Feeding Disorders: Behavioral and Nutritional Assessment, Treatment, and Research

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MEDICINE *of* THE HIGHEST ORDER

*House Keeping

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- Due to the size of our group, we will not be answering questions during the webinar. Instead, **please type in your questions** into the 'chat' box on your screen. We will review/answer all questions at the end.
- If you experience any technical problems at any point during the webinar, the problem is likely to be on your end, so you will need to follow-up with your technology support person.
- The Webinar will end promptly at 5:00. If you would like to speak with us after the webinar, please e-mail the rrcasd@urmc.rochetser.edu to set up a time to speak by phone.

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Learning Objectives - Nutrition

- Discuss the nutritional needs of children and adolescents with autism spectrum disorder (ASD)
- Outline the nutrients of concern in the diets of children and adolescents
- Discuss recommendations for improving nutritional status
- Review common dietary supplements and concerns with the use of supplements

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Learning Objectives – Feeding & Behavior

- Understand common feeding problems in children with Autism Spectrum Disorder (ASD)
- Distinguish between picky eaters and children with feeding disorders
- Learn about behavioral strategies frequently used to treat feeding problems
- How to obtain a feeding evaluation

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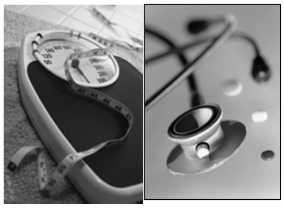
Nutrition Related Health Concerns

- Concern with Dietary Intake – Deficiencies and Excesses
  - Limited or Special Diets (celiac, allergies, cultural, etc.)
  - Supplementation (concern with safety and/or interactions)
  - Socioeconomic (access to healthy foods)
- Weight Management
  - Decreased weight/appetite
    - limited diet
    - side effect of medications (ie. stimulants)
    - other (ie. malabsorption)
  - Increased weight/appetite
    - limited (energy dense) diet
    - medications
    - lack of physical activity
    - other (ie. Prader-Willi)



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Nutrition Related Health Concerns

- Abnormal Lab Values (vitamin D, iron, lipids, etc.)
  - Limited/Selective diet
  - Decreased absorption
  - Medications
- Gastrointestinal Issues (constipation, diarrhea, delayed emptying, abdominal pain)
  - Low fiber intake
  - Low fluid intake
  - Medications
  - Supplementation
  - Withholding
- Enteral Feeding (Feeding Tube)
  - Initiation and management
  - Adjustment when working to increase oral intake

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Nutrition Vocabulary and Definitions:

Term	Definition	Use
Dietary Reference Intake (DRI)	Set of recommended nutrient reference standards; includes EAR, RDA, AI, UL, EER, AMDR	Diet planning and assessment for healthy individuals/groups, applies to all nutrient sources
Estimated Average Requirement (EAR)	Nutrient intake estimated to meet the needs of 50% of individuals in a particular group	Assess prevalence of nutrient inadequacy in groups
Recommended Dietary Allowance (RDA)	Average daily nutrient intake that meets needs of 98% of individuals	Goal for intake by individuals
Adequate Intake (AI)	Recommended average daily nutrient intake when no RDA can be established	Used to plan and evaluate diets of individuals or groups
Upper Limit (UL)	Highest nutrient intake likely to pose no risk	Used to assess excess nutrient intake
Daily Value (DV)	Food label guide to amount of nutrients in one serving based on highest DRI	Useful for comparing nutrient content of foods/beverages

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Nutrition Vocabulary and Definitions:

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Dietary Reference Intake (DRI)	Set of recommended nutrient reference standards; includes EAR, RDA, AI, UL, EER, AMDR	Diet planning and assessment for healthy individuals/groups, applies to all nutrient sources
Estimated Average Requirement (EAR)	**Use to assess nutrient adequacy of a given group**	
Recommended Dietary Allowance (RDA)	**Goal for intake by individuals**	
Adequate Intake (AI)	**Goal for intake by individuals and used to assess dietary adequacy**	
Upper Limit (UL)	**Red flag – does this pose a risk?**	
Daily Value (DV)	**How does this contribute to goals for the entire day's intake?**	

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Sample label for Macaroni & Cheese

Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving

Calories 250 Calories from Fat 110

	% Daily Value*
Total Fat 12g	18%
Saturated Fat 3g	15%
Trans Fat 3g	
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

1 Start Here

2 Check Calories

3 Limit these Nutrients

4 Get Enough of these Nutrients

5 Footnote

6 Quick Guide to % DV

- 5% or less is Low
- 20% or more is High

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Nutrition Facts

Serving Size ¾ cup (28g)
Servings Per Container about 17

Amount Per Serving	Honey Nut Cheerios	with ½ cup skim milk
Calories	110	150
Calories from Fat	15	15
	% Daily Value**	
Total Fat 1.5g*	2%	2%
Saturated Fat 0g	0%	0%
Trans Fat 0g		
Polyunsaturated Fat 0.5g		
Monounsaturated Fat 0.5g		
Cholesterol 0mg	0%	1%
Sodium 160mg	7%	9%
Potassium 115mg	3%	9%
Total Carbohydrate 22g	7%	9%
Dietary Fiber 2g	8%	8%
Soluble Fiber less than 1g		
Sugars 9g		
Other Carbohydrate 11g		
Protein 2g		
Vitamin A	10%	15%
Vitamin C	10%	10%
Calcium	10%	25%
Iron	25%	25%
Vitamin D	10%	25%
Thiamin	25%	30%
Riboflavin	25%	35%
Niacin	25%	25%
Vitamin B_6	25%	25%
Folic Acid	50%	50%
Vitamin B_{12}	25%	35%
Phosphorus	8%	20%
Magnesium	6%	10%
Zinc	25%	30%

* Amount in cereal. A serving of cereal plus skim milk provides 1.5g total fat, less than 5mg cholesterol, 220mg sodium, 320mg potassium, 28g total carbohydrate (15g sugars, 12g other carbohydrate), and 7g protein.

** Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Potassium		3,500mg	3,500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Daily Value vs. Daily Recommended Intake

One Serving (3/4 cup) =
Iron – 4.5mg
Vitamin D – 40 IU

Nutrient	100% Daily Value	RDA 2-3 yr old	RDA 4-8 yr old	RDA 9-13 yr old M/F
Iron (mg)	18	7	10	8
Calcium (mg)	1000	500	800	1300
Vitamin A (IU)	5000	1000	1333	600
Vitamin C (mg)	60	15	25	45
Fiber (g)	23	14-19	19-23	31/26
Vitamin D (IU)	400	600	600	600

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Dietary Recommendations for Children

Years	1	2 - 3	4 – 8 Female Male	9 -13 Female Male	14 -18 Female Male
Calories (kcal/d)	900	1000	1200 1400	1600 1800	1800 2200
Protein (gm/kg/d)	1.1	1.1	.95	.95	.80
Fat (% kcal)	30 - 40	30 - 40	25 – 35	25 - 35	25 – 35
CHO (% kcal)	45 - 65	45 - 65	45 - 65	45 - 65	45 -65
Sodium (mg/d)	1000	1000	1200	1500	1500
Fiber (gm/d)	19	19	25	26 31	26 38

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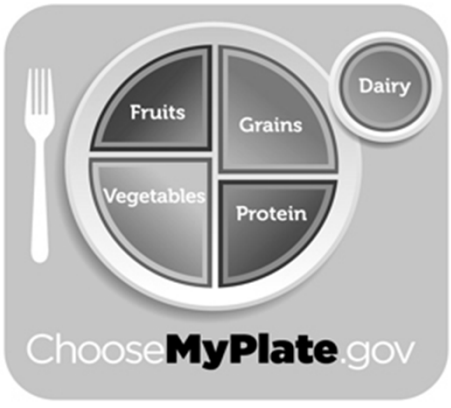
Choose MyPlate

- Make half your plate fruits and vegetables
- Make at least half your grains, whole grains
- Switch to fat-free or low fat (1%) milk
- Keep your protein choices lean and about the size of a deck of cards



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Recommended Servings by Age

Age (yr)	1	2 - 3	4 - 8 F/M	9 -13 F/M	14 -18 F/M
Milk/Dairy (cups)	2	2	2.5	3	3
Meats/Bean (oz)	1.5	2	3 4	5	5 6
Fruits (cups)	1	1	1.5	1.5	1.5 2
Veggies (cups)	¾	1	1 1.5	2 2.5	2.5 3
Grains (oz)	2	3	4 5	5 6	6 7

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Top Sources of Calories
Among Americans 2 Years and Older

- 1. Grain-based desserts (139 calories)
  - Cake, cookies, pie, cobbler, sweet rolls, pastries, and donuts
- 2. Yeast breads (121)
  - White bread and rolls, mixed-grain bread, flavored bread, whole-wheat bread, and bagels
- 3. Chicken and chicken mixed dishes (121)
  - Fried and baked chicken parts, chicken strips/patties, stir-fries, casseroles, sandwiches, salads, and other chicken mixed dishes
- 4. Soda/energy/sports drinks (114)
  - Sodas, energy drinks, sports drinks, and sweetened bottled water including vitamin water
- 5. Pizza (98)

Source: NHANES 2005-2006, Available at http://riskfactor.cancer.gov/diet/foodsources/

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Top Calorie Contributors

	Age Group (Mean kcal/day)			
	2-3 (1471 kcal/day)	**4 – 8** (1802 kcal/day)	**9 – 13** (2035 kcal/day)	**14 – 18** (2427 kcal/day)
1.	**Whole Milk** (104 kcal/day)	**Grain based desserts** (136 kcal/day)	**Grain based desserts** (145 kcal/day)	**Sodas/energy/ sports drinks** (226 kcal/day)
2.	**Reduced Fat Milk** (91 kcal/day)	**Yeast bread** (98 kcal/day)	**Pizza** (128 kcal/day)	**Pizza** (213 kcal/day)
3.	**Pasta and pasta** dishes (86 kcal/day)	**Pasta and pasta dishes** (97 kcal/day)	**Chicken and chicken mixed dishes** (122 kcal/day)	**Grain based desserts** (157 kcal/day)
4.	**Grain based** (68 kcal/day)	**Pizza** (95 kcal/day)	**Yeast bread** (109 kcal/day)	**Yeast bread** (151 kcal/day)
5.	**Yeast Breads** (65 kcal/day)	**Low Fat Milk** (95 kcal/day)	**Sodas/energy/ sports drinks** (105 kcal/day)	**Chicken and chicken mixed dishes** (143 kcal/day)

Source: NHANES 2005-2006, Available at http://riskfactor.cancer.gov/diet/foodsources/

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History of Beverage Consumption

- From 1978 to 1998, average daily soft drink consumption:
  - almost doubled among adolescent females (increasing from 6 ounces to 11 ounces)
  - almost tripled among adolescent males (increasing from 7 ounces to 19 ounces)
- From 1999-2008 and 2007-2008:
  - Total SSB consumption decreased
    - children (78% to 66%)
    - adolescents (87% to 77%).
  - Soda was the most heavily-consumed SSB in all age groups except for children.
  - Prevalence of soda consumption decreased, whereas heavy sports/energy drink consumption tripled (4% to 12%) among adolescents
- http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3662243/

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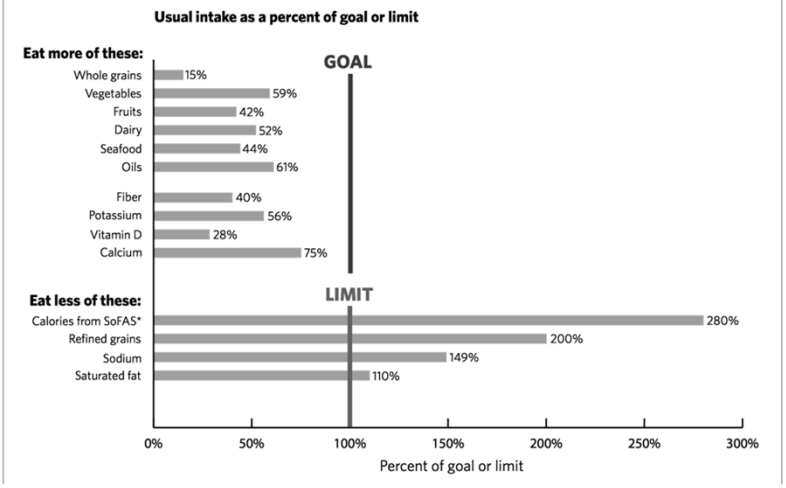
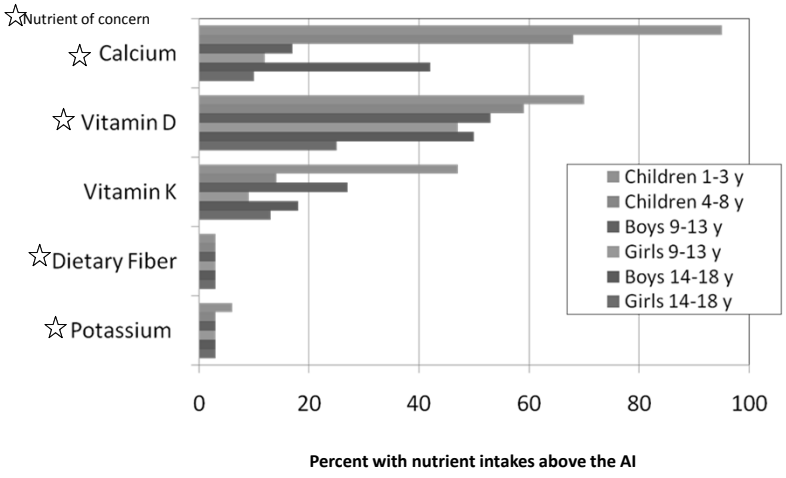
Too Little & Too Much

FIGURE 5-1. How Do Typical American Diets Compare to Recommended Intake Levels or Limits?



Low Percent of Kids & Teens Intakes Above Adequate Intake (AI) for Some Nutrients



Moshfegh USDA/ARS 2005; Moshfegh USDA/ARS 2009

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Nutrients of Concern: 2010 Dietary Guidelines

- **Calcium • Vitamin D • Dietary Fiber • Potassium •**

Nutrient	Function
Calcium	Calcium is the key nutrient in the development and maintenance of bones; additionally calcium aids in blood clotting and muscle and nerve functioning.
Vitamin D	Vitamin D aids in the intestinal absorption of calcium and phosphorus, so it helps to maintain serum levels of these minerals in the body at normal levels. Vitamin D also plays roles in cellular metabolism, which involve antiproliferation and prodifferentiation actions.
Dietary Fiber	Fiber helps maintain the health of the digestive tract and promotes proper bowel functioning.
Potassium	Potassium assists in muscle contraction, maintaining fluid and electrolyte balance in cells, transmitting nerve impulses, and releasing energy during metabolism. Diets rich in potassium lower blood pressure, blunt the adverse effects of salt on blood pressure, may reduce the risk of developing kidney stones, and may decrease bone loss.

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Diet and Nutrition in ASD: Study Summary

- Low intake of:
  - Potassium
  - Fiber
  - Vitamin D
  - Vitamin E
  - Calcium
- Excess intake of:
  - Sodium
  - Vitamin A
  - Zinc
  - Manganese

Ages 1-3

- Similar to other children in America (NHANES)
- BMI - Children with ASD:
  - **ages 2-5** are more likely to be **obese** compared to NHANES data
  - **ages 6-11** are more likely to be **underweight** compared to NHANES data

Hyman, 2012

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Other Concerning Nutrients for Certain Populations

- Folate
  - women who may become pregnant
- B12
  - Individuals 50 years of age and older (decreased absorption of natural forms of B12)
- Iron
  - women who may become pregnant
  - teenage girls

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Food Record – 6 yo male

Time	Food Item	Description of Food/Beverage (Brand name, cooking method used, type i.e. low fat or low carbohydrate, if fortified, and any other additional information)	Amount
7:53 am	Yogurt	Yoplait TRIX **Yogurt** – Raspberry Rainbow	4oz
	Yogurt	Yoplait TRIX **Yogurt** – Cotton Candy	2oz
	Cereal	**Apple Jacks** (in bowl with no milk)	½ cup
	Juice	Welch's 100% **Grape Juice**	1 sip
12:14 pm	Juice	Welch's 100% **Grape Juice**	1 cup
	Dip	Heluva Good French Onion – **Sour Cream**	1 TBSP
	Chips	Ruffles Original **Potato Chips**	13 chips
	Bread	Pepperidge Farm Hearty **White Bread**	1 slice
	Cheese	Kraft Singles White American **Cheese**	1 slice
4:30 pm	Chips	Wegman's Blue Corn **Tortilla Chips**	30 chips
	Bread	Pepperidge Farm Hearty **White Bread**	1 slice
	Cheese	Kraft Singles White **American Cheese**	1 slice
	Juice	Florida's Natural **Orange Juice** (No Pulp)	1 cup
7:00 pm	Poptart	Frosted Chocolate Chip **PopTart**	3 Poptarts
8:00 pm	Cheetos	Crunchy **Cheetos** Cheese	1 oz

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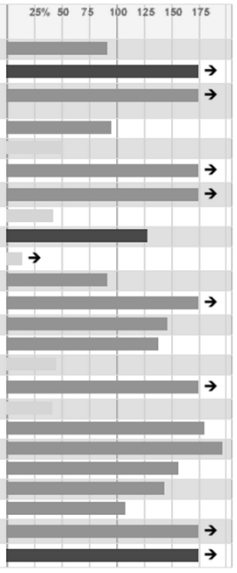
Macro Nutrient	Average Grams	% Caloric Intake	Recommended Intake
Carbohydrates	113.7 g	62.6%	45% - 65%
Protein	12.7 g	6.9%	10% - 30%
Total Fats	25.0 g	30.4%	25% - 35%

	Nutrient	Units	RDA/AI	Average Intake	RDA/AI %
	Pantothenic Acid	mg	3	2.7	91%
	Dietary Folate Equivalents	mcg	200	672	336%
	Total Vitamin A Activity (Retinol Activity Equivalents)	mcg	400	888	222%
☆	Calcium	mg	800	768	96%
	Vitamin K (phylloquinone)	mcg	55	28	51%
	Thiamin (vitamin B1)	mg	0.6	1.9	317%
	Riboflavin (vitamin B2)	mg	0.6	2.3	382%
☆	Potassium	mg	3800	1,613	42%
	Magnesium	mg	130	166	128%
☆	Vitamin D (calciferol)	mcg	15	2.2	14%
	Zinc	mg	5	4.6	91%
	Vitamin C (ascorbic acid)	mg	25	227.8	911%
	Vitamin B-12 (cobalamin)	mcg	1.2	1.8	147%
	Phosphorus	mg	500	692	138%
☆	Total Dietary Fiber	g	25	11	46%
	Niacin Equivalents	mg	8	25	318%
	Choline	mg	250	104	41%
	Selenium	mcg	30	53.8	179%
	Vitamin E (Total Alpha-Tocopherol)	mg	7	13.8	197%
	Iron	mg	10	15.6	156%
	Copper	mcg	440.0	633	144%
	Manganese	mg	1.5	1.6	109%
	Vitamin B-6 (pyridoxine, pyridoxyl, pyridoxamine)	mg	0.6	1.7	285%
	Sodium	mg	1200	2,437	203%



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Recommendations for Calcium and Dairy

DRI Age Group	IOM Recommendation s for Calcium	
	RDA (mg)	UL
1–3 years old	500	2500
4-8 years old	800	2500
9-13 years old	1300	3000
14-18 years old	1300	3000

Age Group	Cups of Dairy Per Day
2-3 years old	2
4-8 years old	2.5
9-13 years old	3
14-18 years old	3

- During the last 25 years, consumption of milk, the largest source of calcium, has decreased 36% among adolescent females.
  - About 85% of adolescent females do not consume enough calcium.

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Calcium Sources

Food	Serving Size	Calcium (mg)
Yogurt	8 oz	415
Mozzarella	1.5 oz	333
Cheddar Cheese	1.5 oz	307
Milk	1 cup	276-299
Fortified O.J.	1 cup	261
Fortified Milk Alt.	1 cup	299
Tofu	½ cup	253
Cereal Bar	1	200
Fortified Cereal	1 cup	100-1,000
Frozen Yogurt	½ cup	103

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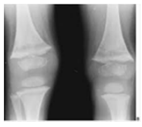
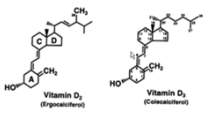
What is Vitamin D?

- Fat soluble vitamin that is produced endogenously when exposed to sunlight (UVB)
- Technically a hormone
  - Converted in liver, kidney
- Vitamin D_3 (also known as <u>cholecalciferol</u>) and vitamin D_2 (<u>ergocalciferol</u>) promote absorption of calcium, iron, magnesium, phosphate, zinc





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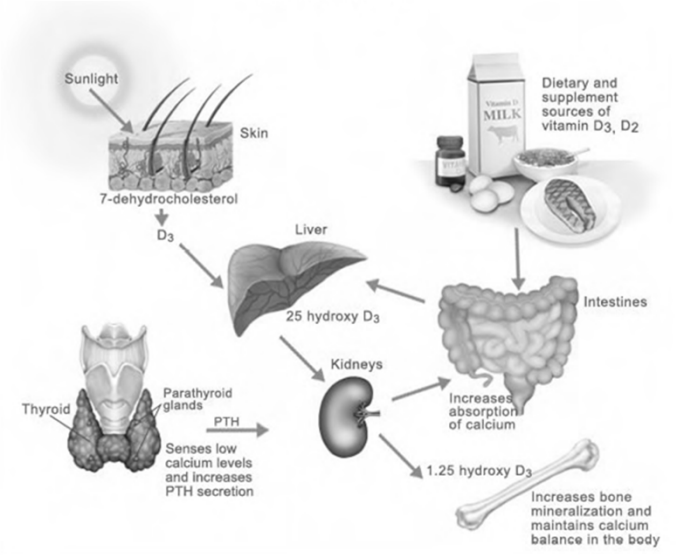
Vitamin D Metabolism



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IOM vs. Endocrine Society Recommendations

DRI Age Group	IOM Recommendations		Committee Recommendations (patients at risk for Vit D Def.)	
	RDA (IU)	UL (IU)	Daily Requirement (IU)	UL(IU)
1–3 years old	600	2,500	600-1,000	4,000
4-8 years old	600	3,000	600-1,000	4,000
9-13 years old	600	4,000	600-1,000	4,000
14-18 years old	600	4,000	600-1,000	4,000

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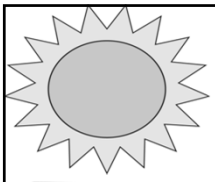
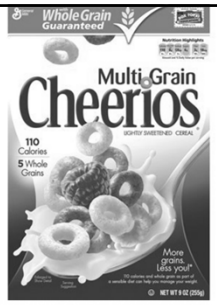
Vitamin D Sources



Food	Serving Size	Vit. D (IU)
Sockeye Salmon	3 oz	794
Canned Tuna	3 oz	154-229
Ovaltine – Malt	¼ cup	200
Fortified Milk	1 cup	100
Fortified O.J.	1 cup	100
Fortified Milk Alt.	1 cup	80-120
Fortified Marg.	1 TBSP	60-80
Fortified Yogurt	½ cup	50
Shiitake Mushrooms	1 cup	45 IU
Fortified Cereal	¾ cup	40



Vitamin D & Calcium in Milk

Nutrition Facts
Serving Size: 1 cup (240mL)
Servings Per Container: 16

Calories	90
Calories from Fat	0
	Amount Per Serving and/or % Daily Value*
Total Fat	0 g (0%)
Saturated Fat	0 g (0%)
Trans Fat	0 g
Cholesterol	<5 mg (1%)
Sodium	125 mg (5%)
Total Carbohydrate	13 g (4%)
Dietary Fiber	0 g (0%)
Sugars	12 g
Protein	8 g
Vitamin A	10%
Vitamin C	4%
Calcium	30%
Iron	0%
Vitamin D	25%

Nutrition Facts
Serving Size: 1 cup (240mL)
Servings Per Container: 16

Calories	150
Calories from Fat	70
	Amount Per Serving and/or % Daily Value*
Total Fat	8 g (12%)
Saturated Fat	5 g (25%)
Trans Fat	0 g
Cholesterol	35 mg (11%)
Sodium	125 mg (5%)
Total Carbohydrate	12 g (4%)
Dietary Fiber	0 g (0%)
Sugars	12 g
Protein	8 g
Vitamin A	6%
Vitamin C	4%
Calcium	30%
Iron	0%
Vitamin D	25%

At Risk for Deficiency
(Who to Screen)

- Inadequate exposure to Sunlight
  - SPF 30 reduces Vit D production by 95%
  - Dark skin tones require 3-5 times more sun exposure
- Obesity (BMI > 30)
- Age (older adults)
- Pregnant/lactating women
- Fat Malabsorption Syndromes / Bariatric Surgery
- Medications
  - Anticonvulsants
  - Glucocorticoids
  - AIDS/HIV meds
- Chronic Conditions:
  - Chronic Granuloma Forming disorders
  - Lymphoma
  - Primary Hyperparathyroidism

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(25-OH) Vitamin D Serum Levels

	Range (ng/ml)	Risk/Benefit
Adequate	30-50	Maximum Ca & Phos absorption
Insufficiency	20-29	Maintains bone health / low risk
Deficiency	< 20	High risk for bone-related diseases
Excess	> 50	Increase in all-cause mortality

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Vitamin D Supplementation

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Increasing Dietary Fiber Intake

- Change to Whole Grain Products
  - White Whole Grain Bread
  - Whole Grain Crackers
- Bake with whole wheat flour
- Use a healthy cereal as a snack
- Increase Fruits & Vegetables
  - Smoothies
  - Veggies and Fruit with Dips
  - Kabobs

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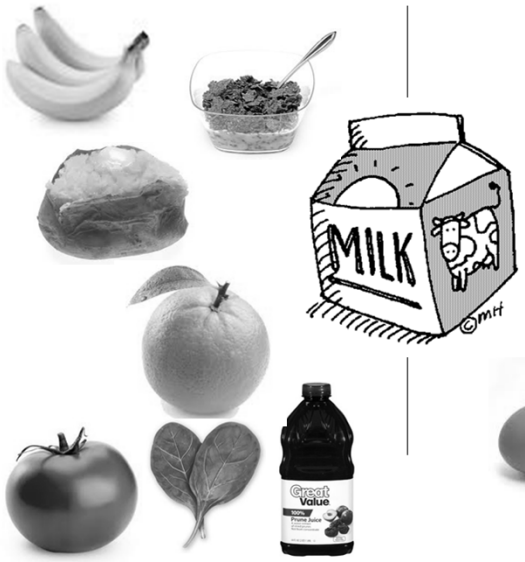
Potassium



Choline

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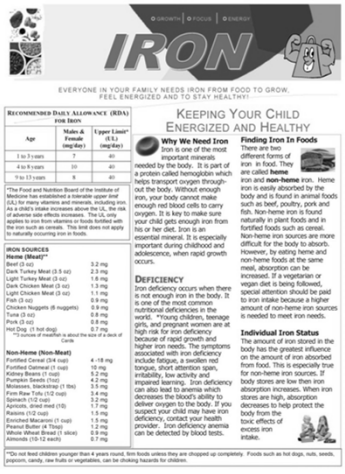
Increasing Dietary Iron

- Heme:
  - Meat (beef, turkey, chicken, fish, chicken nuggets, tuna and pork)
- Non-Heme:
  - Breakfast Cereal
  - Beans
  - Molasses
  - Tofu
  - Oatmeal
  - Raisins
  - Whole Grain Crackers
  - Granola Bars



IRON

EVERYONE IN YOUR FAMILY NEEDS IRON FROM FOOD TO GROW, FEEL ENERGIZED AND TO STAY HEALTHY!

Recommended Daily Allowance (RDA) for Iron

Age	Males & Females (mg/day)	Upper Limit* (UL) (mg/day)
1 to 3 years	7	40
4 to 8 years	10	40
9 to 13 years	8	40

*The Food and Nutrition Board of the Institute of Medicine has established Upper Intake Levels (ULs) for many vitamins and minerals, including iron. As a child's intake increases above the UL, the risk of adverse side effects increases. The UL only applies to iron from vitamins or foods fortified with the iron such as cereals. This limit does not apply to naturally occurring iron in foods.

Iron Sources

Heme (Meat)

Beef (3 oz)	3.2 mg
Dark Turkey Meat (3.5 oz)	2.3 mg
Light Turkey Meat (3 oz)	1.6 mg
Dark Chicken Meat (3 oz)	1.3 mg
Light Chicken Meat (3 oz)	1.1 mg
Fish (3 oz)	0.9 mg
Chicken Nuggets (6 nuggets)	0.9 mg
Tuna (3 oz)	0.8 mg
Pork (3 oz)	0.8 mg
Hot Dog (1 hot dog)	0.7 mg

Non-Heme (Non-Meat)

Fortified Cereal (3/4 cup)	4 -18 mg
Fortified Oatmeal (1 cup)	10 mg
Kidney Beans (1 cup)	5.2 mg
Pumpkin Seeds (1oz)	4.2 mg
Molasses, blackstrap (1 tbs)	3.5 mg
Firm Raw Tofu (1/2 cup)	3.4 mg
Spinach (1/2 cup)	3.2 mg
Apricots, dried med (10)	1.7 mg
Raisins (1/2 cup)	1.5 mg
Baked Potato with skin (1 cup)	1.3 mg
Peanut Butter (4 Tbsp)	1.2 mg
Whole Wheat Bread (1 slice)	0.9 mg
Almonds (10-12 each)	0.7 mg

*Do not feed children younger than 4 years round, firm foods unless they are chopped up completely. Foods such as hot dogs, nuts, seeds, popcorn, candy, raw fruits or vegetables, can be choking hazards for children.

Keeping Your Child Energized and Healthy

Why We Need Iron

Iron is one of the most important minerals needed by the body. It is part of a protein called hemoglobin which helps transport oxygen throughout the body. Without enough iron, your body cannot make enough red blood cells to carry oxygen. It is key to make sure your child gets enough iron from his or her diet. Iron is an essential mineral. It is especially important during childhood and adolescence, when rapid growth occurs.

Deficiency

Iron deficiency occurs when there is not enough iron in the body. It is one of the most common nutritional deficiencies in the world. *Young children, teenage girls, and pregnant women are at high risk for iron deficiency because of rapid growth and higher iron needs. The symptoms associated with iron deficiency include fatigue, a swollen red tongue, short attention span, irritability, low activity and impaired learning. Iron deficiency can also lead to anemia which decreases the blood's ability to deliver oxygen to the body. If you suspect your child may have iron deficiency, contact your health provider. Iron deficiency anemia can be detected by blood tests.

Finding Iron In Foods

There are two different forms of iron in food. They are called **heme** iron and **non-heme** iron. Heme iron is easily absorbed by the body and is found in animal foods such as beef, poultry, pork and fish. Non-heme iron is found naturally in plant foods and in fortified foods such as cereal. Non-heme iron sources are more difficult for the body to absorb. However, by eating heme and non-heme foods at the same meal, absorption can be increased. If a vegetarian or vegan diet is being followed, special attention should be paid to iron intake because a higher amount of non-heme iron sources is needed to meet iron needs.

Individual Iron Status

The amount of iron stored in the body has the greatest influence on the amount of iron absorbed from food. This is especially true for non-heme iron sources. If body stores are low then iron absorption increases. When iron stores are high, absorption decreases to help protect the body from the toxic effects of excess iron intake.

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Iron Supplements

20mg FE/tab

65mg FE/tab

65mg FE/tab

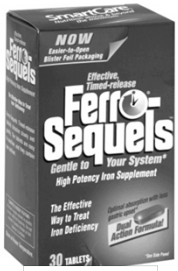
15mg FE/mL

65mg FE/tab

15mg FE/mL

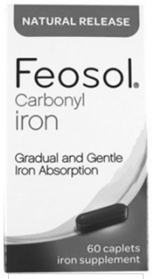
30mg FE/mL

10mg FE/mL



50mg FE/tab

15mg FE/gummy



45mg FE/tab

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During Supplementation:

- Give supplement with orange juice or another source of vitamin C to help absorption
- Do not give with milk or other source of calcium which inhibit absorption
- Best to give between meals for best absorption
- Encourage high fiber foods and fluids to prevent constipation

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During Supplementation:

- Use age appropriate supplements (if using MVI)
  - Gummy MVI's typically DO NOT contain iron
- Give orange juice or brush teeth right after a dose of liquid iron to prevent staining of teeth
- Ensure that the iron supplement is kept out of reach to prevent overdose which could be fatal
- Do not start iron supplementation without the guidance of a health care professional
- Follow recommendations for ROUTINE FOLLOW UP LABS and adjust supplementation as directed

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Tips for Weight Management:

Overweight or Obese

- Increase physical activity (non-food reward)
- Use smaller plates
- Serve away from table
- Monitor "seconds"
- Drink low-calorie beverage between bits (put down fork – encourages slower eating)
- Provide healthy snacks ("snack drawer")
- Minimize fast food consumption
- Use small plastic bags for portion control
- Increase fiber intake
- Switch to 1% or skim milk
- Monitor juice intake
- Reduce soda intake (try adding soda water to 100% juice)
- Meal time and snack schedule

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Nutrition Factors that May Increase Risk of Weight Gain

- Low fruit and vegetable intake
- High intake of sweetened beverages
- Frequency and energy density of snacks
- Frequency of eating out the home
- Skipping breakfast
- Increased portion size

2010 Dietary Guidelines

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Tips for Weight Management: Underweight

- Structured meals and snacks
- Increase % fat milk
- Peanut butter on crackers or with apples
- Add butter to bread, sandwiches, pasta, muffins
- Use oils in cooking
- Top food with cream sauces and dressing
- Add cheese to potatoes, salads, vegetables, etc.
- Use trail mix with dried fruit, nuts and candy as a snack
- Have healthy high-energy snack available

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Example: Gummy Multivitamin

- Nutrients of Concern
  - Fiber
  - Vitamin D
  - Potassium
  - Calcium
  - Choline
  - Iron

Serving Size: 1 gummy (2 & 3 years of age); 2 gummies (4 years of age and older)

	Amount Per 2 Gummies	% DV (Ages 2 & 3)	% DV (Ages 4+)
Calories	15		
Total Carbohydrate	3 g	**	1%*
Sugars	3 g	**	**
Vitamin A	2000 IU	40%	40%
Vitamin C	30 mg	38%	50%
Vitamin D	400 IU	50%	100%
Vitamin E	18 IU	90%	60%
Vitamin B6	1 mg	71%	50%
Folic Acid	200 mcg	50%	50%
Vitamin B12	3 mcg	50%	50%
Biotin	75 mcg	25%	25%
Pantothenic Acid	5 mg	50%	50%
Iodine	30 mcg	21%	20%
Zinc	2.5 mg	16%	17%
Choline	38 mg	**	**

* Percent Daily Values are based on a 2,000 calorie diet.
** Daily Value not established.

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Supplement Use In Children

- 34% general pediatric population
- 61% with children with chronic illness
- 66% of children with autism
- Parents who use dietary supplements are more likely to have children who do so
- Multivitamin/mineral supplements are the most commonly used type of dietary supplement
- Other frequently used supplements are vitamins A, C, D, and calcium and iron

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Top 10 Dietary Supplements in Children (2004)

1. Multivitamins/minerals
2. Calcium
3. B-Vitamins
4. Vitamin C
5. Glucosamine/Chondroitin
6. Vitamin E
7. Other vitamin combinations
8. Coenzyme Q10
9. Fish Oils
10. Vitamin A/β-Carotene

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AAP Recommendations for Infants & Toddlers

- Vitamin D
  - Breastfed infants
  - Infants & toddlers without adequate consumption (fortified food sources) and/or sun exposure
- Iron
  - Depends on risk (e.g., breastfeeding at 6 months, formula-fed, pre-term or low birth weight, toddlers consuming limited iron-rich foods)
- Fluoride
  - 6 months - 3 years in areas with low fluoride concentration of community water supply

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Pediatric Supplement Recommendations

"Routine supplementation of healthy children and adolescents is **unnecessary** except in special cases."

- AAP 2009

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Adverse Effects of Excess Consumption

Nutrient	Effect
Vitamin A (preformed)	Birth defects, liver toxicity, increased intracranial pressure, dizziness, nausea, headaches, skin irritation, pain in joints and bones, coma, death
Zinc	Reduced copper status, altered iron function, reduced immune function, reduced HDL cholesterol, nausea, vomiting, loss of appetite, abdominal cramps, diarrhea, headaches, possible effect on kidney function
Folate (synthetic)	Masks neurological complication in individuals with vitamin B_{12} deficiency, may accelerate progression of pre-cancerous lesions
Manganese	Neurotoxicity, may be present in specialty supplements
Copper	Gastrointestinal distress, liver damage

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Safety Concerns with Supplements

- Dietary supplements are not required to be standardized in the United States
  - no legal or regulatory definition exists in the United States for standardization as it applies to dietary supplements.
- Independent organizations offer quality testing:
    - U.S. Pharmacopeia
    - ConsumerLab.com
    - NSF International
  - assurance that the product was :
    - properly manufactured
    - contains the ingredients listed on the label
    - and does not contain harmful levels of contaminants
  - do not guarantee that a product is safe or effective

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Safety Concerns with Supplements

- Iron:
  - keep iron preparations out of the reach of children
  - monitor iron status closely when supplementing
- Fish Oils:
  - supplements may contain vitamins A and D; these vitamins can be toxic in high doses
  - Omega-3 supplements may interact with drugs that affect blood clotting
  - It is uncertain whether people with fish or shellfish allergies can safely consume fish oil supplements
  - Side Effects (seen at >3g/day)
    - bleeding, aftertaste, loose stools, gas, bloating, belching, nausea

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Safety Concerns with Supplements

- Seek guidance from physician and dietitian with knowledge in the area of supplementation
- Encourage families to trial separately
- Gather detailed information about supplements, doses and timing as well as other medications the patient is taking
  - Use a local drug interaction line
- Compare nutrient amounts in supplements to age appropriate Upper Limits and counsel parents on potential side effects of high dose

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Nutrition Resources

- **Academy of Nutrition and Dietetics**
  - http://www.eatright.org/
- **Autism Speaks Toolkits**
  - http://www.autismspeaks.org/site-wide/tool-kit
- **Dietary Guidelines**
  - **http://www.health.gov/dietaryguidelines/**
- **DRI Books – Institute of Medicine**
  - http://www.nap.edu/catalog.php?record_id=9956
- **DRI Tables (United States Department of Agriculture**
  - http://fnic.nal.usda.gov/dietary-guidance/dietary-reference-intakes/dri-tables
- **Office of Dietary Supplements (NIH)**
  - http://ods.od.nih.gov/
- **Lexicomp Online**
  - **http://online.lexi.com/lco/action/home/switch**
- **National Center for Complementary and Alternative Medicine (NIH)**
  - http://nccam.nih.gov/
- **UpToDate**
  - http://www.uptodate.com/home

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Nutrition Take Home Points

- We recommend initiating one intervention at a time
  - Identify clear outcomes and timeline
  - Weigh pros and cons (cost, burden on family, etc.)
- Focus on nutrients of greatest concern
  - Vitamin D, calcium, iron (source), fiber and potassium
  - These nutrients may not come from traditional food sources –
  - **Be Creative!**
- Increasing variety is KEY
  - If consuming < 20 foods, less likely to meet nutritional needs

- Encourage physical activity
  - Limit screen time (<2 hours)
    - avoid eating while watching TV
  - 6 to 17 yo - at least 60 min daily
- Focus decreasing intake of sugar sweetened beverages and grain based desserts
  - Soda/Energy Drinks in 14-18 yo
- Supplements – Do Ask, Do Tell
  - Make sure your child's doctor aware of the supplements your child is taking
- Seek guidance from a registered dietitian with experience working with children with ASD

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Feeding & Behavior

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DSM IV (1994, Rev 2000)

- Persistent failure to eat adequately or gain weight, or significant weight loss over at least one month
- Not due to existing medical condition
- Not better accounted for by another mental health disorder or lack of food
- Onset before age 6

55

Focus on Failure to Thrive

- Debate about organic vs. nonorganic FTT
- FTT admissions, fed by nursing
- Multiple labs and procedures
- If they gained weight, it was environmental
- Faulted the parent for poor weight gain

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Are Parents to Blame?

- 60 children from Montreal clinic, ages 1-4
- N=22 for OFTT and N=38 for NOFTT
- Did parent behaviors affect negative eating behaviors?
- Parent affect and interaction styles
- Child - Tracked meal length, interest in food (appetite), texture tolerance and food refusal
- Questionnaires and Meal Observations

- Ramsay, Gisel, Boutry 1993

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Results – Not the Parents' Fault

- NOFTT had hx of neurophysiological symptoms
- Parent affect and interactions were similar across families and groups of OFTT vs. NOFTT
- All children displayed some refusal behavior
- Only half of the parent child interactions were negative
- Behaviors/interactions may represent long term problems
- Not indicators of parental psychopathology

- **Early feeding problems may trigger negative parent-child interactions**

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Picky Eaters vs. Feeding Disorders

Component of Feeding	Picky Eaters	Feeding Disorder
Nutrition	1-2 foods per food group	Missing food groups
Refusal Behavior	Mild, verbal	Disruptive, screaming Brand and Container
Social Interactions Involving Foods	Can eat at a restaurant, Friends house, parties	Bring food from home Eat before going out
What is the Motivation to Try New Foods	Peers, favorite foods	No interest

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New Definition of a Feeding Disorder

- A. Persistent failure to meet nutritional/ energy needs with 1 (or more) of the following
  - Weight loss, failure to maintain weight (fall off growth chart
  - Nutritional deficiency (significant)
  - Depends on enteral feedings or oral supplements
  - **Marked interference with social functioning**
- DSM 5 (2013)

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Diagnostic Criteria

- B. Not due to lack of food or cultural practice
- C. Does not occur with Anorexia Nervosa or Bulimia Nervosa (no body image issues)
- D. Not due to concurrent medical condition or mental health disorder
  - **Unless, severity of feeding concerns exceeds what is typically seen with that condition**
  - **Warrants additional clinical attention**

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Behavioral Eating/Feeding Disturbance

- Lack of interest in food or eating
  - Don't seem to care about what other people eat
  - Don't show hunger
- Concerns about aversive consequences of eating
  - It might make me sick, It tastes bad
- Avoidance based on sensory characteristics of food
  - That looks gross, It's too sticky

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Diagnostic Features

- Sensory Characteristics
  - Smell, texture, taste, temperature, color, shape
  - Brand and Container
  - Food selectivity
  - Food refusal
  - Food neophobia
    - Anxiety

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Origins of Feeding Disorders

- Aversive event was paired with eating,
- Reflux, pneumonia, feeding tube, choking
- Treat the illness, but food aversion remains
- Classical Conditioning Model
  - What foods have you had a bad experience with?

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Medical Disorders

- GERD, Chronic vomiting
- Delayed emptying
- Food allergies
- Eosinophilic esophagitis
- Celiac disease
- G-tube dependence
- Swallowing dysfunction
- Upper respiratory infections

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Associated Diagnoses

- Autism Spectrum Disorder
- Prematurity
- Cystic Fibrosis
- Cerebral Palsy, Down Syndrome
- Oral Motor/ Structural (i.e., Cleft lip/palate)
  - Aspiration
- 40-80% of children with disabilities have a feeding problem

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Neuro/Dev/Beh Issues

- Developmental levels
- Oral motor skills
- Protect airway
- Sit at a 90-90-90 angle
- Coordinate hand to mouth for independence
- Encouragement, interaction, opportunity

- **Breathing, Positioning, Eating**

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When do feeding problems start?

- Sudden illness
- Onset of behaviors associated with ASD
- Introduce solids/table foods
- Disruptions in the developmental food continuum

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Developmental Food Continuum

Age	Foods/Fluids	Feeding Skills	Motor Development
1-4 months	Breast milk thru 6 mo per AAP	Suckle pattern	Improved head control at 4 mo
4-6 months	Thin cereals	Decreasing tongue thrust Move gag reflex back	Grasp objects Bring hands to mouth
6-8 months	Thick cereals Stage 1-2 Start w/ veggies	Lip closure Munching Tongue moves front to back	Sits with balance (6 mo) Start holding bottle/cup
8-10 months	Table purees Mashed foods Meltables	Lateralize tongue Starts chewing Finger feeding	Coordinates hand – mouth Improved cup drinking Increases solid intake
10-12 months	Chopped foods Soft meats Mixed textures	Rotary chew Bite and tear	Works on spoon feeding

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Critical /Sensitive Periods

- Need certain experiences/stimuli to move through developmental stages
- There are periods of development where we learn certain skills better than others
- Language, oral motor skills
- 4-6 months decrease tongue thrust, gag reflex
- 6-12 for munching, tongue movement, chewing
- Missing these stages can cause oral motor delays and create difficulty advancing textures

Illingsworth & Lister, 1964

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Common Feeding Problems

- Food selectivity by type and/or texture
- Food selectivity by brand and/or container
  - Perseverative interests, obsessions, meal presentation and routines
  - Food neophobia, anxiety
- Food refusal
- Oral motor delay
- Parent-child interactions

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Food Selectivity

- Type
- Texture
- Brand
- Container
- Visual presentation

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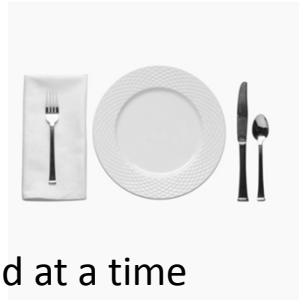
Perseverative Behaviors at Meals

- Bottles to cups
- Favorite utensils, plates, bowls
- How food is presented on plate



- Food can't touch, only eat 1 food at a time
- Significant disruptive behaviors if food items are not exactly the same

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Disruptive Behaviors

- Head turning
- Batting at the spoon
- Throwing food
- Spitting food out
- Screaming
- Holding food in the mouth (packing)
- Leaving the table – refusing to sit

74

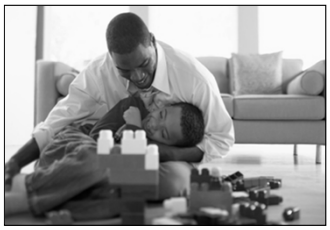
Oral Motor Delays

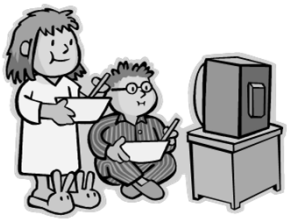
- Delayed chewing skills
- Poor tongue lateralization
- Hypersensitive gag reflex
- Hypotonia
- Difficulty biting/tearing food
- Tactile and oral defensiveness

75

Parent-Child Interactions

- Attention
- Follow-through
- Distractions
- Siblings





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Food Neophobia

- Anxiety responses around food increasing in young children
- Shaking, staring off, flush red, turn pale, fidgety, sit on their hands.
- Flap hands with touch, facial grimaces with smell
- They don't have good insight

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How Kids Think About Food

- "It looks gross."
- "It's gonna make me puke."
- "I've tried it before." (over a year ago)
- "That's not mine."

- Different means bad.
- Once they think it will taste bad, it will.
- Becomes a "cognitive-behavior" problem

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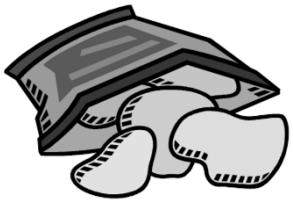
Matching Stress to Strategies

- Take the Pressure off Eating
- Positive Self Talk
- Humor and Logic
  - "Taste with our tongue, not with our eyes."
- Distraction
- Rating Scales

79

Myth or Fact?

- Take away preferred foods (junk foods) and the child will get hungry enough to eat what you serve the family.
- Children won't starve themselves.



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Do Children Get Hungry?

- Children do not appear to be hungry
- No interest in other people's food
- Do not typically request food
- Do not eat when they do request food
- Eat a few bites and then are done

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What does hunger feel like?

- Kids sometimes say their stomach grumbles
- Pain, nausea, always feels this way
- Take edge off hunger with grazing (solids & liquids)
- Typically cant describe being "full"
- Children are left to try and regulate their own systems.

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Hunger–Satiety Cycles

- Our Hunger-Satiety cycle runs about every 4 hours.
- We recognize our hunger and satiety cues by pains in our stomach – growling for hunger, low throb for fullness.
- Scheduling meals helps establish hunger.

83

Myth or Fact?

- Leaving food out all day will increase the amount of food a child eats

84

Grazing and Hunger

- Adults eat small frequent meals throughout the day to lose weight.
- It takes the edge off our hunger so we never feel really hungry or full.
- Affects children in the same way.
- Milk alone can curb hunger and keep a child from eating their meal.

85

Positive Mealtime Routine

- Meals/snacks at the same time every day
- No grazing, Water only
- Activities between meals
- Appropriate seating
- Eat meals together
- Limit distractions
- Rules/set limits (Time limits, sitting, clean up)
- Fun and positive (Ignore whining)

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3 Core Strategies to Increase Variety

1. Reinforcement – What follows behavior increases behavior
   a. Layers
2. Shaping – Shape a Response
   a. The Steps to Eating
3. Fading – Fade a Stimulus
   a. Food Chaining

87

Myth or Fact?

- Offer preferred foods as rewards for eating non-preferred foods (Grandma's rule)

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1. Reinforcement

- Before: Prepare meal/snack
- During: TV/toys, technology, praise, games
- After: Fun activity for cooperation
- Document: Food logs, charts, checklists

- Later: Change rewards

- Layers of reinforcement help reduce refusal and anxiety

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Characteristics of Reinforcement

- Contingent – applied just to target behavior
- Specific – child should know exactly what behaviors to emit and what will happen
- Reasonable – relatively easy to complete
- Immediate – as soon as behavior occurs
- Value – must be worth the effort to earn
- Each time – reward each instance of behavior
- Use reminders – Charts, PECS, etc

90

Common Questions?

- Why don't sticker charts work?
- Rewards work for a little while and then stop.
- Child never consistently plays with the same thing.
- How do I chose a reinforcer if my child doesn't like to "play?"
- Why do I have to buy prizes for my child just to take a few bites?

91

Myth or Fact?

- Takes 10- 20 offers of a new/novel food for a child to learn to like it
- Put something new on their plate every day

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2. SHAPING- The Steps to Eating

- Increase tolerance to foods
  - On the table, near or on child's plate
- Increase interaction with foods
  - Stab, stir, touch with hands, serving others
- Increase nearness of food to mouth
  - Smell, touch to lips
- Increase tasting of food with tongue
  - Licking, touching food to tongue
- Take a small bite

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Shaping

"Touch-Smell-Kiss-Lick-Bite"

- Hierarchy
  - Touch
  - Smell
  - Kiss
  - Hold in teeth
  - Lick
  - Bite
    - Bite and expel
    - Bite hold and expel
    - Chew and expel
    - Chew and swallow

Koegel et al, 2011

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3. Fading

- Slow introduction of
  - Volume of food presented
  - Types of foods
  - Changing cups or plates
  - Different seating
- Helps with kids who are rigid and have set preferences

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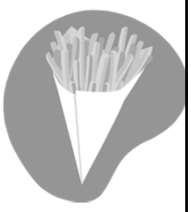
Where to Start

- Foods to offer
  - Similar to foods they already eat
  - Foods fed to the family
  - Foods they used to eat but don't eat now
  - Match by texture, taste, shape



- Foods to Avoid
  - Foods that have made them sick
  - Foods they show clear dislike for

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Food Chaining

- Food chaining uses fading to introduce new foods.
- Pair preferred foods with similar, but different foods (e.g. plain cheerios with honey nut cheerios)
- Compare and Contrast
- Continue to pair different flavors, or different brands to expand the repertoire of a preferred food.

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Chicken Nuggets Food Chain

- Chicken Nuggets – McDonald's
  - Wendy's
  - KFC
  - White meat frozen nuggets
  - Pop corn chicken
  - Chicken tenders or strips
  - Fried chicken (skin and chicken only, no bone)
  - Baked chicken (Rotisserie)
  - Grilled chicken

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Feeding Therapy Case Study

- Manny – 3 y/o, ASD
  - Food selectivity by type, brand
  - Food refusal & disruptive behaviors
  - Previous therapy had mixed results
  - 36 outpatient sessions over 1 year
  - Continued to have some therapy from school
  - Mom carried out all recommendations at home

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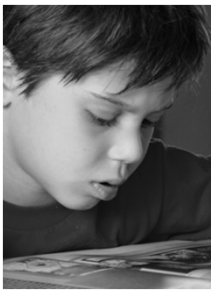
Manny's Protocol

- Layers of Positive Reinforcement
  - Monitor how it's delivered
- Shaping
- Food Chaining
- Choices – "Illusion of control"



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Manny's Foods:

Initial Foods – 11/2012

- **Carbs** – Waffles, Pretzels, Toast
- **Dairy** – Baby yogurt
- **Fruit** – Apple
- **Other** – Baby foods, smooth (multiple flavors)

Current Foods – 5/2014

- **Carbs** – Bread variety, Brown rice, Spaghetti with sauce
- **Dairy** – Soy yogurt variety, Cheese (plain, sandwich, grilled)
- **Fruit** – Applesauce variety, Bananas
- **Vegetables** – Carrots, Broccoli potato cakes
- **Protein** – Variety of Chicken, meatloaf, pizza, Peanut butter
- **Healthy snacks** – Nutri-Grain bars, organic fruit snacks
- **Eliminated baby foods**

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Take Home Points

- Think about the difference of picky eating vs feeding problems – more than just about growth
- Be specific when talking with professionals
- Children need mealtime structure – sitting
- Allow food interactions to be fun and not stressful
- Make nutritionally sound food choices,
  - based on need rather than opinion
  - but also realistic

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Picky Eaters vs. Feeding Disorders

Component of Feeding	Picky Eaters	Feeding Disorder
Nutrition	1-2 foods per food group	Missing food groups
Refusal Behavior	Mild, verbal	Disruptive, screaming Brand and Container
Social Interactions Involving Foods	Can eat at a restaurant, Friends house, parties	Bring food from home Eat before going out
What is the Motivation to Try New Foods	Peers, favorite foods, activities	No interest

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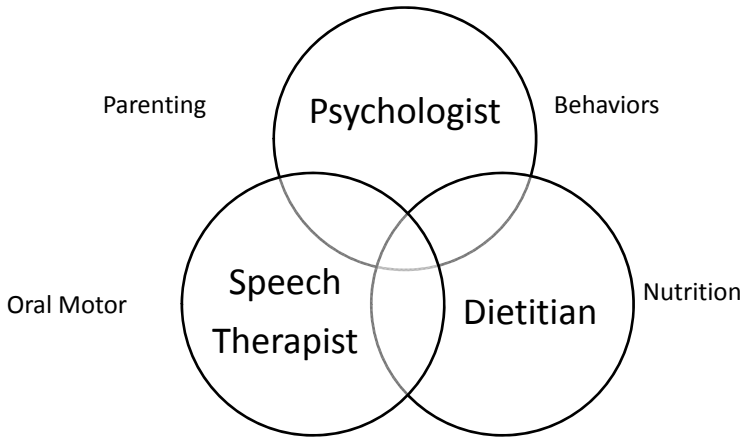
Kirch Developmental Center: Feeding Team Members



At the initial assessment the parent and child may meet with a psychologist, registered dietitian, and speech therapist.

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Kirch Feeding Disorder Program

- Initial evaluation often includes meal observation
- Learn about the child's behavioral, oral motor, and nutritional status
  - Match nutrition needs with child's feeding patterns (follow-up visit)
- Identify needed services for therapy/follow-up
  - May start with 4-6 sessions of therapy depending on needs of the child and family.
- Families would bring their child, preferred foods, and new/novel foods to try.
- Cost:
  - Feeding therapy may be covered by insurance, self-pay, or grant funding.
  - Family should talk with their insurance company to determine what services are covered.

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Kirch Feeding Disorder Program

- Strategies such as positive reinforcement, shaping and fading will be used to increase acceptance of new foods.
- Ongoing nutritional analysis to determine the foods your child need to improve their nutritional status.
- Provide homework so families can practice these strategies at home.
- Parents call to schedule evaluation
  - (585)275-2986 – ask to speak with Lisa Snow
  - determine what services needed on intake (SLP and/or RD)

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*Resources

- Rochester Regional Center for Autism Spectrum Disorder (RRCASD).
  - On-line educational resources, webinars, Information & Referral services.
  - Contact information:
    - Website: www.golisano.urmc.edu/rrcasd-nyautism
    - E-mail: rrcasd@urmc.rochester.edu
    - Tele: 1-855-508-8485
- Autism Speaks: website: www.autismspeaks.org
    - This site contains various toolkits and guides for home, school, work, safety, health/medical, etc.

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Behavioral Feeding Resouces

- Fraker, C., Fishbein, M., Cox, S., and Walburt, L. (2007). Food Chaining: The proven 6 step plan to stop picky eating, solve feeding problems, and expand your child's diet. Philadelphia, PA, Da Capo Press.
- Satter, E. (1987). How to get your kid to eat…but not too much
- Jana, L., and Shu, J. Food Fights. (2008). Amercican Academy of Pediatrics, Department of Marketing and Publication Staff.
- www.dole5aday.com
- www.eatright.org/kids/

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Question & Answer

A ***Webinar Evaluation Survey*** will be sent to your e-mail.
Please complete to receive a ***Certificate of Attendance***.

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Thank You!

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