Banting Lecture* at ADA in 1988 on the 'Role of Insulin Resistance in Human Disease'
- **First to discuss relationship between:**
  - **Obesity** ***and***
  - **Insulin Resistance**
  - **Dyslipidemia**
  - **Hypertension**
- **Came to be known as 'Metabolic Syndrome'**
- **Definitions vary:**
  - Adult Treatment Panel/NCEP, WHO, International Diabetes Federation.
  - No consensus on definition of MS in youth.
  - Best to discuss 'CardioMetabolic Burden" appears to have prevalence of 2-9.4% children.

Reaven Diabetes 1988; Lepe Pediatric Research 2021

Why? Should We Care About CardioMetabolic Burden: *Increased Risk for CVD*

Population	HR for CVD	
	NCEP MetS	WHO MetS
Entire Population	2.53	1.63
Only those without pre-existing CVD	2.71	1.63

- In the San Antonio Heart Study, Hazard Ratios for CV mortality increased in persons with CardioMetabolic risk factor clustering regardless of which definition was used.

Adjusted for age, race, sex, Hunt, K (Circulation, 2004; 110:1245-1251)

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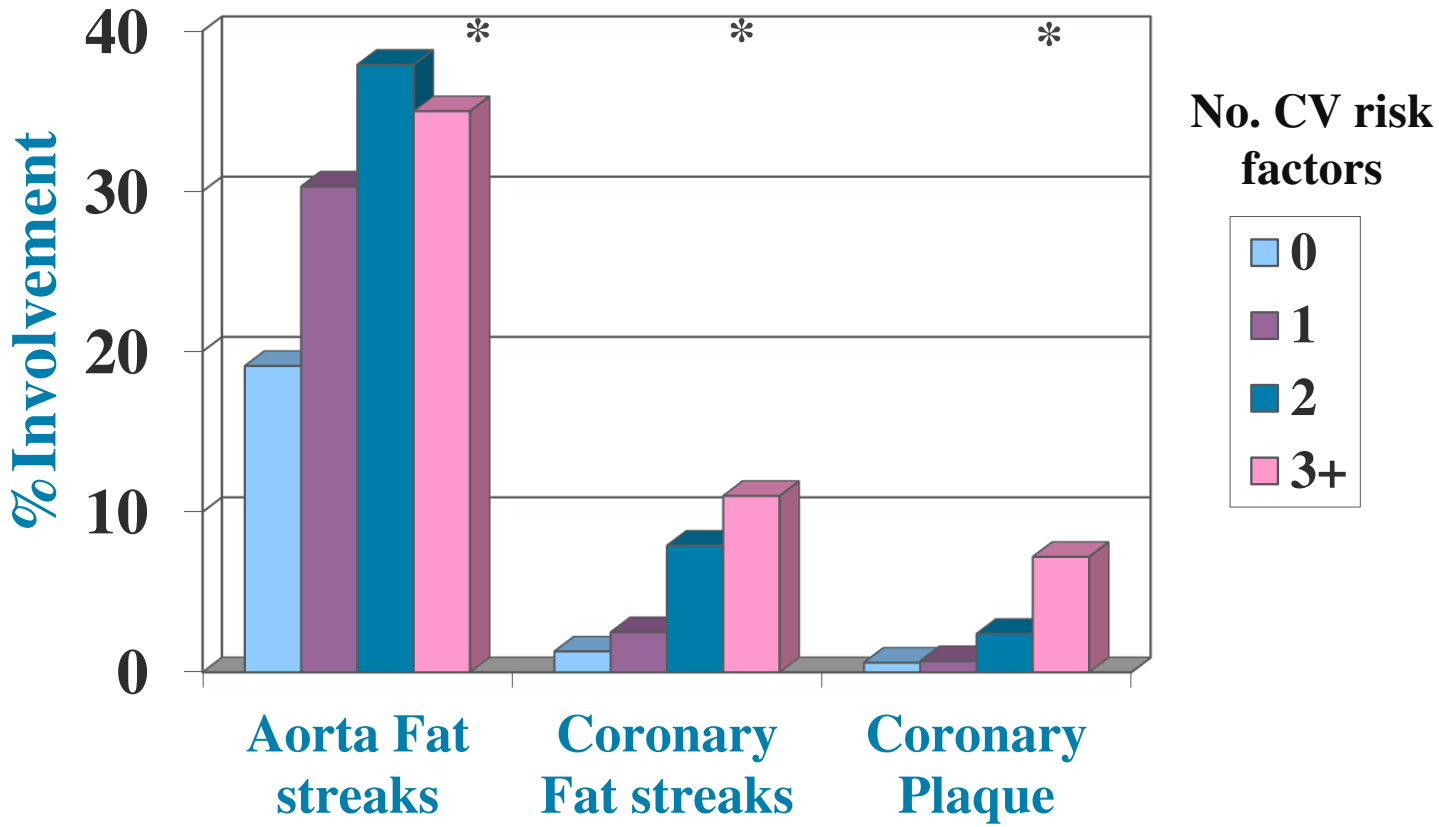
Effects of CardioMetabolic Burden

Evident in Youth

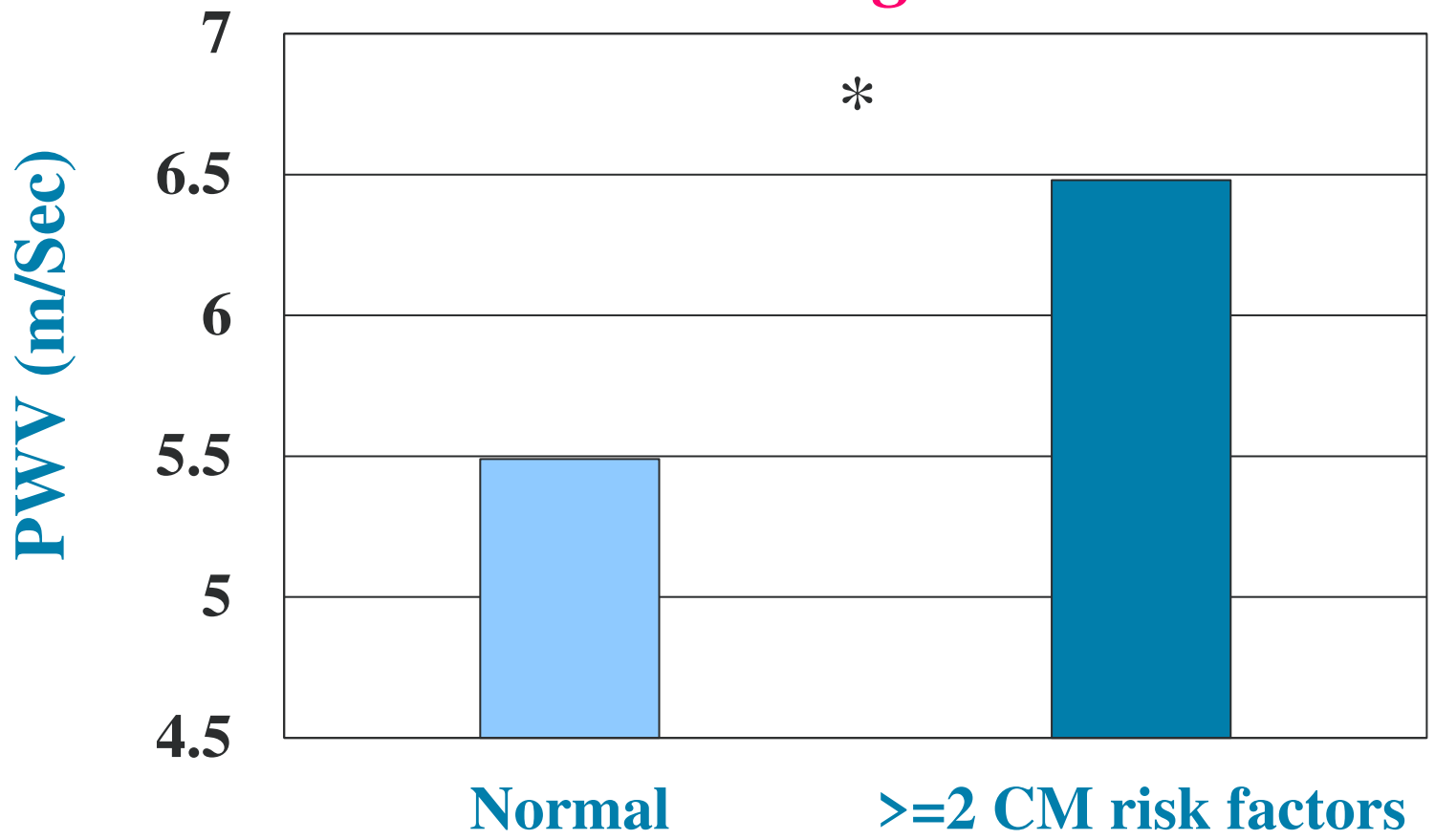


Coronary Arteries
Obese Young
Smoker with High Cholesterol

- **Clustered CardioMetabolic risk factors linked to Coronary plaques.**

**P≤0.01 for trend, N = 204, 2-39 years; Berenson, NEJM 1998.*

Non-Invasive Measures Show Increased Atherosclerosis *in Youth with Higher CardioMetabolic Burden*



- Adolescents with increased CardioMetabolic burden also have increased PWV.

*Shah, Urbina Pediatrics 2011; *P≤0.05 for Low vs high risk, N = 673, age 10-23 yrs.*

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What?

Can we do to improve the outcome?

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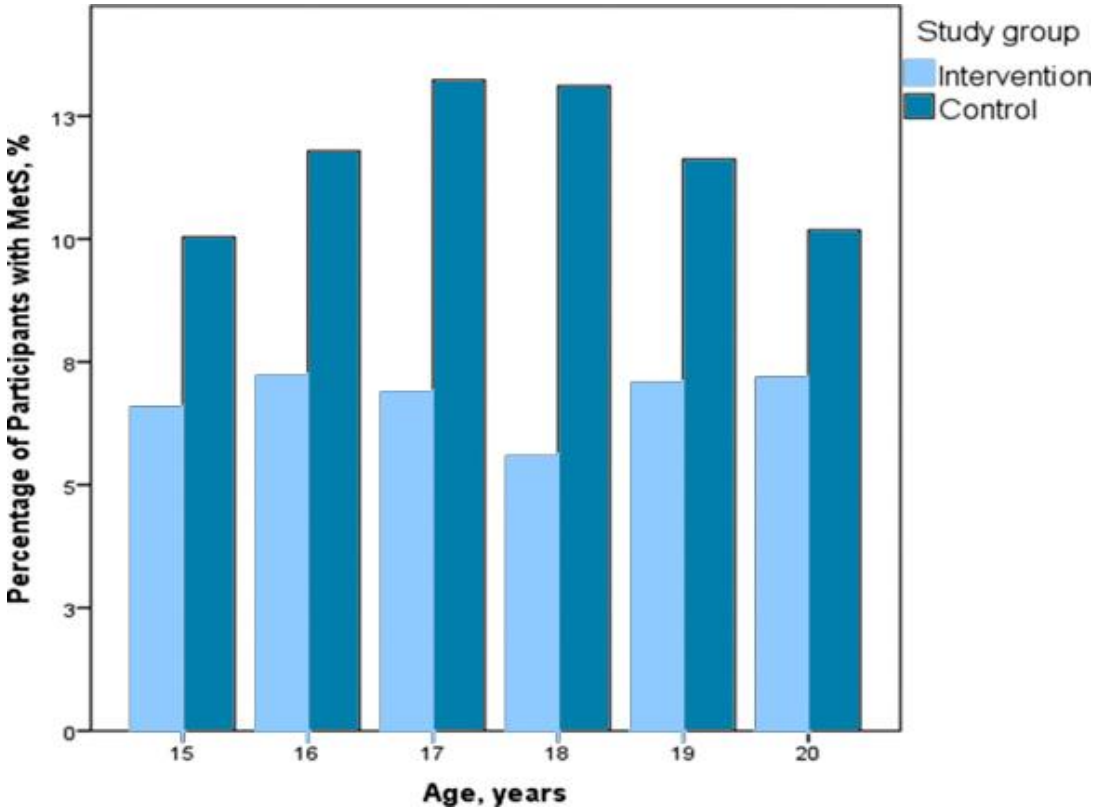
Primordial Prevention

Initiating Good Habits Early in Life

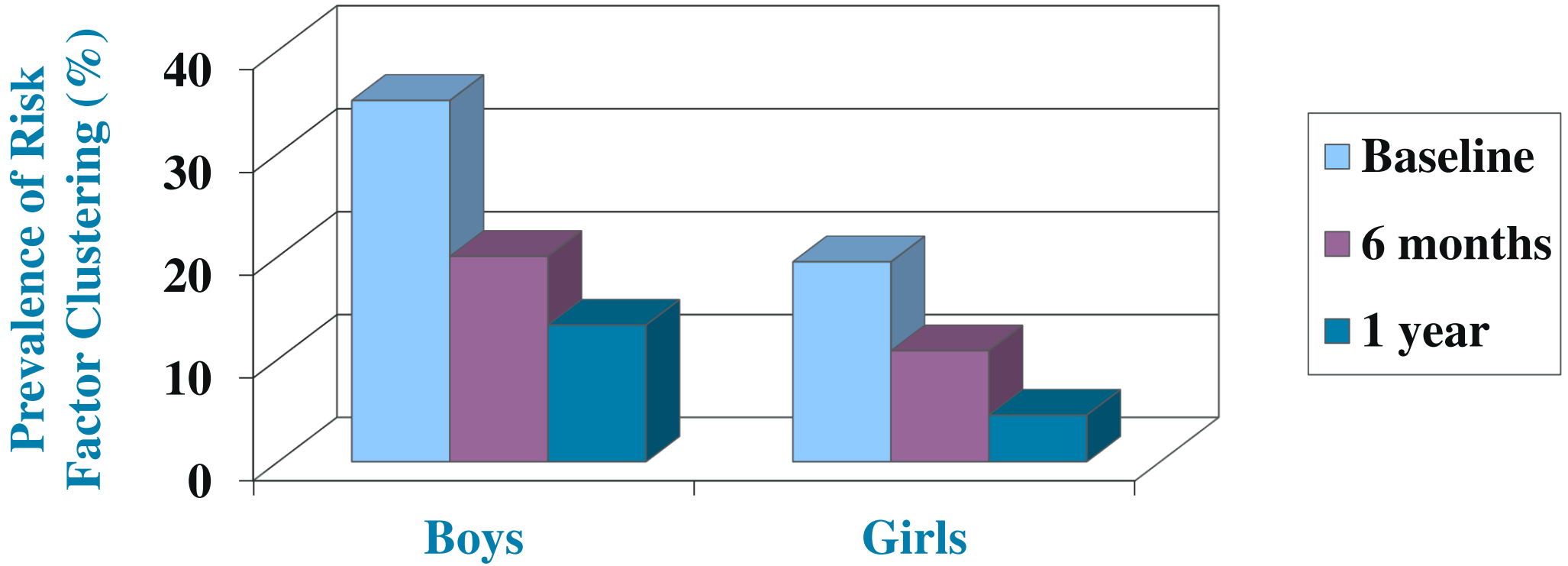


- **STRIP initiated reduction in saturated fat in infancy.**
- **Lower prevalence of CardioMetabolic risk factors in intervention group at 15-20 years of age.**

Special Turku Coronary Risk factor Intervention Project, Nupponen Circ 2015

Primary Prevention

Intervention in Youth with Elevated CardioMetabolic Burden

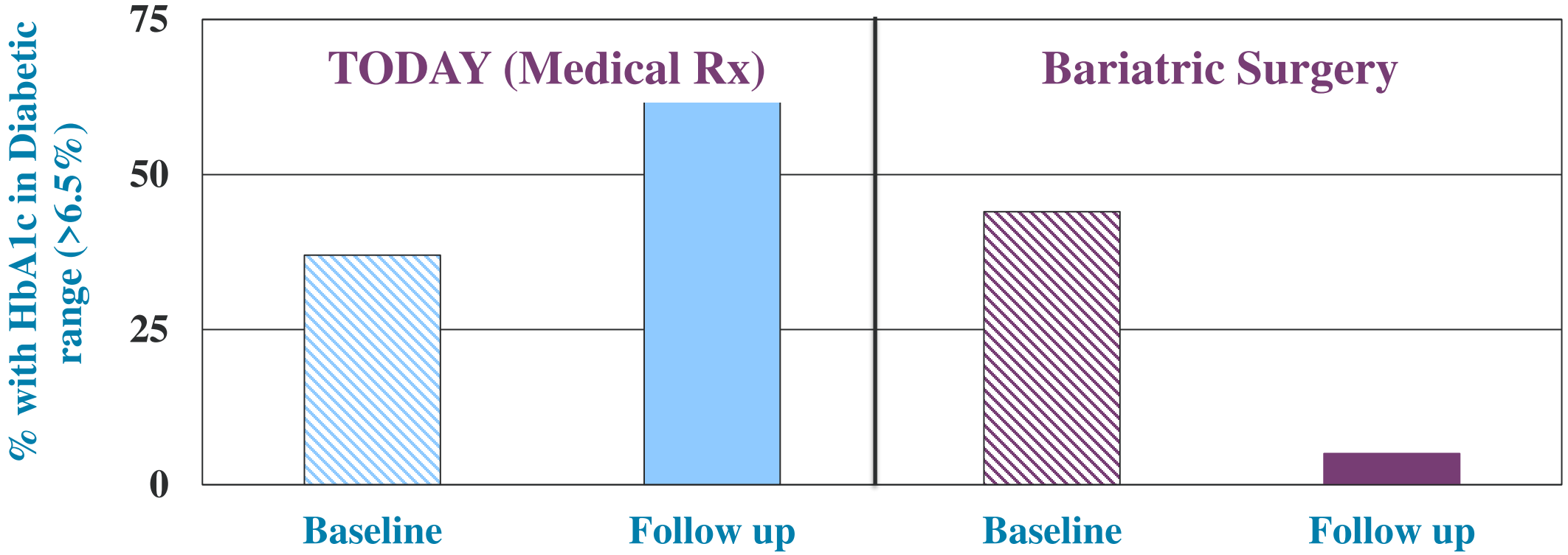


- Adolescents underwent multidisciplinary intervention consisting of nutritional, exercise, psychological, and clinical therapy.
- Mean 4 kg/m^2 drop in BMI → prevalence of RF clustering dropped (27% to 8%)

N=83, Caranti , 2007 Metab

Secondary Prevention:

Aggressive Control of CV Risk Factors in High Risk Youth

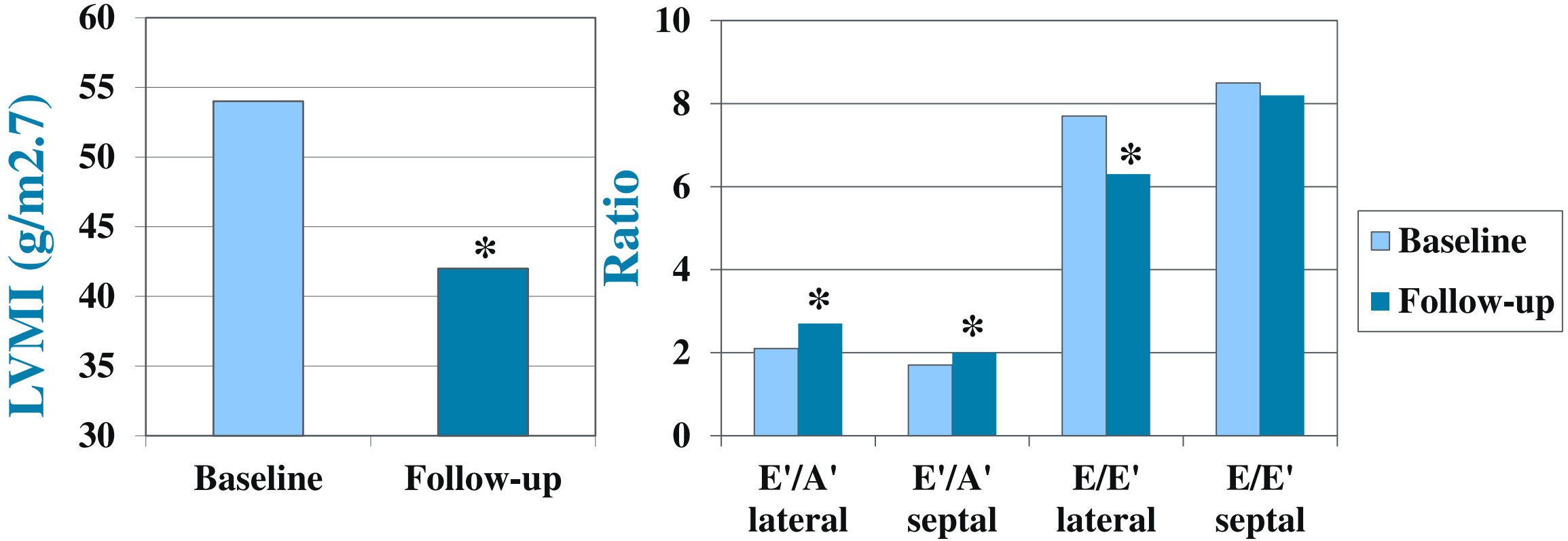


- In patients treated with lifestyle & medication, subjects gained BMI (4%) and more developed HbA1c > 6.5% after 2 years of follow-up.
- Youth treated with Bariatric surgery lost 29% of BMI & had near total resolution of T2DM.

Inge Urbina 2018 JAMA Pediatr

Surgical Weight Loss

Results in Improvement in Cardiac Structure & Function

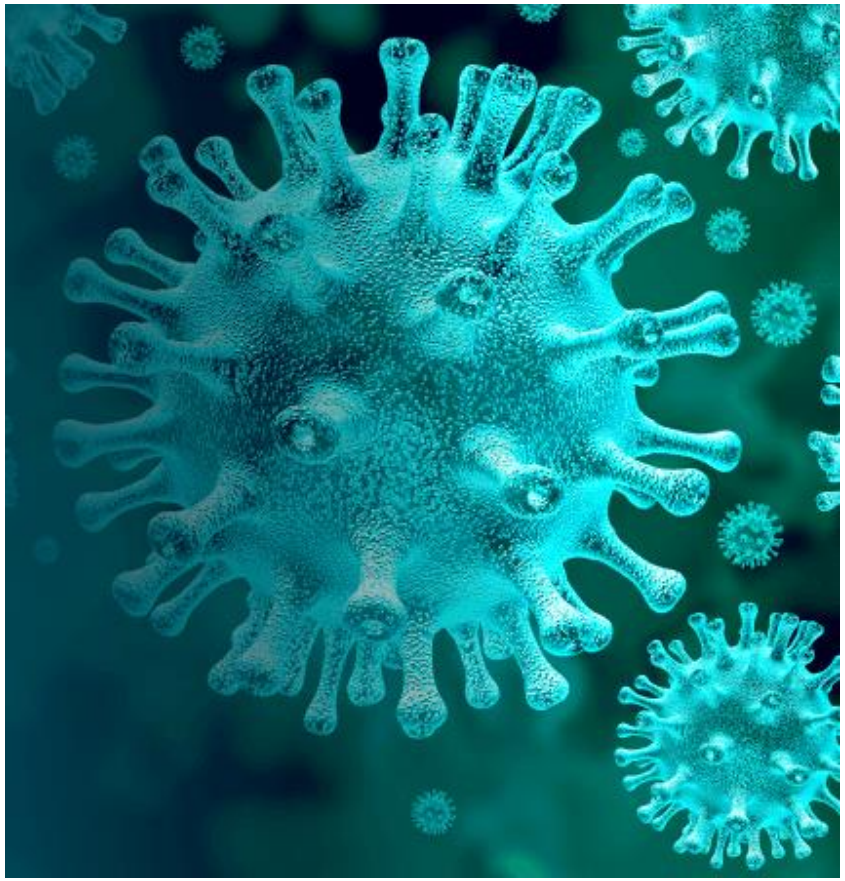


- After bariatric surgery extremely obese adolescents had significant drop in BMI & CV risk factors.
- Accompanied by a decrease in LVM & improvement in diastolic function.

**P ≤ 0.001; Ippisch JACC 2008, N = 76, 13-20 yrs*

We need Address the World's *Greatest Problems*

First:



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