

# Prevention, Assessment and Treatment of Childhood Obesity and Type 2 Diabetes: A Dietitian's Perspective

***Marina Chaparro, RD, CDE, LDN***

*Certified Diabetes Educator*

*Clinical Dietitian*

**“Kids don’t need kids’ food.** If adults are eating healthfully, kids should be eating the same foods that adults eat.”

“Families can all eat the same foods, and that should make life easier for all concerned.”

“If you don’t want your kids drinking sodas, don’t bring them home from the supermarket. Teach kids to eat real foods early on, and they will be great eaters throughout life”

– Marion Nestle 8/2012

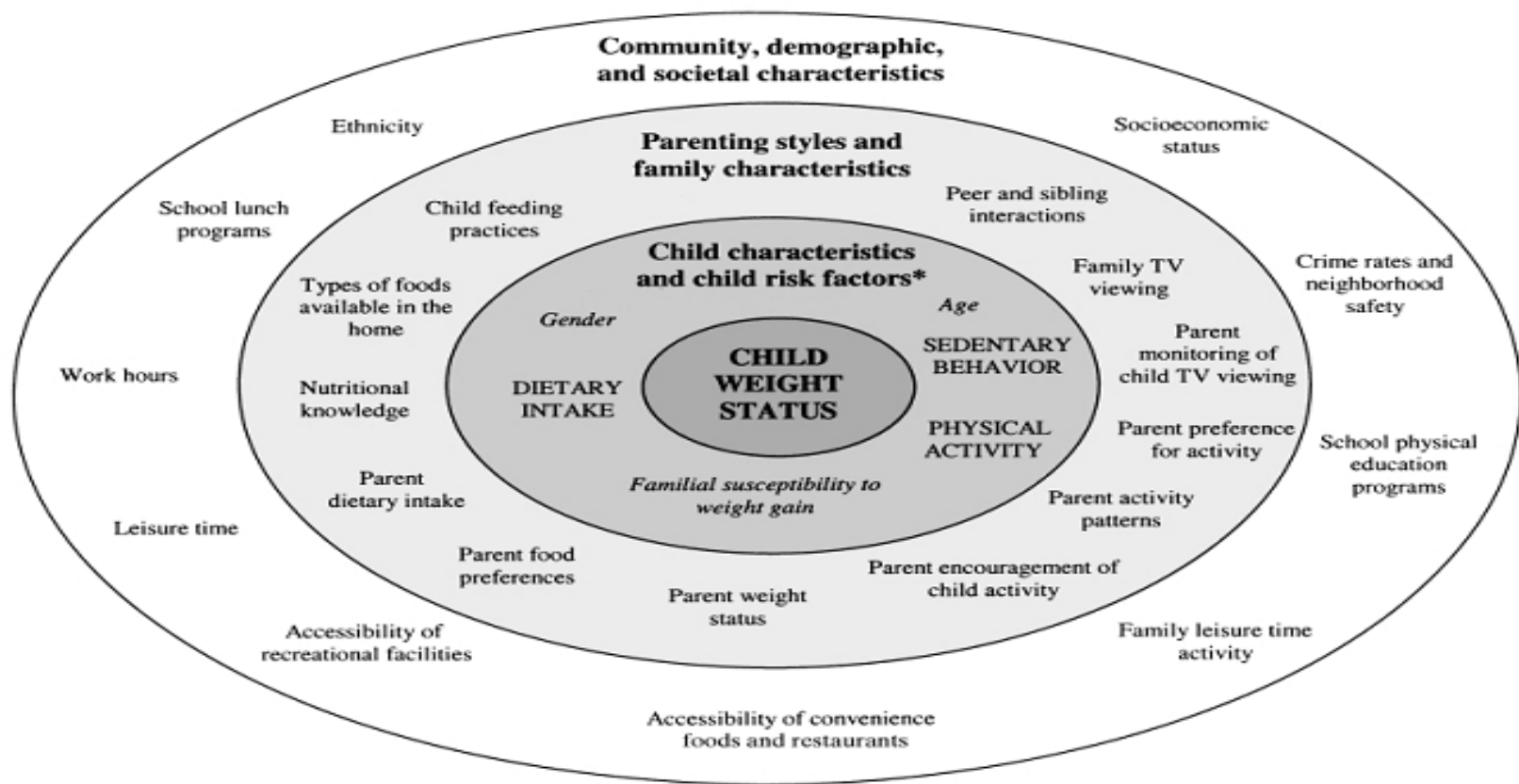
# Objectives:

- ▣ Understand the genetic, behavioral and environment determinants of childhood obesity
- ▣ Discuss evidence based approaches for addressing childhood obesity
- ▣ Review the pediatric weight management recommendations & American Academy of Pediatric practice guidelines for for the treatment of childhood obesity and type 2 diabetes
- ▣ Review a visit with the RD
- ▣ What is next?

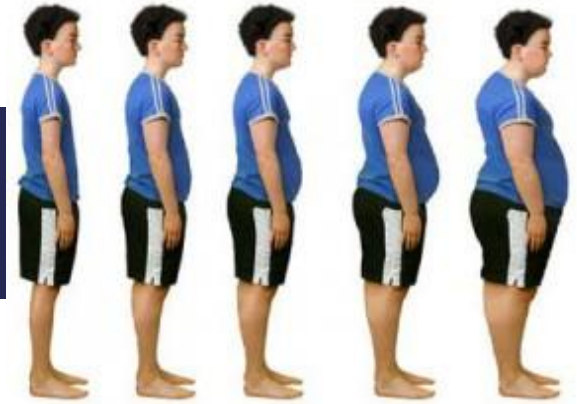
# Incidence & Prevalence

- Childhood obesity has doubled in children and tripled in adolescents in the last 30 years ~17% in the US
- Ethnic minorities are disproportionately affected
- Adolescents are particularly at risk: (12-19)
  - Results from the 2009–2010 NHANES
  - 28.9% Mexican-American boys were obese
  - 24.8% Non-Hispanic black girls were obese
- Children and adolescents who are overweight are more likely to be obese as adults

# Understanding DETERMINANTS



# Genetics



- Appetite regulating hormones and neurotransmitters
  - Leptin: suppresses food intake and increases metabolic rate
  - Gherlin: stimulates hunger and slows down metabolism
  - Obese individuals have gene abnormalities (surprising high concentration of leptin, *leptin resistant*)
  - Other hormones: cortisone, adenoponectin
- Intestinal micro flora and pre-disposition of obesity
  - Lower intestinal micro flora seen in obese individuals

# Environment

- ▣ Schools (unhealthy lunches, less physical activity)
- ▣ Media/TV ads
- ▣ Access to parks/ security
- ▣ Family environment and support



# Behavior

- ▣ Treat the parent then the child
- ▣ Parental obesity is a stronger predictor of obesity in adulthood than the child's weight status
- ▣ Maternal and Child feeding practices
  - ▣ Duration of breastfeeding
  - ▣ Introduction of solid foods
  - ▣ Cultural norms & perceptions



# Expert Committee Recommendations for the Prevention, Assessment & Treatment of Pediatric Overweight & Obesity (June 2007)

- Representatives from 15 national health care organizations
- CDC, American Medical Association, Nursing, Psychology, Nutrition, Epidemiology
- Provide practical guidelines to practitioners and provide evidence based recommendations in many areas of obesity care
- Published in Pediatrics 2007

# Expert Committee Recommendations for the Prevention, Assessment & Treatment of Pediatric Overweight & Obesity (June 2007)

- Universal assessment of obesity risk by **BMI**
- Obesity Prevention should start at Birth; BMI starting point for classification of health risks.
- BMI levels correlate with body fat and cardiovascular risks.

## CDC: BMI charts Girls 2-20yrs

## 2 to 20 years: Girls

### Body mass index-for-age percentiles

NAME

RECORD #

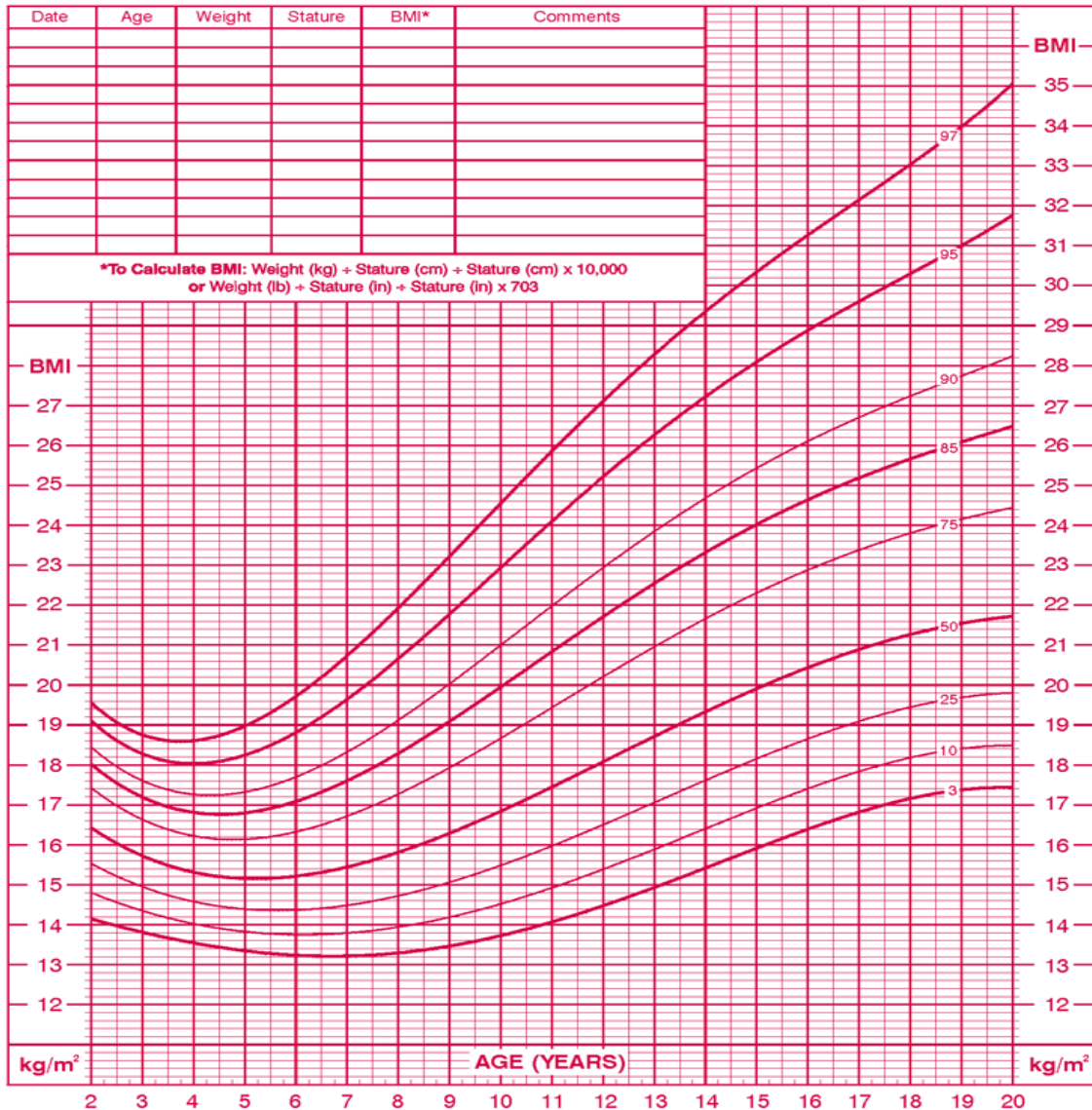
BMI >99%: Severe Obesity

- BMI 95-99%: Obesity

BMI 85-94%: Overweight

BMI 5-84%: Normal Weight

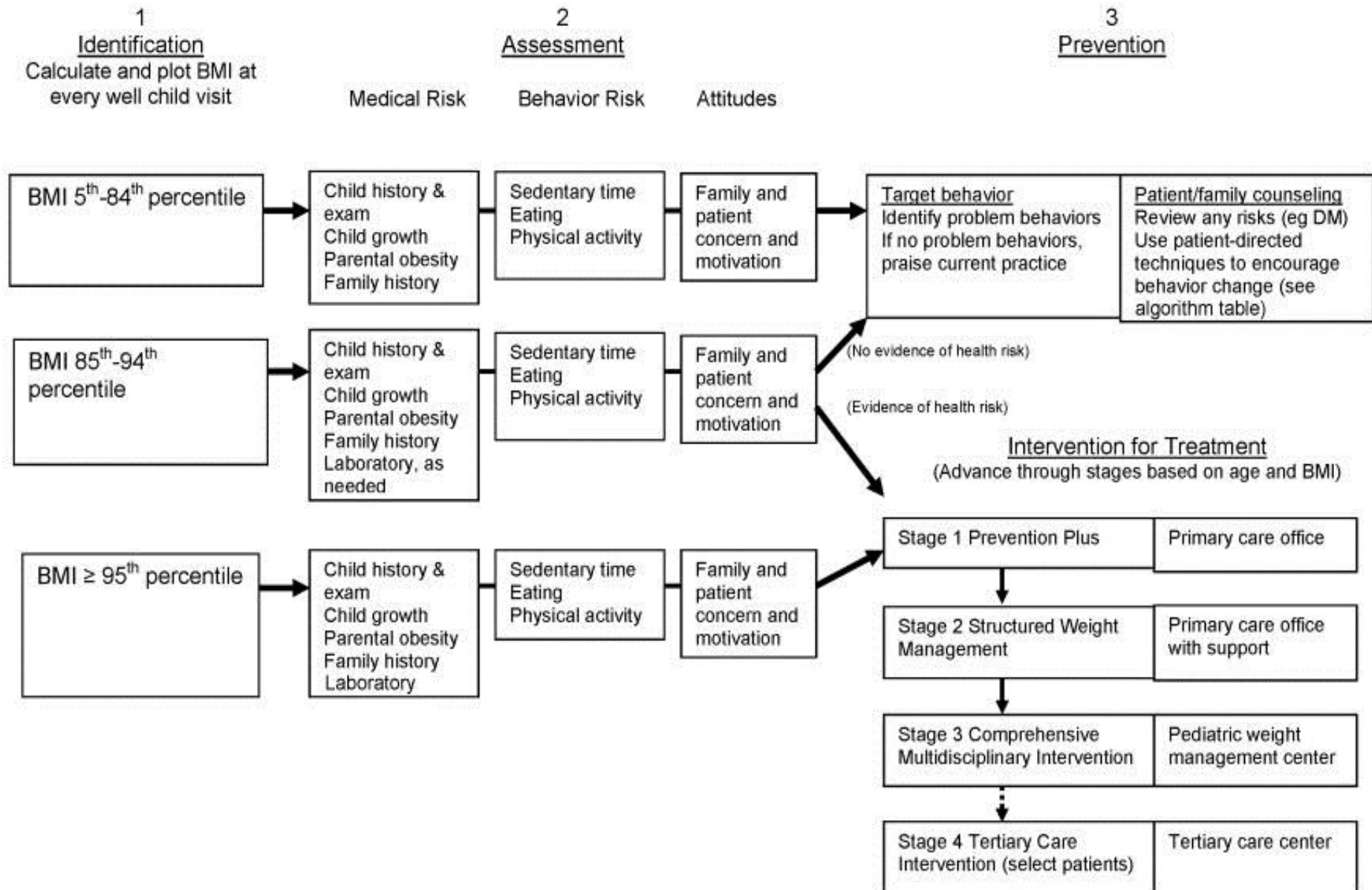
BMI  $\leq 3\%$ : Underweight



# Expert Committee Recommendations for the Prevention, Assessment & Treatment of Pediatric Overweight & Obesity (June 2007)

1. Identify, calculate BMI % and plot in graph annually in all children
2. Assess medical and behavioral risk behaviors regardless of healthy BMI
3. Prevent by either providing patient-centered counseling or discussing target behaviors (if BMI normal 5-84%)
4. If above 85-99%, advance to staged intervention treatment

# Universal assessment of obesity risk and steps to prevention and treatment.



# Expert Committee Recommendations

## Target Behaviors

- ▣ Limit consumption of sugar-sweetened beverages
- ▣ Encourage fruits/vegetables (5/day)
- ▣ Limit TV and screen time to 2hrs/day
- ▣ Daily breakfast consumption
- ▣ Limiting eating out
- ▣ Encourage family meals
- ▣ Limit portion sizes

# **(ADA) Academy of Nutrition and Dietetics Pediatric Weight Management Evidence-Based Nutrition Practice Guidelines**

1. Evidence-based recommendations for the pediatric weight management
2. Guidelines for the treatment of pediatric obesity in a multicomponent, multidisciplinary setting and include family interventions, nutrition therapy, physical activity interventions, behavioral and pharmacotherapy
2. Focuses on nutrition screening, nutrition assessment, nutrition intervention, monitoring and evaluation
3. Ages 6-18yrs
4. Recommendations grading criteria:
  1. Strong
  2. Fair
  3. Weak
  4. Consensus
  5. Insufficient Evidence

# (ADA) Pediatric Weight Management Evidence-Based Nutrition Practice Guidelines

## What does the Evidence say?

### ■ Foods/Nutrients

1. **Fruits & Vegetables**-Strong evidence to support a decreased in risk of overweight with increased fruit and vegetable intake
2. **Fruit juice**-Fair (Academy of Pediatrics recommends limiting juice to 4-6ozd/day)
3. **Sweetened beverages**-Strong evidence to support positive association between intake of calorie dense sweetened drinks and adiposity

# (ADA) Pediatric Weight Management Evidence-Based Nutrition Practice Guidelines

## What does the Evidence say?

### ■ Eating behaviors of Children

1. **Skipping breakfast**- (Fair Imperative)- Obese children more likely to skip breakfast compared to leaner children. Breakfast skipping may be a risk factor for obesity.
2. **Eating out** (Fair)- Consumption of fast food may be associated with adiposity especially among adolescents
3. **Portion sizes** (Fair)- Increased portion sizes may contribute to the prevalence of overweight. Most powerful determinant of amount of food consumed at meals was amount served-  
**poor regulation of energy intake**
4. **Snacks** (Limited): snaking frequency might NOT be associated with adiposity in children

# **(ADA) Pediatric Weight Management Evidence-Based Nutrition Practice Guidelines**

## **What does the Evidence say?**

### **▣ Family Interactions**

1. Family involvement integral component of pediatric weight management
2. Family training as part of multicomponent family-based group intervention for overweight school-age children.
3. Family meals associated with greater intake of fruits/veg
4. Parenting style- parental restriction linked to higher weight status among children

# (ADA) Pediatric Weight Management Evidence-Based Nutrition Practice Guidelines

## What does the Evidence say?

### ▣ Nutrition Interventions

1. Low carbohydrate and low glycemic index diets (Weak)-
  - Modest short term improvements (6-12yrs age)
  - Not recommended long term
  - Lack of evidence
2. Energy Restriction (strong):
  - 6-12yrs: balance macronutrient 900-1200 associated with short and longer-term changes
  - 13-18yrs: balanced micronutrient no fewer than 1200kcal.

# (ADA) Pediatric Weight Management Evidence-Based Nutrition Practice Guidelines

## What does the Evidence say?

### ▣ Nutrition Interventions

3. Very low fat diets-(insufficient evidence)
  - Less than 20% of total energy intake
  - Not recommended for use in pediatric weight management, not studied
4. Protein sparing modified fast diets-(weak)-
  - Short term improvements in weight status
  - Beneficial in children/adolescents >120% IBW
  - Have serious complications
  - Usually done (10weeks) under supervision of multidisciplinary team



Overweight and obesity is the most important risk factor for the development of T2DM in youth

# Type 2 DM in youth

- 1 in 3 new cases of DM in youth younger than 18yrs is type 2 DM
- The earlier the onset of T2DM, the earlier the onset of complications
- The increase rate of childhood obesity parallels the rise in number of cases of T2DM
- Quicker progression of complications!

# Pediatric Recommendations for screening of type 2 DM

- Overweight (BMI >85<sup>th</sup> %tile or weight for height >85%tile)
- Weight >120% of IBW/height
- Starting at age 10 years or at onset of puberty if puberty occurs at a younger age
- **Plus Have two of the following risk factors:**
  - ① Family history of type 2 diabetes in a first or second degree relative
  - ② Race/ethnicity (American Indian, African-American, Hispanic, Asian/Pacific Islander)
  - ③ Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, PCOS)
- Screen every 2 years
- Fasting plasma glucose and 2-h PPG are suitable, but fasting plasma glucose is preferred

# Treatment of type 2 DM in children

## ■ Challenges

- Most educational materials geared for type 1
- Most medication tested for adults >18
- Limited evidence for kids
- Limited pediatric endocrinologist
- Children not small adults!! (hormonal changes, difference in physiology can affect medication dose, toxicity and response)
- Ideal to be treated in team approach (Endo, nurse, diabetes educator, nutritionist, behavioral specialist)

■ reality is not that in US!

# Evidence based guidelines for management of T2DM in children

- AAP published guidelines based on evidence based recommendations for the treatment of t2DM. Written along with ADA, Pediatric endocrine society, Academy of Family physicians and Academy of Nutrition and Dietetics.
- Committee experts in pediatrics, epidemiology, nutrition, medical informatics.
- Ages 10-18 years
- Intended for children with DM not with the impaired fasting BG or pre-DM

# Definition of type 2 DM

- Childhood T2DM disease in the child who typically
  - Is overweight or obese (BMI  $\geq 85$ -94<sup>th</sup> and  $>95$ <sup>th</sup> % age/gender)
  - Strong family history of T2DM
  - Substantial residual insulin secretory capacity at diagnosis (normal or elevated insulin and C-peptide concentrations)
  - Demonstrates insulin resistance (evidence of PCOS or acanthosis nigricans)
  - Lacks evidence for diabetic autoimmunity (neg. antibodies for type 1 DM)

# American Diabetes Association Diagnosis Criteria for Diabetes

	DM	Pre-DM	Normal
Fasting Plasma Glucose	<b>≥ 126mg/dL</b>	<100- 125mg/dL	< 100mg/dL
Random BG	<b>≥200mg/dL</b>	----	---
2hr glucose (75g oral glucose tolerance test)	<b>≥200mg/dl</b>	140-199mg/dL	<140mg/dL
A1C	<b>≥6.5%</b>	5.7-6.4%	<5.7%

# Key Action Statement 2

- **In all other instances, clinicians should initiate a lifestyle modification program, including nutrition and physical activity and start metformin as first-line therapy for children and adolescents at the time of diagnosis of T2DM. (Strong recommendation)**

# Key Action Statement 2

- ▣ Lifestyle modifications:
  - ▣ Low success rate with diet and exercise alone
  - ▣ Very few RCT to show results
  - ▣ Lifestyle changes are HARD to do!
    - ▣ Fewer than 10% of pediatric T2DM patient attain BG goals through lifestyle interventions alone
    - ▣ Patients perception that intervention not as important
- ▣ Metformin or insulin (RCT: TODAY)
  - ▣ Start 500mg day, max of 2000mg daily in divided doses.
  - ▣ Limited therapeutic options for children

# Key Action Statement 3

- **The committee suggest that clinicians monitor HbA1c concentrations every 3months and intensify treatment if treatment goals for BG and HbA1c concentrations are not being met.** (expert opinion and studies in children)

# HgA1c in children

- HgA1c for children with T1DM are higher and vary by age.
- **HgA1c ideal <7% for T2DM for children and adolescents.**
- But must be individualized
- In absence of hypoglycemia, even lower HgA1c can be considered

# Key Action Statement 5

- The committee suggests that clinicians incorporate the **Academy of Nutrition and Dietetics Pediatric Weight Management Evidence-Based Nutrition Practice Guidelines** in the nutrition counseling of patients with T2DM both at the time of diagnosis and as part of ongoing management. (evidence quality, expert opinion)

# Key Action 6

- **The committee suggest clinicians encourage children and adolescents with T2DM to engage in moderate-to-vigorous exercise for at least 60min daily and to limit nonacademic “screen time to less than 2hrs day** (expert opinion and evidence form studies of metabolic syndrome and obesity)



Visit with the RD: Nutrition  
Assessment and Treatment of kids  
with obesity and/or T2DM

# Visit with the RD/CDE

1. Why are you here?
2. What are your goals & expectations?
3. How can I help you?

# Physical Assessment

- ▣ Weight/Height
- ▣ Weight for age%/ height for age%
- ▣ BMI
- ▣ Tanner stage
- ▣ Acanthosis nigricans/ metabolic syndrome
- ▣ Plot...

## CDC: BMI charts Girls 2-20yrs

### 2 to 20 years: Girls

#### Body mass index-for-age percentiles

NAME \_\_\_\_\_

RECORD # \_\_\_\_\_

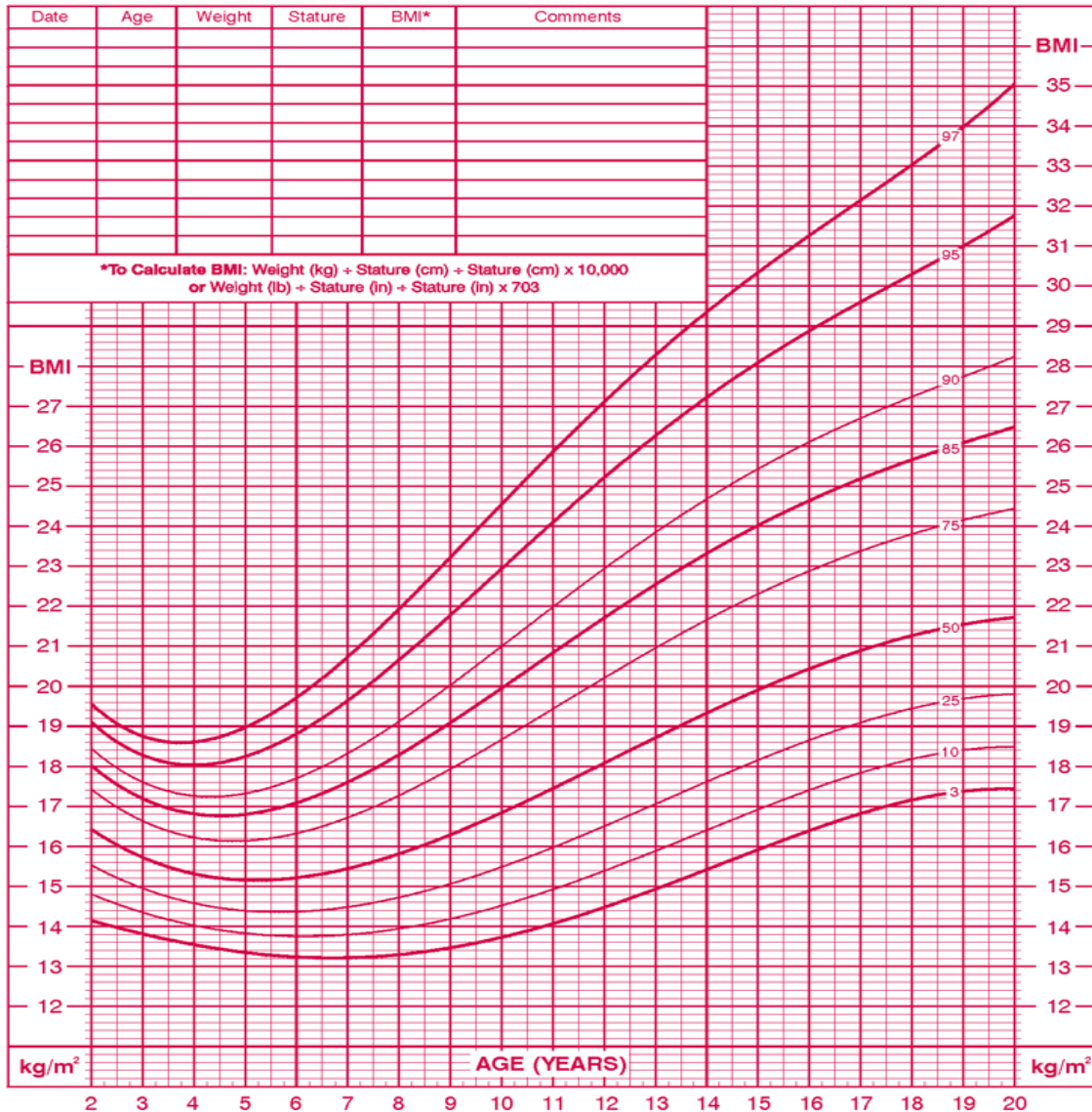
BMI >99%: Severe Obesity

- BMI 95-99%: Obesity

BMI 85-94%: Overweight

BMI 5-84%: Normal Weight

- BMI  $\leq 3\%$ : Underweight





# Weight Management Goals Children 2-5 years

BMI Percentile	Weight Management Goal
85 <sup>th</sup> -94 <sup>th</sup> %	<ul style="list-style-type: none"><li>• Weight maintenance until BMI &lt;85% or slow weight gain</li></ul>
>95%	<ul style="list-style-type: none"><li>• Weight maintenance until BMI &lt;85%</li><li>• Weight loss should not exceed 1lb/month</li></ul>

# Weight Management Goals Children 6-11 years

BMI Percentile	Weight Management Goal
85 <sup>th</sup> -94 <sup>th</sup> %	<ul style="list-style-type: none"><li>• Weight maintenance until BMI &lt;85% or slow weight gain</li></ul>
95%-98%	<ul style="list-style-type: none"><li>• Weight maintenance until BMI &lt;85%</li><li>• Loose weight( ~1lb/month)</li></ul>
≥99 <sup>th</sup> %	<ul style="list-style-type: none"><li>• Weight loss, not to exceed 2lbs/week)</li></ul>

# Weight Management Goals Children 12-18yrs

BMI Percentile	Weight Management Goal
85 <sup>th</sup> -94 <sup>th</sup> %	<ul style="list-style-type: none"><li>• Weight maintenance until BMI &lt;85% or slow weight gain</li></ul>
95%-98%	<ul style="list-style-type: none"><li>• Weight loss (<math>\leq</math> 2lbs/week) until &lt;85%</li></ul>
$\geq$ 99 <sup>th</sup> %	<ul style="list-style-type: none"><li>• Weight loss (<math>\leq</math> 2lbs/week)</li></ul>

# Laboratory Assessment

- ▣ HgA1c, Glucose, Insulin, OGTT
- ▣ Lipid panel (LDL, HDL, Total Cholesterol, TG)
- ▣ Blood glucose meter report
- ▣ Thyroid function test
- ▣ Free testosterone (PCOS)

# Medications

- ▣ PMH: other existing co-morbidities
- ▣ Metformin/insulin
- ▣ If on antipsychotics, possible weight gain, cortisone, higher BG
- ▣ BG testing, log, patterns

# Nutrition Assessment

- ▣ 24hr food recall/ 3 day food recall
- ▣ Meal time schedules, location of meals, snacks
- ▣ Eat out
- ▣ Food availability
- ▣ Family meals/schedules
- ▣ Who prepares meals/child care/grandmother
- ▣ School lunch

# Psychosocial Assessment

- ▣ Cultural beliefs (view on obesity, diabetes)
- ▣ Readiness to change
- ▣ Denial of problem
- ▣ Family support
- ▣ **Expectations**
- ▣ Family relation with food, constant dieters
- ▣ Body image/self esteem
- ▣ Depression
- ▣ Eating disorders

# Physical Activity Assessment

- Physical activity
  - (goal: 60min/day)
  - Opportunities for structured and unstructured activity
  - Structured:
  - Unstructured:
- Screen time
  - Goal (less than 2hrs TV/Computers/day)

# Nutrition Prescription and Intervention

- ▣ Match readiness to change to intervention
- ▣ Age-appropriate
- ▣ Integrate culture to intervention
- ▣ Individualize!

# Dietetics Pediatric Weight Management Evidence-Based Nutrition Practice Guidelines

## ▣ **Nutritional Interventions**

- ▣ Low carbohydrate and low glycemic index diets
- ▣ Low fat diets
- ▣ Protein sparing modified fast diets
- ▣ Other diets: Traffic Light and Food Guide Pyramid

# Energy Needs/Recommendations

- Institute of Medicine: Total Energy Expenditures for Overweight and Obesity in youth
  - $TEE = 389 - 41.2 * \text{Age}(y) + PA * (15 \times \text{weight}(\text{kg}) + 701.6 \times \text{Height}(\text{m}))$
- Resting Energy Needs
- WHO equations
- Schofield equations

# Estimated Kcal Requirements based on activity level

Gender	Age(yrs.)	Sedentary	Mod Active	Active
Child	2-3	1000-1200	1000-1400	1000-14000
Female	4-8	1200-1400	1400-1600	1400-1800
	9-13	1400-1600	1600-2000	1800-2200
	14-18	1800	2000	2400
Male	4-8	1200-1400	1400-1600	1600-2000
	9-13	1600-2000	1800-2000	2000-2600
	14-18	2000-2400	2400-2800	2800-3200

Source: 2010 US Dietary Guidelines

# Stage 1: Prevention Plus

## ▣ Address basic lifestyle and activity habits

- ▣ Increase fruits/vegetables- 5 servings of F/V day
- ▣ Eliminate sugar-sweetened beverages
- ▣ Eat breakfast every day
- ▣ Increase PAL 1hr or more/day
- ▣ Decrease TV viewing and screen time <2hrs
- ▣ Prepare more foods at home, decrease eating out
- ▣ Aim to eat as a family 5x week
- ▣ Allow child to self regulate meals and avoid being overly restrictive

Follow up monthly

## Stage 2: Structured Weight Management

- ▣ **Includes stage 1 + ore support and structure to achieve specific behaviors/goals**
  - ▣ Planned eating plan
  - ▣ Structured meals and snacks
  - ▣ Specific activity goals, limit TV/screen to 1hr or less
  - ▣ Self-monitoring and reinforcement
  - ▣ Referral to counselor or exercise therapist as needed.
  - ▣ Increase monitoring of behaviors.

Follow up monthly, if no improvement in BMI/weight after 3 months, advance to stage 3

## Stage 3: Comprehensive Multidisciplinary Intervention

- ▣ **Multidisciplinary team, increases intensity of behavior changes and frequency of visits**
  - ▣ Same eating and activity goals as Stage 2
  - ▣ More structured behavior modification program to include, food and activity monitoring, short-term diet and activity goals.
  - ▣ Negative energy balance resulting from diet and PA
  - ▣ Parent participation and training (child<12yrs)
  - ▣ Systematic evaluation of anthropometrics, diet, PA.

Follow up weekly fro 8-12 weeks

# Stage 4: Tertiary Care Intervention

- ▣ **Very intense intervention usually for severely obese youth**
  - ▣ Requires referral to specialized weight management center with comprehensive services
  - ▣ Careful evaluation from a team that specialize in pediatric obesity.
  - ▣ Interventions may include:
    - ▣ Medications
    - ▣ Very low calorie diets
    - ▣ Weight loss surgery

Follow up weekly from 8-12 weeks

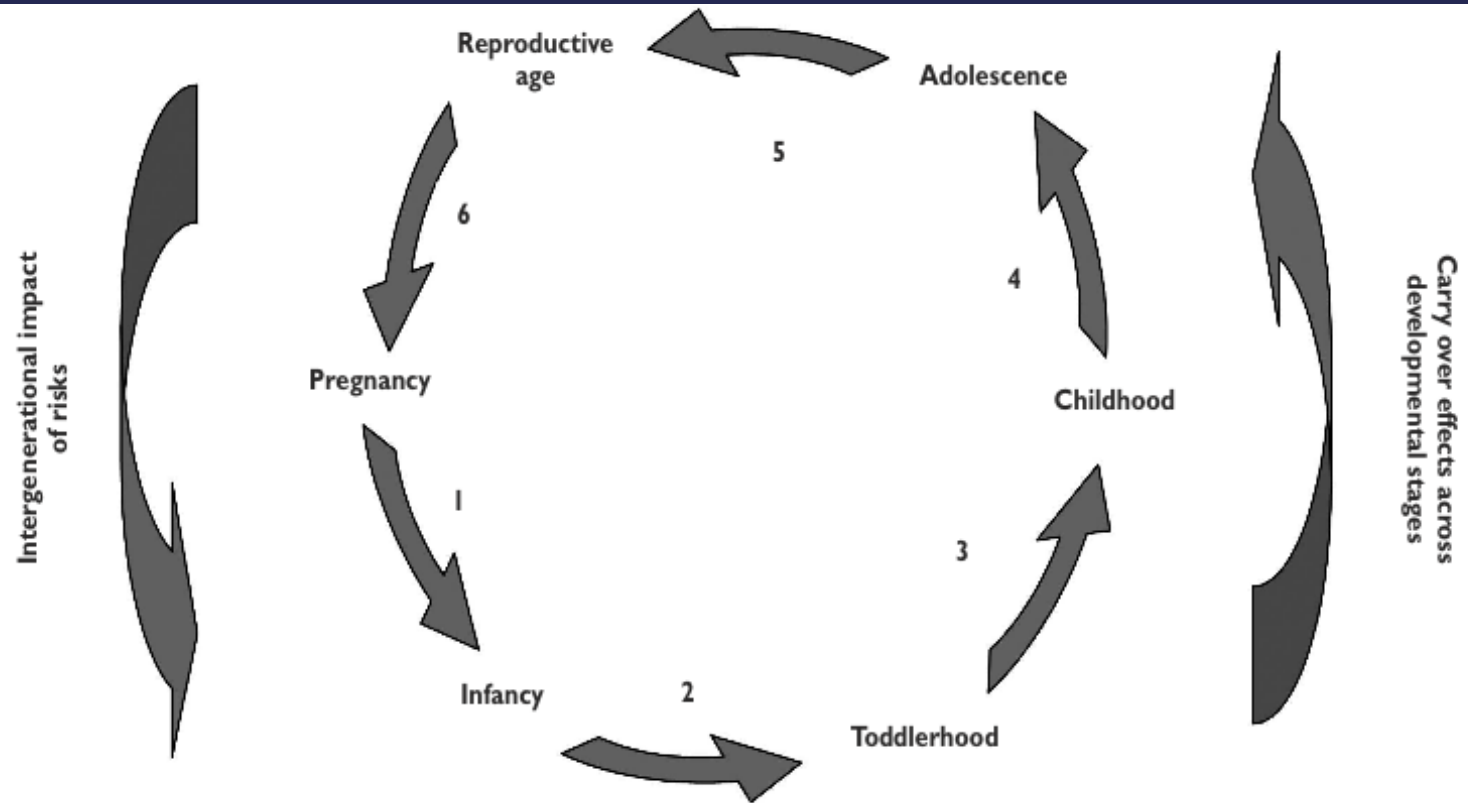
# Goal/Monitoring

- ▣ Weight
- ▣ Food intake
- ▣ Physical activity
- ▣ Family support
- ▣ Laboratory values (BG, HgA1C)
- ▣ Readiness to change
- ▣ Adherence to recommendations

# Future

- Early life systems
  - Pregnancy
  - During infancy and through preschool
- *“We need to prevent diabetes, before that, we need to prevent childhood obesity. Before that, we need to prevent pregnancies complicated by obesity and diabetes.”* Phil Zeitler, MD, PhD, Professor of Pediatrics at the University of Colorado and TODAY Study Chair.

# Future



**Figure 1. Developmental and intergenerational effects of obesity.** Significant interstage events include: 1, Intrauterine programming; 2, breastfeeding, early food exposure, attachment stage; 3, early childhood growth, child care, habit formation; 4, brain maturation, self-management, puberty, health behavior change, increased salience of peer effects and school effects; 5, independence, increasing life stress; 6, preconceptional health, parental health status, prenatal care.

# Future

- ▣ Focus on genetics
- ▣ Multicomponent approach:
  - ▣ Address multiple sectors and societal levels
  - ▣ Policy
  - ▣ Environment (schools, community)
  - ▣ Parental practices

# Thank you!!

Contact: [marina@nutrichicos.com](mailto:marina@nutrichicos.com)

Blog: [www.nutrichicos.com](http://www.nutrichicos.com)

# References

1. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *Journal of the American Medical Association* 2012;307(5):483-490.
2. Fryar, CD, Carroll, MD, Ogden, CL. (2012). Prevalence of Obesity Among Children and Adolescents: United States, Trends 1963-1965 Through 2009-2010. CDC/NCHS. National Centers of Health Statistics Health E stats.
3. Davison, KK, Birch, LL (2001). Childhood overweight: a contextual model and recommendations for future research. *Obesity Reviews* 2(3): 159-171.
4. Klok, MD., Jakobsdottir, S., Drent, ML.,(2007) The role of leptin and gherlin in the regulation of food intake and body weight in humans: a review. *Obesity Reviews*, 8 (1): 21-34.
5. Whitaker, RC, Wright JA, Pepe, MS, Seider, KD, Dietz, WH (1997). Predicting Obesity in Young Adulthood from Childhood and Parental Obesity. *New England Journal of Medicine*, 337:869-873
6. Barlow, SE. Expert Committee Recommendations Regarding the Prevention, Assessment and Treatment of Child and Adolescent Overweight and Obesity: Summary Report. (2007). *Pediatrics*, 120; S164-S192
7. Barlow, S. (2007). Expert committee recommendations regarding the prevention, assessment and treatment of child and adolescent overweight and obesity: Summary report. *Pediatrics*, 120(S), S164-192.
8. American Dietetic Association Evidence Analysis Library. Available at <http://www.adaevidencelibrary.org>
9. Davis, MM, Gance-Cleveland, B, Hassink, S, Johnson, R, Paradis, G, Resnicow, G. (2007). Recommendation for prevention of childhood obesity. *Pediatric*, 120: (suppl 4): 228-252
10. Committee on Nutrition (2003). Prevention of Pediatric Overweight and Obesity. *Pediatrics*, 113; 424-430.
11. Consensus Statement of The American Diabetes Association. (2000). Type 2 diabetes in children and adolescents. *Diabetes Care*, 23(3), 381-389
12. Kaufman, FR. (2002). Type 2 Diabetes mellitus in children and youth: a new epidemic. *Pediatric Endocrinology and Metabolism* 15 (supplement 2): 737-744
13. ADA Clinical Practice Guidelines, Diabetes Care, Vol 35, Suppl 1, 2012
14. Nader, PR.,Huang, TTK.,Gahagan, S.,Kumanyika, S.,Hammond,RA.,Christoffel,KK.,(2012) Next Steps in Obesity Prevention: Altering Early Life Systems to Support Healthy Parents, Infants and Toddlers. *Childhood Obesity Review*, 8 (3):195-204