

# FUTURE OF PEDIATRICS TALKS!

A VIRTUAL SUMMER SERIES

Pediatric Health Network  
 Children's National.



# A few notes about today's Webinar

- All lines are muted throughout the webinar.
- Please use the Q&A box to ask questions or make comments.
- Today's Webinar recording and slides will be posted to the PHN website following the presentation. You can find past FOP presentations on our website at <https://pediatrichealthnetwork.org/future-of-pediatrics/>

# Speakers



**Elizabeth Estrada, MD**

## **Conflicts to disclose:**

- Consultant for Rhythm Pharmaceuticals

# Upcoming FOP Talks!

DATE	TOPIC	SPEAKER
July 15	Abnormal Thyroid Labs in the Primary Care Setting	Priya Vaidyanathan, MD
	A Pediatrician's Approach to a Young Child With Joint Effusion	Bitu Arabshahi, MD
July 29	Allergic Reactions: When to Refer?	Amaziah Coleman, MD Claire Boogaard, MD
	Dermatologic Manifestations of COVID-19	Anna Kirkorian, MD
August 12	Obstructive Sleep Apnea: Primary Care Management and When to Refer	Claire Lawlor, MD
	Neuropsychological Evaluations: What are they, when are they needed and how can I get them for my patients?	Kristina Hardy, PhD Laura Kenealy, PhD
August 26	Meeting Teens Where They Are: the Contraception Discussion	Brooke Bokor, MD, MPH Natasha Ramsey, MD
	School's Out: Supporting School Attendance and Distance Learning Engagement	Asad Bandealy, MD Heidi Schumacher, MD

# PHN Webinars

**July 7<sup>th</sup> – 12PM PCP Town Hall: Back to School Guidance featuring Nathaniel Beers, MD**

<https://childrensnational.org/healthcare-providers/refer-a-patient/covid/covid-19-webinars>

**July 8<sup>th</sup> – 12PM: PHN Office Manager and Practice Administrator Steering committee presents *Practice Management: Road to Recovery Series***

Link to register: <https://cvent.me/mq8XxD> or email [PHN@childrensnational.org](mailto:PHN@childrensnational.org) if you are interested in attending.

July 8	Reports and Recalls
July 22	Payment Collection
August 5	Best Practices: New Initiatives and Implementing Change
August 19	Managing a COVID-19 positive Employee and Wellness In Your Workplace

# Prediabetes and Type 2 Diabetes : Diagnosis and Management



Elizabeth Estrada, MD

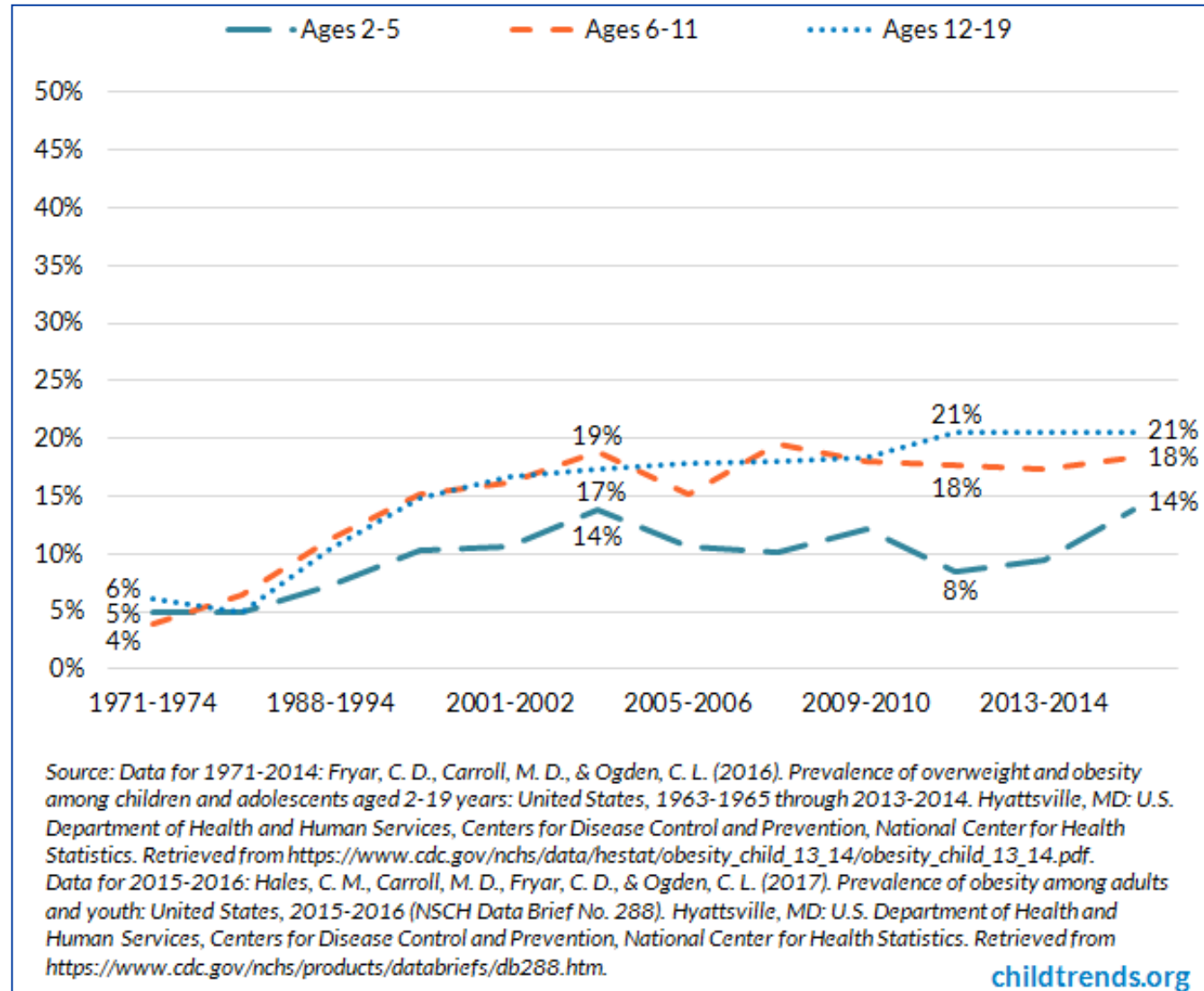
Endocrinology

# Objectives

- Discuss the epidemiology of type 2 diabetes and prediabetes in childhood
- Review the pathophysiology
- Discuss the screening guidelines, evaluation, and treatment of type 2 diabetes and prediabetes in childhood
- Review referral guidelines to type 2 diabetes clinic

# Percent Obesity in Children 2-19y

## 1971-2016





# Obesity Comorbidities:

## Direct correlation with Severity of Obesity

Type 2 diabetes

Pre-diabetes

PCOS

Metabolic syndrome

Hypertension

Hyperlipidemia

Non-alcoholic fatty liver disease

Sleep apnea

GERD

Asthma

Orthopedic complications:

- Joint pain
- SCFE, Blount's disease

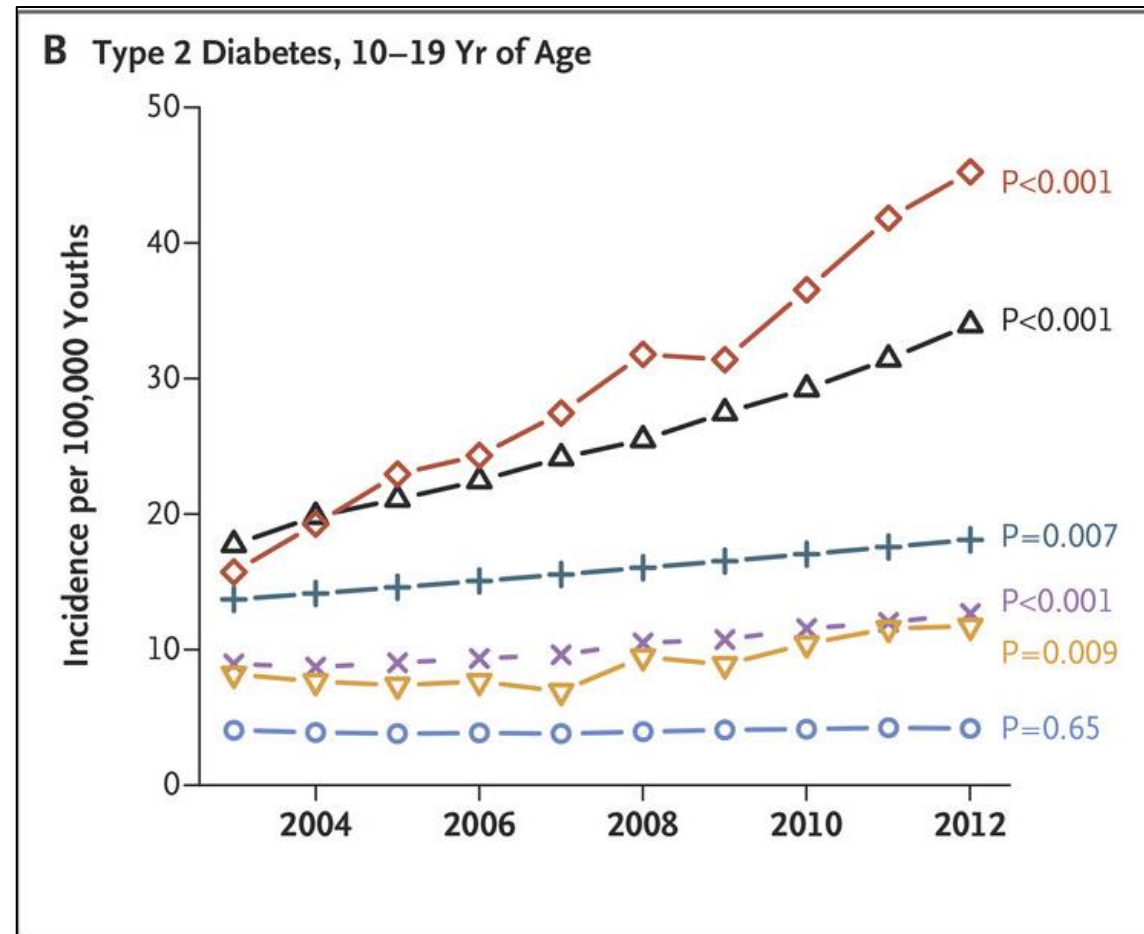
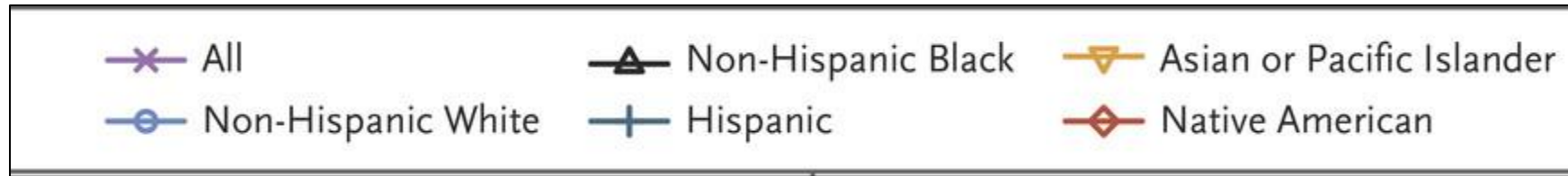
Gallstones

Depression, body image

Eating disorders

Cancer

# Incidence of Type 2 Diabetes in Youth



More than 4-fold increase projected in the next decades

# Prevalence Prediabetes

Cross-sectional analysis NHANES 2005-2016

- About 1 of 5 adolescents have prediabetes
  - Increase from 1.8% in 1988-1994
  - Higher in males and non-Hispanic Blacks

**Increased risk for diabetes and CVD**

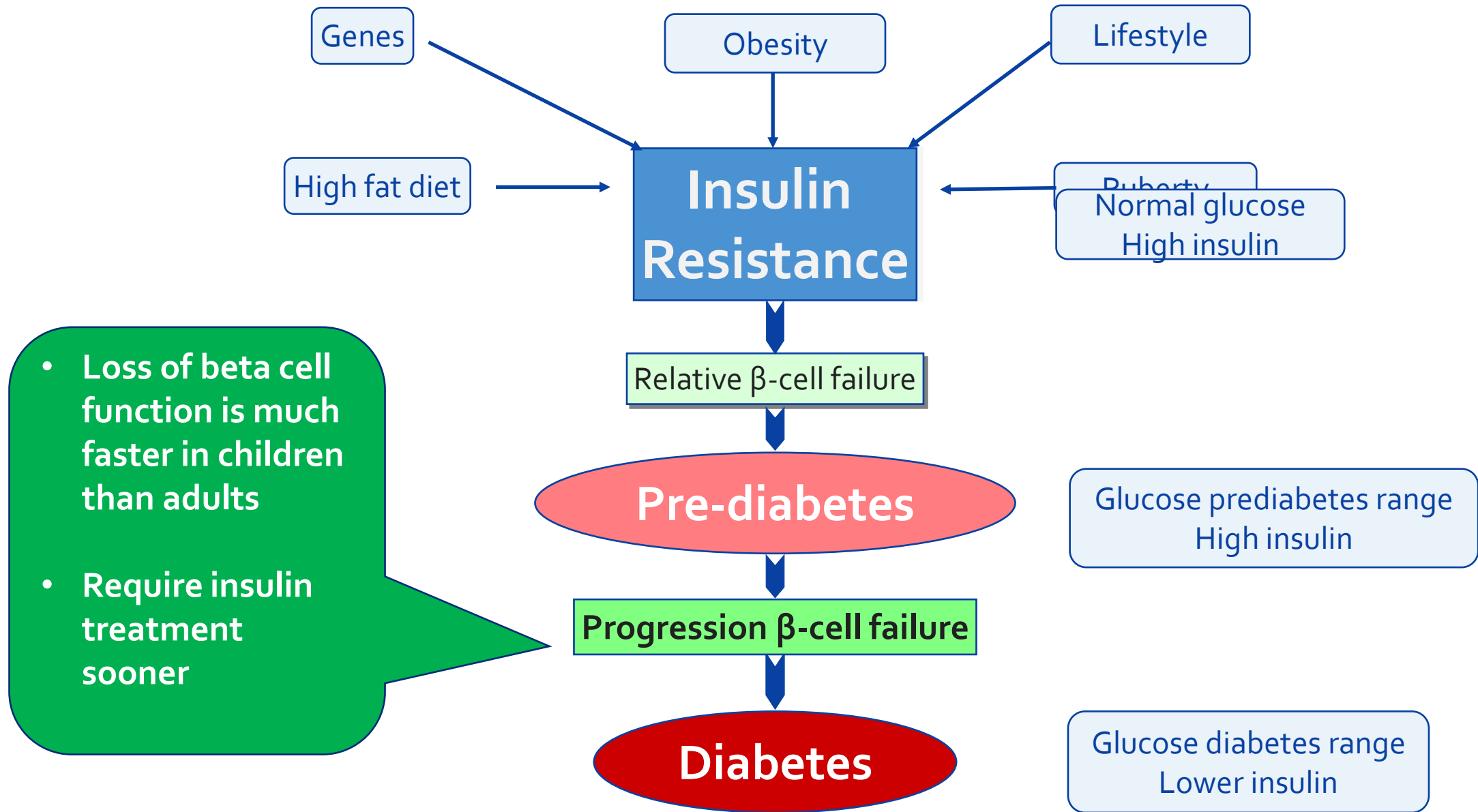
*Andes et al. JAMA Pediatr. 2020;174(2):e194498.*

# Pathophysiology

Insulin Resistance

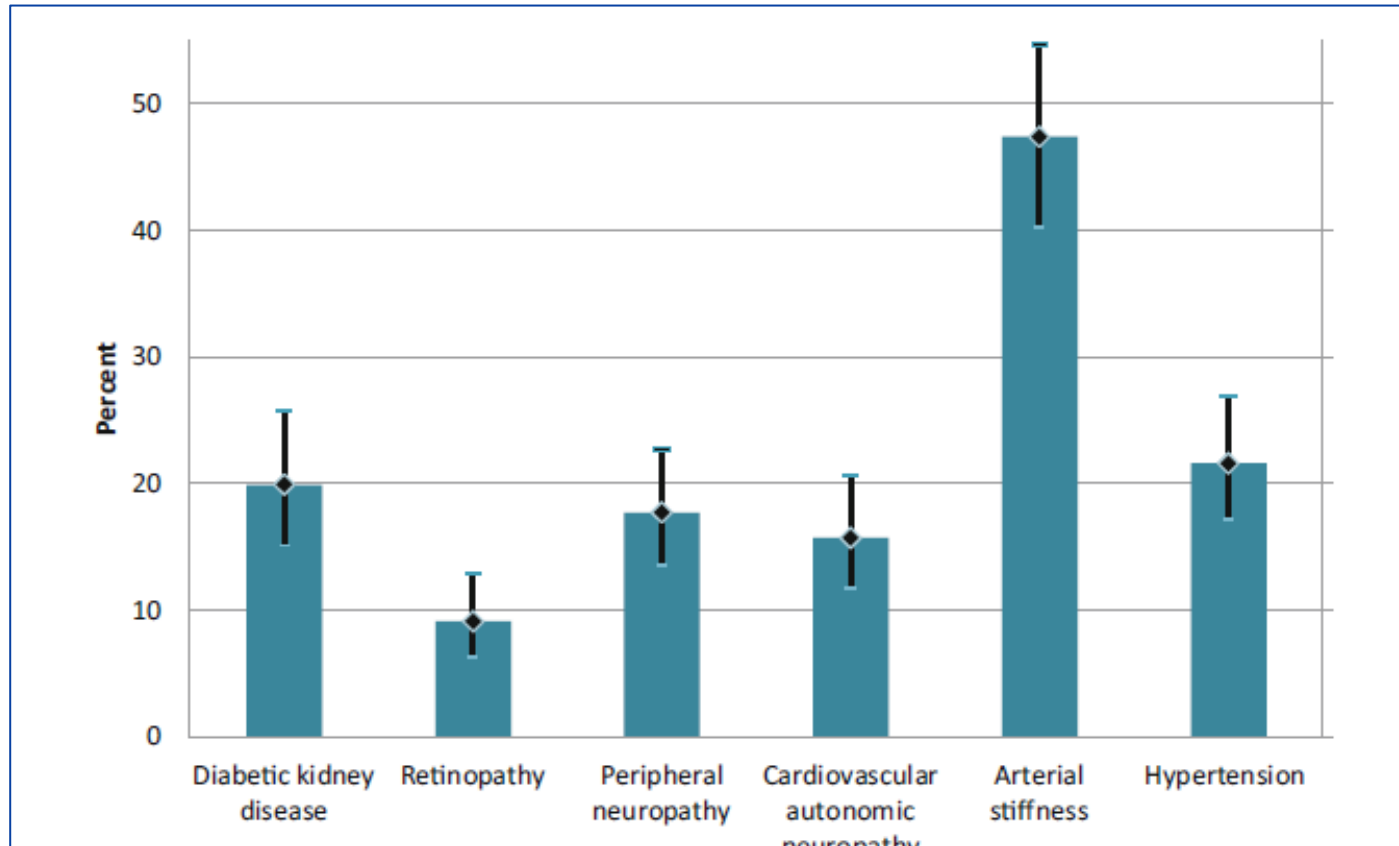
+

$\beta$ -cell Failure



# Diabetes Complications: Earlier than Adults

Prevalence of Complications at Age 21



# Prediabetes

## Adults:

- 5%-10% will progress to diabetes within a year
- Risk factor for CVD
- 50-60% increased 5-year mortality
- DPP and other studies show lifestyle modifications and weight loss prevent progression of prediabetes to diabetes
- Similar studies have not been conducted in adolescents

# Screening Guidelines: Risk-based BMI $\geq 85\%$

## One or more additional risk factors

- Maternal diabetes during the child's gestation
- Family history of type 2 diabetes in first- or second-degree relative
- High risk race/ethnicity:  
Native American, African American, Latino, Asian American, Pacific Islander)

- Signs or conditions associated with insulin resistance
  - Acanthosis nigricans
  - HTN
  - Dyslipidemia
  - PCOS
  - SGA

*ADA Position Statement. Diab Care 2018; 41(12)*



# Screening Labs: Interpretation

Test	Pre-Diabetes		Diabetes
	Impaired fasting glucose (IFG)	Impaired glucose tolerance (IGT)	
Fasting Glucose	100-126 mg/dl		≥126 mg/dl
2-hr OGTT		140-200 mg/dl	≥200 mg/dl
Random Glucose			>200 mg/dl plus symptoms
HbA <sub>1</sub> C	5.7-6.4%		≥6.5%

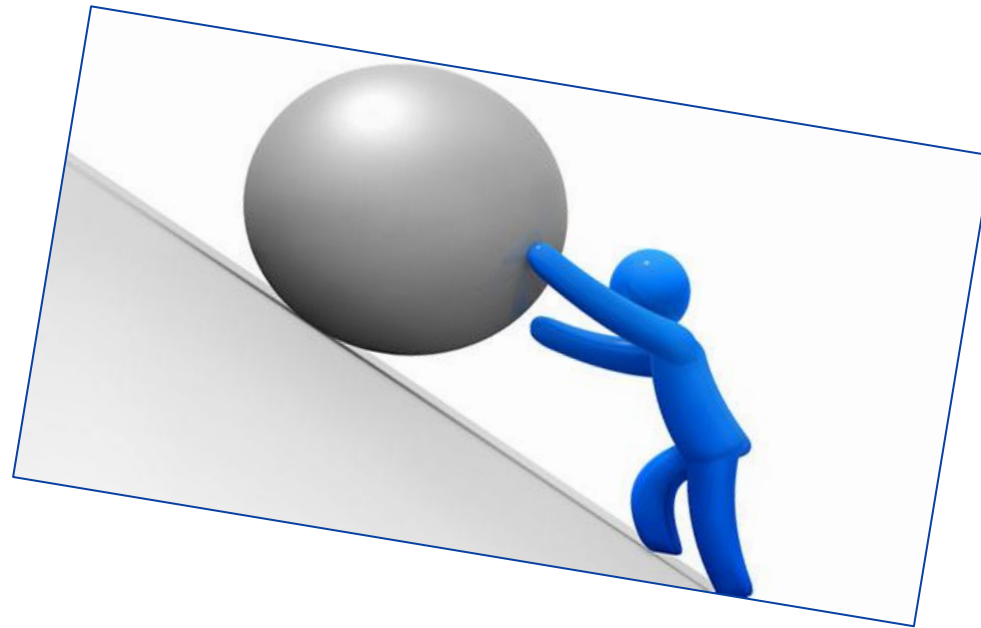
# Type 2 Diabetes in Children: Presentation

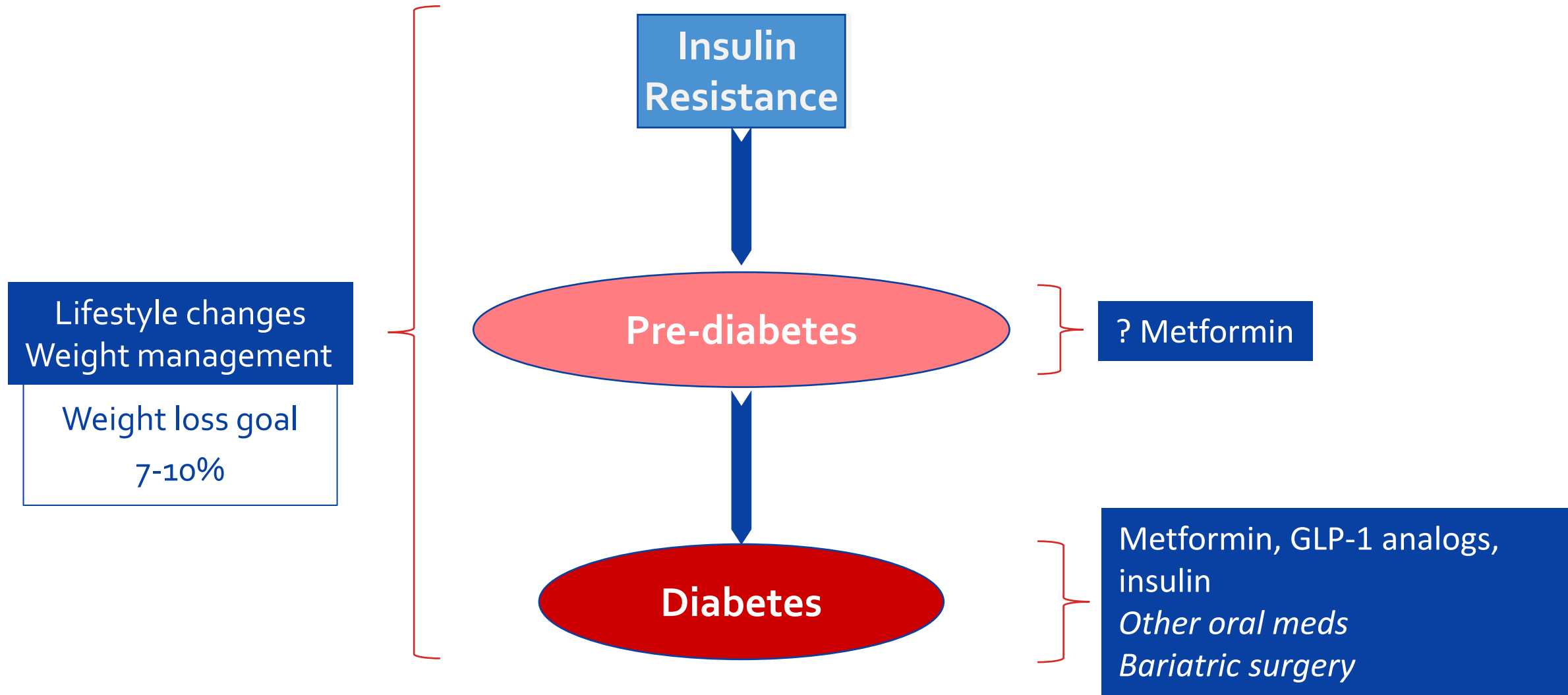
- Asymptomatic
- Vaginitis, UTI
- Polyuria, polydipsia, weight loss
- DKA or HHS, more frequent in blacks
- Obesity/overweight
- Acanthosis nigricans



# Treatment

Challenge for the pediatric endocrinologist





# Metformin

- First line therapy
- GI side effects
- 50% treatment failure within 1 year

Increase dose by 500 mg increments:

- 1000 mg po BID
- 2,000 mg xtended release QD or

Monitor yearly:

- CBC, ALT, AST, creatinine
- Stop metformin:
  - Macrocytic anemia
  - AST/ALT >2.5 x upper normal
  - Creatinine >1.0

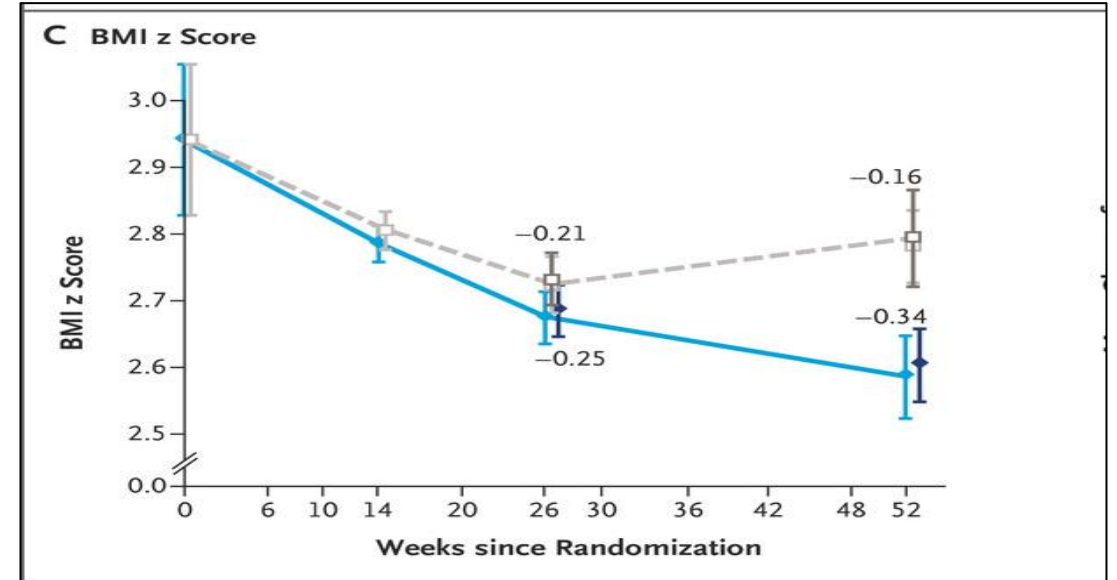
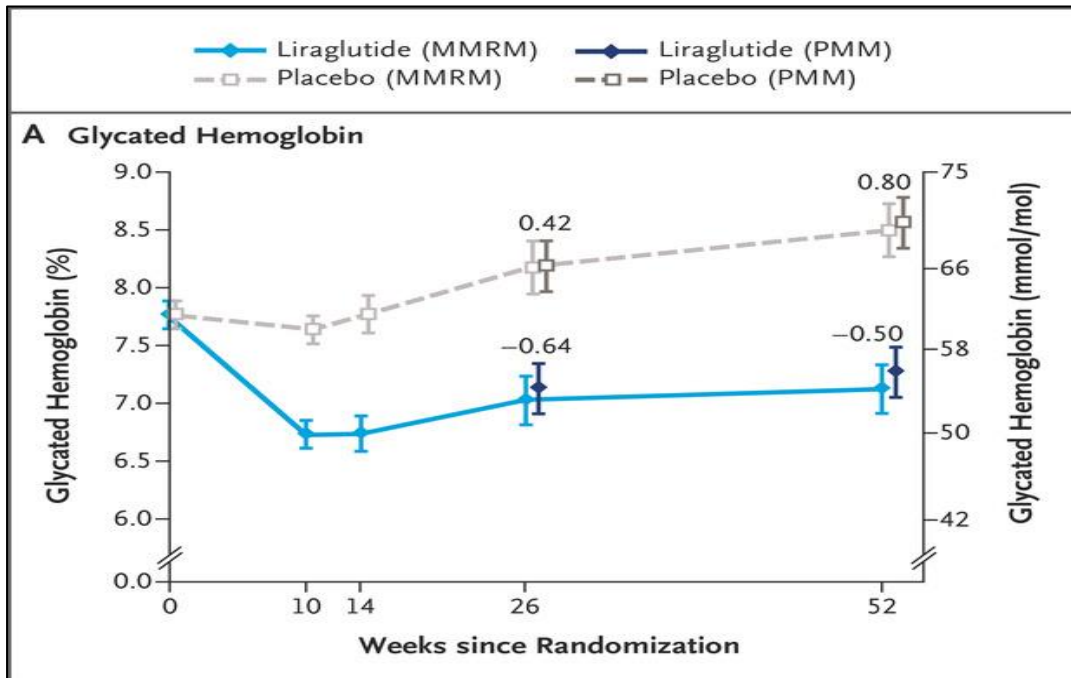
# GLP-1 Analogs

## (Victoza, Trulicity, Ozempic)

- Enhance glucose-dependent insulin secretion
- Slow gastric emptying
- Weight loss
- Side effects: nausea, vomiting, pancreatitis

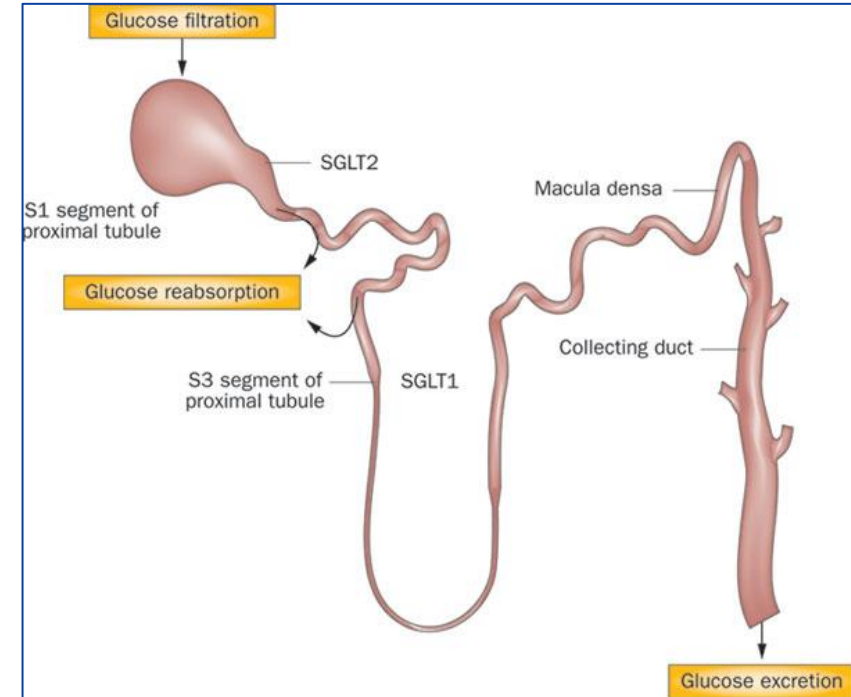
# Liraglutide in Children and Adolescents with Type 2 Diabetes

GLP-1 analog  
(Victoza, daily SC injection)



# SGLT-2 Inhibitors

- SGLT2: sodium-glucose transporter kidney
  - Glucose reabsorption
- Induce glycosuria





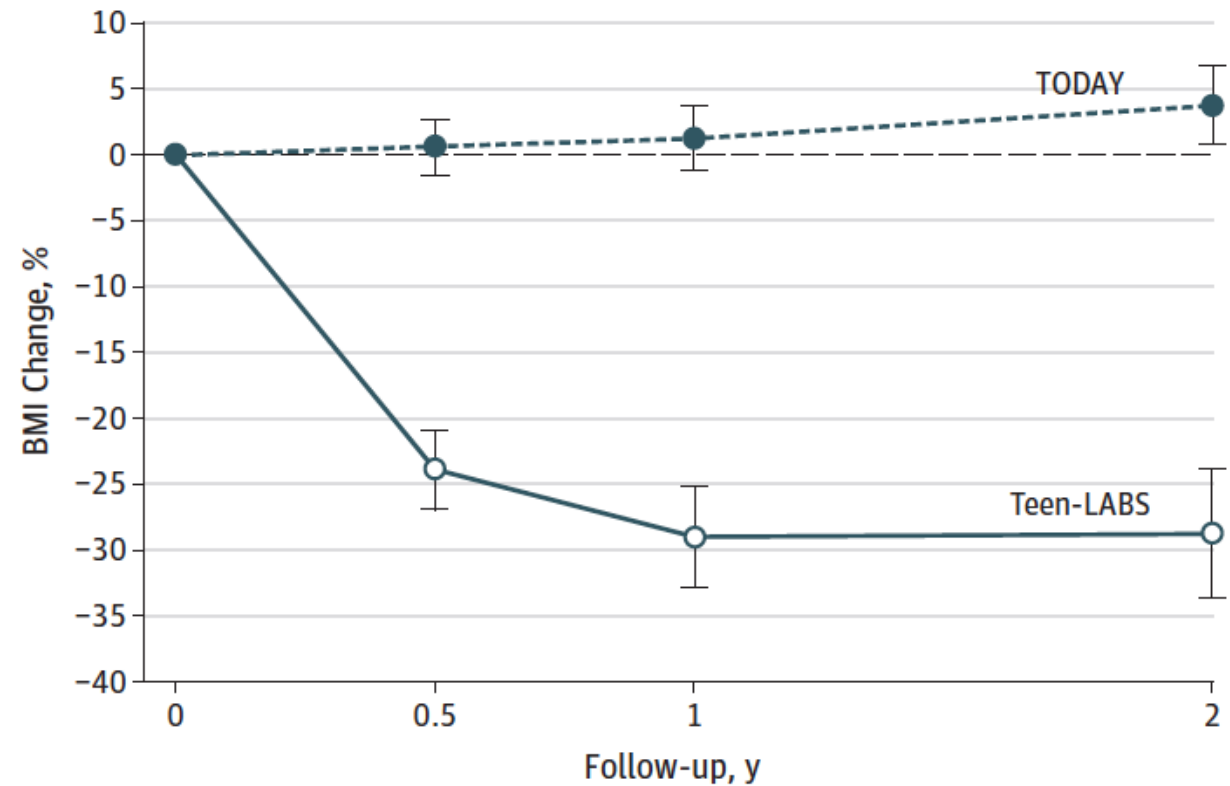
# Other Medications

- Sulfonylurea
- Dipeptidyl peptidase 4 (DPP-4) inhibitors
- Colesevelam (Welchol)
- Thiazolidinediones (TZDs)
- Alpha-glucosidase inhibitors

# Bariatric Surgery – Metabolic Surgery

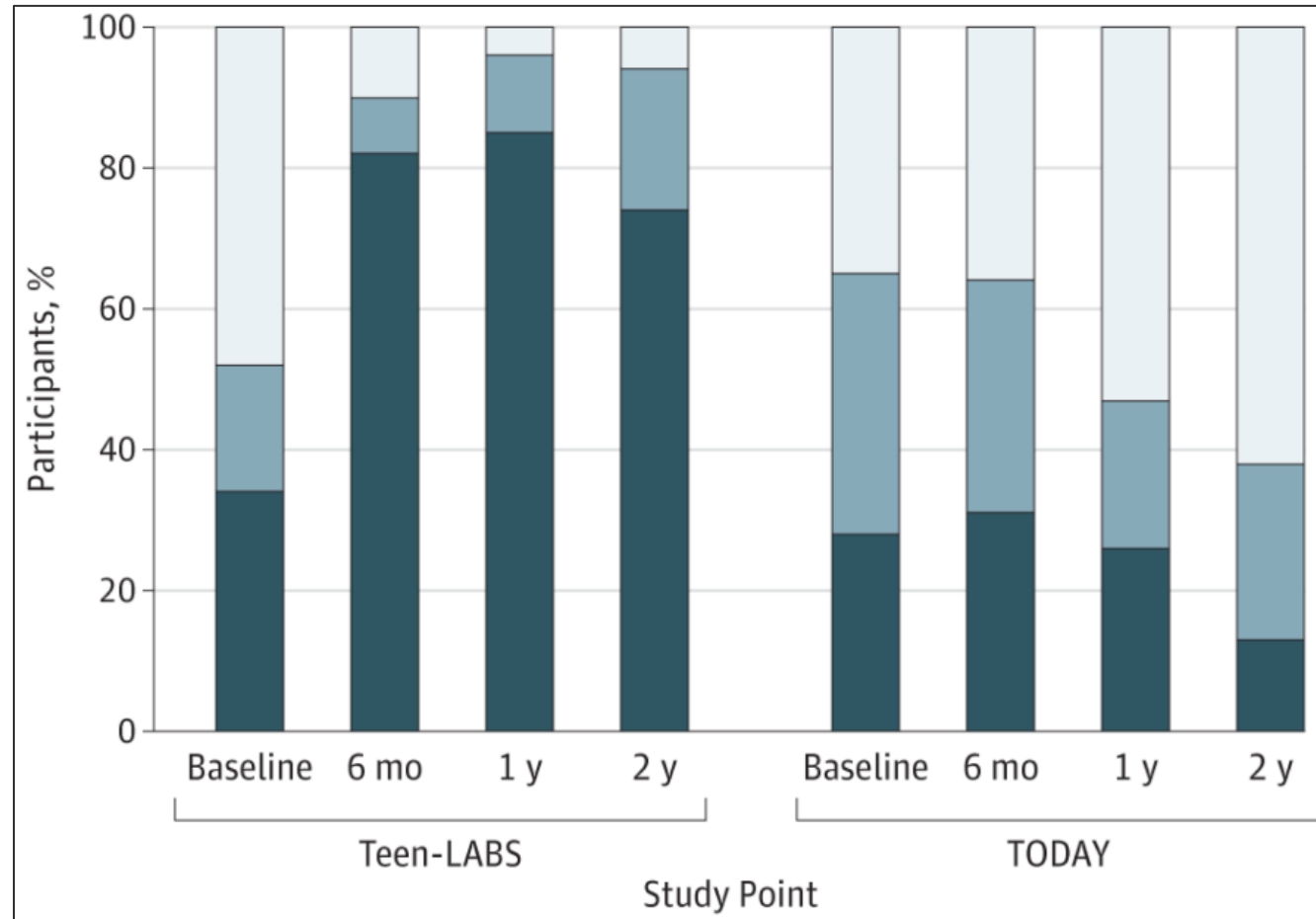
- TODAY:  
Lifestyle and oral medications
- Teen-LABS:  
Bariatric surgery

Figure 1. Mean Percent Change in Body Mass Index (BMI) Over Time



*JAMA Pediatr.* 2018;172(5):452

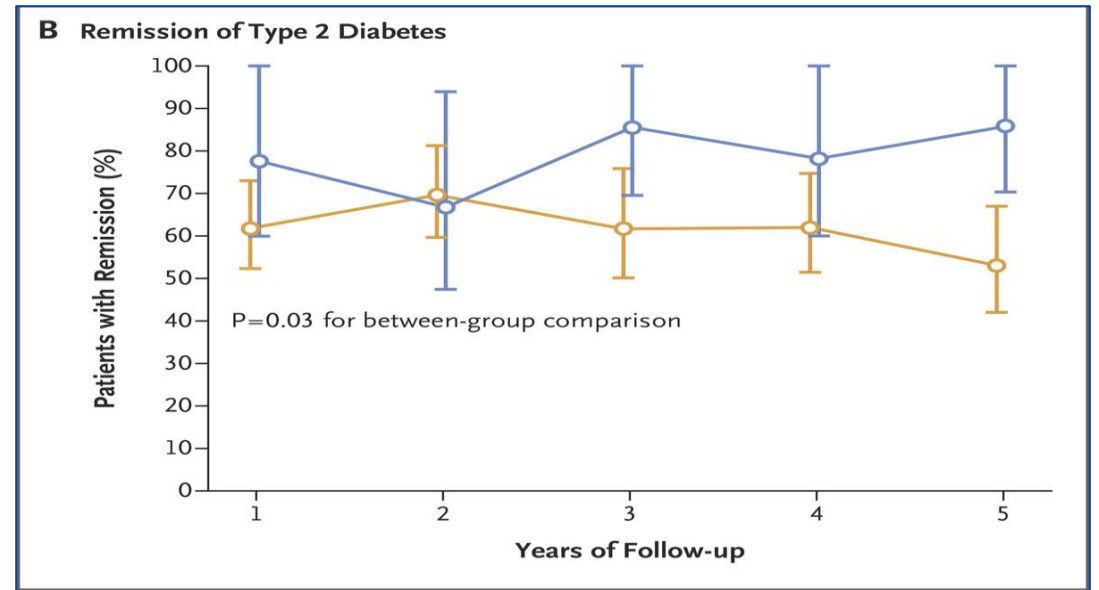
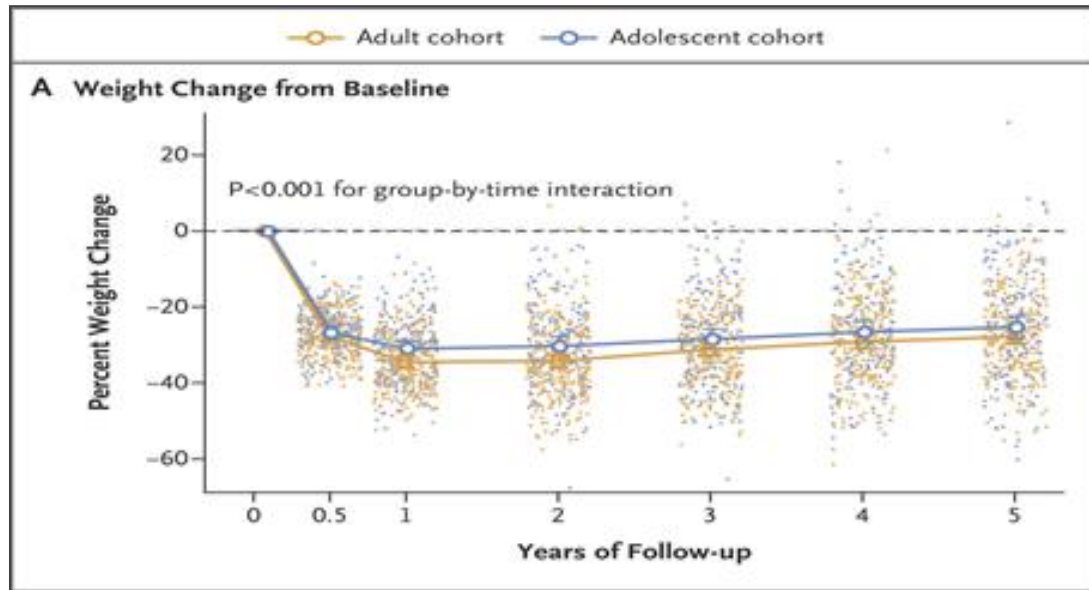
# Changes in HbA<sub>1c</sub>



*JAMA Pediatr.* 2018;172(5):452

# Weight Change and Remission of Diabetes and Hypertension

## Gastric Bypass Surgery - 5-Year Outcomes



*Inge et al. N Engl J Med 2019;380:2136-2145.*

# Prediabetes and Type 2 Diabetes Referrals

**These categories are for scheduling purposes only, not diagnostic criteria**

## HbA1c 5.7-6%

- Lifestyle intervention
- If the fasting glucose is >100 mg/dL or post-prandial >140 mg/dL → prediabetes clinic

## HbA1c 6%-7.0%

- Lifestyle intervention
- Refer to prediabetes clinic

## HbA1c > 7.0%

- Refer to type 2 diabetes clinic

## Significantly elevated blood glucose or HbA1c

- Urgent referral, on-call physician at 202-476-5000

# Conclusions

- Type 2 diabetes and prediabetes are increasing in children
  - Parallel to obesity
  - Non-Hispanic Blacks, Hispanics and Native Americans are most affected
- Risk-based screening indicated in overweight and obese youth
- Prediabetes increases risk for diabetes and CVD in adults
- Recommended treatment of prediabetes is lifestyle modification
- Rapid  $\beta$ -cells loss leads to high therapeutic failure in youth with type 2 diabetes
- Type 2 diabetes complications appear earlier than adults
- More research is needed to understand the role of bariatric surgery

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