

Viewing Time

The program will take up to one hour to complete.

Target Audience

This program is designed for primary care physicians.

Other health care professionals working with patients and their families may also find this program of interest.

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Faculty Disclosure

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During this educational activity **Ms. Entgelmeier and Dr. Arora** will not be discussing the use of any commercial or investigational product not approved for any purpose by the FDA.

First-Line Care for Children with Autism: Management of Common Feeding & GI Issues

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First-Line Care for Children with Autism: Management of Common Feeding & GI Issues

A lecture about how to treat and improve feeding and GI issues in children with Autism Spectrum Disorder

Program Objectives

Upon completion of this program, participants should be able to:

- Identify several approaches to addressing expanding food choices in children with Autism Spectrum Disorder
- Identify common GI problems in children with Autism Spectrum Disorder (ASD)
- Identify interventions often recommended for children with ASD
- List reasons why children with ASD have nutritionally inadequate diets
- Identify nutrition supplements commonly used in children with ASD

Disclaimer

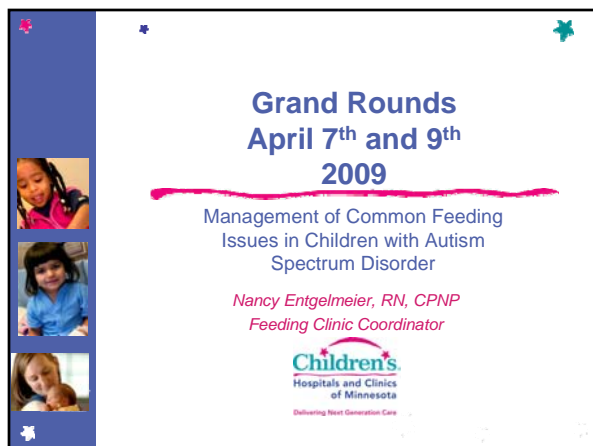
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Receiving CME Credit

To receive CME credit you must view the entire program and complete the evaluation form at the end.



Grand Rounds
April 7th and 9th
2009

Management of Common Feeding Issues in Children with Autism Spectrum Disorder

Nancy Entgelmeier, RN, CPNP
Feeding Clinic Coordinator

Children's
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Delivering Next Generation Care

This slide features a blue vertical sidebar on the left with three small photos of children. The main content is centered on a white background with a pink wavy underline under the title. The Children's Hospitals and Clinics of Minnesota logo is at the bottom.



Concerns that affect eating for children with ASD





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This slide features a blue vertical sidebar on the left with a small photo of a child. The title is at the top, underlined in pink. Below the title is a large photo of a young girl with a pink hair bow, smiling. The Children's Hospitals and Clinics of Minnesota logo is at the bottom.

Nutritional Concerns



- Extreme food restrictions put them at risk for poor nutrition
- A child with ASD may look great on the growth charts
- Diets can be low in calcium, omega-3, omega-6, iron and zinc

(zinc may impact sensory development, taste)
(omega-6 EFA from grains, processed foods, meat, milk, eggs and corn oil)
(omega-3 EFA from cod, halibut, mackerel, herring, trout, sardines, salmon or eggs from chickens fed a special diet to increase omega-3)



Concerns that affect eating

- Constipation, diarrhea, GER
- Sleep patterns
- Sensory Processing
- Rumination-either from GI concerns or a self – stimulation behavior


Nutritional Concerns

- Obesity may be a concern due to high intake of carbohydrates or liquids
 - Many children have preference for dry, crunchy types of foods high in carbohydrates, or prefer to drink their diet instead of eating foods
- Patterning of eating/drinking affects weight gain:
 - 3 meals and 2-3 snacks per day with no grazing
 - Food jags can add to extreme food selectiveness
 - Parents often adapt to child's preferences, which may increase child's food selectivity
 - Expecting child to eat what you put in front of him thinking "he'll eat if hungry" just doesn't work for children with ASD






Concerns that affect eating

- Medications for treatment of autistic behaviors
 - Many medications used have adverse effects on sleep patterns, cause increase weight gain, increase appetite, contribute to constipation


Food Checklist of child with ASD

Foods choices of 5 year old with ASD

1. **Vegetables:** carrots (cooked only), bell peppers
2. **Meats/Protein :** bacon, sausage, hot dogs, chicken, roast beef, pork, scrambled eggs (only form of egg)
3. **Grains:** Spaghetti noodles (one shape only), rice, Cheddar, Barbeque and Lay's Sour Cream and Onion chips (brand specific only)
4. Strawberry or orange jello (no other colors)
5. **Cookies:** Chips-A-Hoy Choc Chip (brand specific)
6. **Pizza:** Sausage/pepperoni (brand specific)
7. **Dairy:** Vanilla ice cream sandwiches (brand specific)

No milk or other dairy, no fruits, no other grains



*** Food Choices of 8yr old with ASD**

- Bread:** (cinnamon only), bagels (Panera only), choc. chip muffin with cauliflower, donuts, pancakes, waffles, Nutrigrain bar (strawberry only), occasionally french toast, crackers (saltines only), teddy grahams, choc chip granola bars, broccoli brownies
- Vegetables:** carrots (raw only and eats very infrequently)
- Fruits:** Most juices, apples, applesauce, very occasionally other fruits,
- Dairy:** milk, choc pudding, yogurt (specific brands, colors and like to see specific pictures on container), smoothies (Yoplait strawberry only), choc or vanilla ice cream

No meats and limited protein choices

*** Food choices of 8yr old with ASD on Gluten Free diet**

- Grains:** Natures' Choice cereal bars, tapioca bread/toast, donuts(wheat/gluten free), Pamela's pancakes, popcorn, pretzels (wheat/gluten free)
- Meats/Protein:** sausage, hot dogs, hamburgers, chicken, eggs, peanut butter (in grilled PBJ sandwich), turkey, chicken nuggets (wheat/gluten free)
- Fruits:** most juices, strawberries, blueberries, grapes, raisins, kiwi, oranges, bananas, peaches, applesauce, jelly
- Condiments:** Ketchup, salt, pepper, cinnamon

Supplements

Supplement:

- Multivitamin with or without iron depending on child's food intake
- Omega-3 EFA: 650 mg/day fish oil in capsule, flavored chewable, custard, or squeeze from capsule into food (flaxseed oils and types of algae supplement used in vegan diets don't provide the useful sources provided by fish oil)
- Calcium: tablet or fortified drinks


Fish Oil



Omega-3 supplement in ASD



- No well controlled study of Omega-3 EFA in higher doses to improve ASD symptoms with doses up to 2,320 mg per day
- Question:
 - do children with ASD have lower omega-3 levels and problems converting EFAs from food into the forms necessary to help with biochemical reactions that affect brain function?
 - Does lack of omega-3 EFA affect mood and behavior?
 - Given in larger amounts, does it improve sleep patterns, cognition, social interactions, eye contact, hand flapping? (omega-3 given at 1.5 gm per day)

Special Diets




Gluten Elimination diet

- Used in diagnosis of Celiac disease, which is not necessarily prevalent in children with ASD
- Foods and drinks with wheat, barley, rye, oats or any product made with these grains are avoided.
- Gluten is in many products as a hidden ingredient
- **Theory:** diet with gluten leads to high levels of gliadomorphins in children with ASD. Higher levels could reduce desire for social interaction, block pain messages and increase confusion
- Some families note positive behavioral changes in their child with ASD, but is a difficult diet to follow if child is very food selective
- Parents would benefit from nutritional guidance by a dietitian if following this diet for their child.





Casein Elimination Diet

- Used with thought that children with ASD have GI difficulties that make it hard to digest milk protein (casein)
- **Theory:** Eating or drinking milk protein leads to high levels of protein by-product, casomorphins. Higher levels of casomorphins could reduce desire for social interaction, block pain messages and increase confusion
- High levels of protein by-products were found in urine of children with ASD in one study and showed some improvement with elimination of casein/gluten in diet.





Sensory Processing

Sensory Processing



- “Sensory Processing” refers to our ability to take in information through our senses, screen, organize and interpret that information in order to make an adaptive response appropriate to the demands of our environment.

(from 2008 Grand Rounds presentation from Robin Campbell, OTR/L)



Sensory Processing

- Tactile: messy touch of foods on body, hands, face, intra-orally
- Sound: crunching or squishing of food
- Visual: color, appearance, shape, presentation on plate/table
- Taste: flavor preferences
- Temperature: preferences and difficulty with change
- Smell: reaction to cooking odors, smell of food on plate
- Vestibular: fatigue with low postural tone, require intense input prior to eating to remain calm



Sensory Processing

- Proprioceptive:
 - **Hyper-responsive** - avoids chewy, crunchy foods because input is too intense (may have preference for smooth foods like puddings/yogurt)
 - **Hypo-responsive** - seeks out chewy/crunchy foods, or non-food items, to get input they haven't received in their jaw (preference for foods that tend to be high in carbohydrates)
 - **Pica**- caused by nutritional deficiencies, sensory stimulation, lack of ability to discriminate non-edible items, relief of anxiety



Common Feeding Issues related to sensory preferences

- Food choices in either sweet, sour, bitter or salty
- Require condiment on any food
- Temperature of foods has to always be the same, usually room temperature
- Consistency of food has to be exact each time presented (mashed potato thickness)
- Introducing new bottle/cup/utensil is a challenge
- The "look" of a food must always be the same (cracker must be whole, not broken)




Common Feeding Issues related to sensory preferences

- Preference depends on color of food – often white, orange or red
- Food always must be presented in same container/plate, same spot on plate, same utensils
- Can't tolerate other non-preferred foods on the table where they are eating, much less on same plate with their preferred foods
- "Hiding" non preferred foods in preferred foods may backfire to all food refusal





Other concerns that affect eating

- Dental discomfort – Oral hygiene often a concern from a sensory aspect and child may be more at risk for cavities, abscess, oral sensitivity
- Food allergies – may be overlooked because of rigidity of food choices and inability to express discomfort from GI concerns
- Difficulty adjusting in social situations – eating outside the home at restaurants, relatives' homes, noisy environments, high stimulation areas (malls) or around new people is too stressful




Treatment Options




Treatment Options

- Key to success is finding an approach that is non-threatening to the child
- Find a Feeding Therapist who understands sensory / behavior approaches to therapy
- Parent / Family consistency and follow through at home is essential for success
- Treatment of child's extreme anxiety may require assistance with medications in order to see success
- Parents and therapists work together with expectations that this most often is a SLOW PROCESS



Treatment Options

- Expect setbacks: illness, changes in routine at home or school, changes in treatment therapist
- Not all treatments work for every child with ASD. Flexibility in treatment plan is essential



Treatment Options

- SOS Approach
- Food Chaining
- Food Scientist (may be more appropriate for child with Aspergers)
- Story Boards

Sequential Oral Sensory

- Dr. Kay A. Toomey, Ph.D in Denver, Colorado
- Commonly referred to as “SOS Approach”
 - Steps to Eating
 - Steps to Negotiating Textures

Food Chaining

- Cheri Fraker, CCC-SLP and Laura Walbert, CCC-SLP
- Book reference: Food Chaining – The Proven 6- Step Plan to Stop Picky Eating, Solve Feeding Problems, and Expand Your Child’s Diet

Food Chaining

- Example from book : child eats McDonald's chicken nuggets and parents want them to eat grilled chicken
 1. McDonald chicken nuggets to different fast food brand of chicken nuggets
 2. Change texture by going to lightly breaded chicken nuggets
 3. Change texture and taste by adding cheese to breading on nuggets
 4. Change shape by trying breaded chicken strips
 5. Change shape of chicken strip by cutting into small pieces
 6. Change to plain chicken breast strip with no breading

Food Chaining

Once child can eat chicken in various forms, move to new meat/protein building from the chicken nugget/strip


- Change from breaded chicken to breaded fish
- Change from fish to breaded pork
- Change from breaded meats to breaded vegetables (tempura)
- Change from breaded vegetables to breaded cheese sticks

Food Chaining

- McDonald french fries to other potatoes
 1. Other brand of french fries
 2. Tater tots
 3. Potato Wedges or fried potato slices
 4. Baked potato
 5. Mashed potato
 6. Mashed potato with gravy
 7. Pot pie with meat/veg/gravy
 8. From here go to casseroles with noodles/gravies or change chain to tolerating crusts of pies/crescents/quiche

Food Scientist

- Child needs to be able to understand concept of food and how it can change properties
- Child with Aspergers may grasp this concept easier as they focus on one food and its changing properties




Food Scientist

If red is one of preferred food colors and applesauce is an accepted texture


1. Look at apple, feel its texture in uncut form, smell
2. Cut apple and see, feel, smell its changes in color, texture, shape, new property of juiciness
3. Peel apple and see and feel its changes in shape, color and texture
4. Cook apple down to applesauce noting changes in form, texture, smell if you add sugar/cinnamon





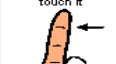







Taste!




Story Boards







- Tool to combine with any approach to feeding treatment
- Provides the visual planning a child with ASD may best respond to
- Available in Children's Family Resource Center on both Minneapolis and St. Paul campuses and used in treatment by therapists in Children's Developmental and Rehabilitation Departments
- Volunteers in Resource Center will help parents with program and lamination is free of charge to families




push food away 	look at it 	smell it 
touch with spoon 	touch it 	pick up 
lick it 	put in mouth 	chew it 
swallow 	put in bucket 	all done 




Mealtime Routine

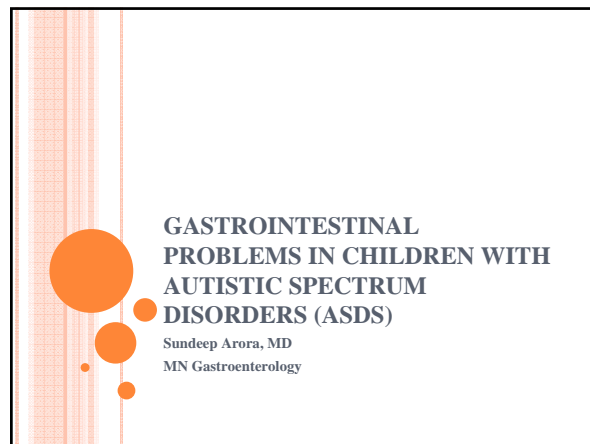
- wash hands

- sit down

- mealtime

- clean up

- wash hands

- all done




Treatment Options

- Examples available to view at back of room following Grand Rounds
- Thanks to Helen Jahangir, CCC-SLP from Children's - Mpls. Developmental and Rehab Department



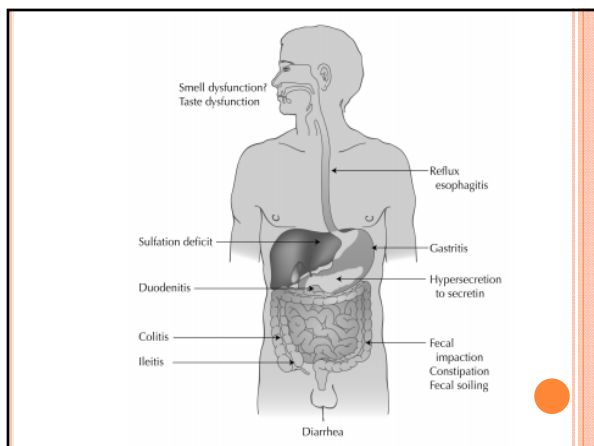


AUTISM

- Collection of behavioral symptoms characterized by dysfunction in social interaction and communication in affected children.
- Typically associated with restrictive, repetitive and stereotypic behavior which manifests within the first 3 years of life.
- Cause: unknown
- In the last decade the focus of research has been to explore the biological basis of this disorder.

OBJECTIVES

- To identify common problems in children with autistic spectrum disorders (ASDs)
- To identify interventions often recommended for children with ASDs
- To list reasons why children with ASDs have nutritionally inadequate diets
- To identify nutritional supplements commonly used in children with ASDs



FREQUENT GI COMPLAINTS

- Chronic diarrhea
- Gaseousness/Bloating
- Abdominal discomfort
- Abdominal distention
- Chronic constipation
- Chronic abdominal pain

Horvath et al. J Pediatr. 1999, 135:559-563
Horvath et al. Current Gastroenterology Reports. 2002, 4:251-258

INCIDENCE

- 30-40% of the children with ASDs may have GI problems
 - 69.4% had reflux esophagitis
 - 42% had chronic gastritis
 - 67% had chronic duodenitis
- Many of these children are non-verbal and may not be able to express GI discomfort. Behaviors such as self-stimulation and temper tantrums may be a reaction to pain, but not obviously referable to the gastrointestinal system.

PREVALENCE OF GI PROBLEMS

- Survey conducted in AZ
- 379 children with ASDs
 - Chronic diarrhea 71: 19%
 - Constipation 78: 21%
 - Change in stool consistency 25: 7%
- 40 siblings (non-autistic)
 - Diarrhea 8%
 - Constipation 10%
- Lightdale et al studied 500 children
 - 20% had \geq stools per day
 - 50% had frequent flatulence, bloating
 - 30% had abdominal pain

- Horvath et al
- 412 autistic children & 43 age matched healthy siblings
- Symptom questionnaire
- Age 6.5 ± 3.6 years
- Symptoms
 - Diarrhea ≥ 3 loose or watery bms/day > 2 wks
 - Constipation ≤ 2 bms/day or hard bms
 - Foul-smelling stools
 - Gaseousness 2-3 times/wk
 - Abdominal bloating q weekly
 - Abdominal discomfort
 - Food regurgitation
 - Toilet training not achieved by 6 years
- 84.1% of autistic patients had one of the above listed symptoms compared to 31.2% of healthy age matched controls

TOILET TRAINING

- Significantly delayed
- Horvath study of 412 pts with ASDs, 57% of patients were not yet toilet trained > 4 years
- Lower cognition and verbal skills were correlated with poor achievement of toilet training

SLEEP DISTURBANCE

- Sleep disorders with nighttime awakening:
 - 50% of patients^a
 - 6.8% of patients^b
- Mechanism unknown
- ? Nighttime awakening with pain/abdominal discomfort may be due to GERD and reflux esophagitis

^aGhaem et al. J Paediatr Child Health 1998, 34:160-163

^bHorvath et al. Current Gastroenterology Reports 2002, 4:251-258

TASTE FUNCTION

- Hyposensitive to salt (sodium chloride) and sugar (sucrose)
- Significant hypersensitivity to bitter (quinine sulfate) and sour (citric acid)

INTESTINAL PERMEABILITY AKA "LEAKY GUT"

- D'Eufemia et al examined 21 children with ASDs
- No known intestinal disorders
- Increased intestinal permeability was noted in 43% vs. 0% in controls
- Horvath et al performed lactulose-mannitol (LM) test in 25 autistic children
- 19/25 (75%) had increased LM ratio
- After secretin treatment 13/20 had a decrease in LM ratio



DYSBIOSIS

- Abnormalities in gastrointestinal flora
- Rosseneu et al examined 80 children with ASD and GI symptoms
- 61% had increased growth of aerobic G- endotoxin producing bacteria
- ? Could possibly cause bowel damage
- 55% had overgrowth of S. aureus
- 95% had overgrowth of E. coli
- 11 were treated with non-absorbable antibiotic
- On Rx, bacterial load decreased and GI symptoms improved
- Bacterial load returned to pre Rx levels 8 weeks after treatment



ENDOSCOPIC FINDINGS

- Frequent
 - Distal esophageal swelling, hyperemia and increased friability
- Less frequent
 - Ulcers
 - Erosions
 - Antral hyperemia (stomach)
 - Nodularity of duodenal bulb
 - Friability of duodenal mucosa

Horvath et al. Current Gastroenterology Reports 2002, 4:251-258



ENDOSCOPIC FINDINGS

- Colon
 - Segmental swelling
 - Hyperemia
 - Superficial erosions
 - Nodularity
- Lymphonodular hyperplasia (? Autistic colitis)
 - 93% in the terminal ileum
 - 30% in the colon
- Less common
 - Granularity, loss of vascular pattern, erythema, red halo sign and superficial ulcerations

Wakefield et al. Am J Gastroenterol 2000, 95:2285-2295



HISTOLOGIC FINDINGS

- Reflux esophagitis 69%
- Chronic gastritis 42%
- H. pylori infection 0%
- Chronic duodenitis 67%
- Increase # of paneth cells in the duodenum 81%
- Villus blunting 6%
- Celiac disease 0%

Horvath et al. J Pediatr 1999, 135:559-563



HISTOLOGIC FINDINGS

- Chronic colitis 88%
- Eosinophilic colitis 40%
- Subepithelial apoptosis 50%
- Increased IELs* 13%
- Follicular hyperplasia 92%
- Acute ileitis 8%
- Aphthous ulceration 4%

Wakefield et al. Am J Gastroenterol 2000, 95:2285-2295
 *Intraepithelial lymphocytosis



COLITIS

- Immunohistochemistry & morphometric studies
- Paneth cell hyperplasia & hypertrophy
- Furlano et al showed increased basement membrane thickness and mucosal gamma/delta cell density
- Collectively, endoscopic, histologic and immunohistochemical studies suggest presence of chronic inflammation
- Further studies are required

LIVER ABNORMALITIES

- No evidence for hepatic dysfunction
- No decrease conjugation capacity
- Using acetaminophen as a substrate, serum concentration of sulfate was noted to be lower than age matched controls
- Possible decrease in sulfation capacity

SPECIFIC DIETS

- Solid scientific evidence is lacking on the benefit of the gluten or casein-free diet in children with ASDs
- Anecdotal reports of behavioral improvement on these diets
- 420¹ children were studied-serology negative for celiac disease
- No evidence of celiac disease on biopsies taken during upper endoscopy

Horvath et al. Current Gastroenterology Reports 2002, 4:251-258

CASEIN-FREE/GLUTEN FREE DIET

- "Opioid excess theory"
 - Exorphins (exogenous opioids:β-casomorphins from casein and gliadorphins from gluten) enter the brain causing dysfunction
- Only one small pilot study
- No evidence for celiac disease
- Lactose free diet would only be helpful in patients with lactose intolerance
- Large epidemiologic studies needed to clarify this association b/w ASDs and celiac disease

DIETS CONTD.....

- Italian study
- 120 patients with celiac disease
- None had serologic or histologic evidence of celiac disease
- 11 patients with ASDs-no evidence of celiac disease

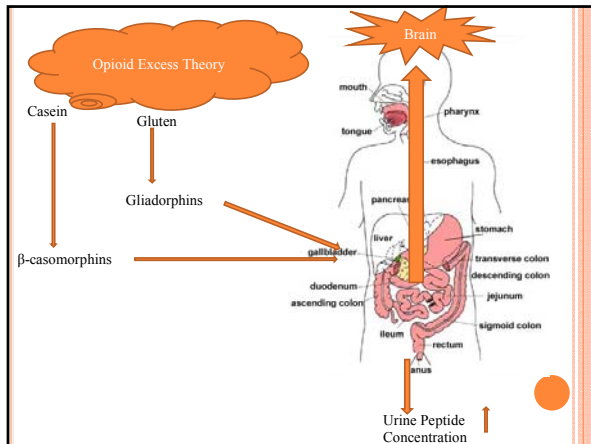
Pavone et al. Biol Psychiatry 1997, 42:72-75

DIETS CONT'D...

- McCarthy and Coleman (1979)
- 8 children with ASDs
- Hx of steatorrhea, hypocalciuria and alleged behavioral improvement on gluten free diet
- Added 20 gm of gluten/day to their diet x 4 wks
- No change in body wt, bowel habits
- No histological abnormalities noted on intestinal bx

McCarthy et al. Lancet 1979, 2:877-878

Nancy Entgelmeier, RN, CNP Sundeep Arora,
MD First-Line Care for Children with Autism:
Management of Common Feeding and GI Issues



OPIOID EXCESS THEORY

- Knivsberg et al
 - 5 patients with ASDs
 - 24 hr urine samples-hyperpeptiduria
 - Placed on Gluten and Casein-free diets
 - Followed for 4 years
 - Urine peptide levels normalized in 1 year
 - Social behavior/cognitive/communicative skills
 - ↓ in odd behaviors, improvement in social, cognitive and communicative skills
 - Open study with no control group
- Knivsberg et al. Scand J Educ Res 1995, 39:223-236

DIGESTIVE ENZYME SUPPLEMENTS

- Supposedly break down these exorphins (harmful exogenous opioids)
- No evidence for pancreatic enzyme deficiency
- ~ 50% of patients may have decrease in activity of one of the disaccharidase enzymes

USE OF PROBIOTICS

- Theory: Improve the "leaky gut" and dysbiosis
- NO published research study

SECRETIN

- Study noted 1 SD increase in pancreatico-biliary fluid output after IV administration in children with ASDs and diarrhea
- May indicate upregulation of secretin receptors in the ductal cells of the pancreas or bile-duct epithelium
- Autistic children are not secretin deficient
- Pilot study examined serum secretin levels after acidification of duodenum during endoscopy-no abnormality was noted

SECRETIN

- ? Dysfunction in cephalic phase of digestion
- ? Problem of release from intestinal S cells
- Further research to look into biological and clinical markers
- Only 1/89 children had pancreatic insufficiency

VANCOMYCIN

- For small bowel bacterial overgrowth (SBBO)
- Effect was found to be temporary with no sustained behavioral benefits

NYSTATIN, FLUCONAZOLE

- For suspected fungal overgrowth based on urine organic acid tests
- Problems:
 - Urine organic acid testing is not validated
 - Microbiologic confirmation of overgrowth is necessary
- Anecdotal reports suggest behavioral improvement
- Majority of the children receive low-dose, long-term antifungal therapy

FOOD ALLERGIES

- 24% had food allergies compared to 4.5% of sibs
- Most were IgG-type, minority being IgE based
- No large scale study had addressed relationship between food allergy & autism
- No study had examined the prevalence of eosinophilic esophagitis or gastroenteropathy
- Italian study examined 36 pts with ASDs
- Elevated IgA antigen-specific antibodies to casein, lactalbumin, beta-lactoglobulin, elevated IgG & IgM antibodies to casein compared with 20 healthy children.
- Noted improvement in behaviour after 8 wks of elimination diet.

MEASLES AND AUTISM

- Wakefield et al examined the lymphoid follicles from the colon/terminal ileum
- 75/90 children with ASDs had measles virus compared to 5% of controls
- Virus was identified in the center of the follicle
- Later study confirmed this to be the vaccine strain measles virus
- Conclusion:
 - Finding a portion of a virus in peripheral blood lymphocytes & intestinal tissue specimens using molecular techniques does not constitute evidence for a causal relationship, since some viruses do persist in unaffected hosts.

DIGESTIVE ENZYMES

- 44/90 (49%) of autistic children were found to have at least one deficient disaccharidase activity
- 18/44 had ≥ 2 deficiencies
- Most common: lactase and maltase deficiency
- Less frequent: sucrase, palatinase and glucoamylase deficiencies

SUMMARY

- GI abnormalities may contribute to some of behavioral problems noted in children with ASDs
 - Esophagitis/gastritis may cause nighttime awakening, aggressive behavior and increased irritability
 - Gaseousness could result from disaccharidase deficiency, constipation
 - No solid evidence for the role played by dietary modifications or use of different antibiotics
 - Further studies are needed to better understand this disorder

**Comments
and
Questions**

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Book and Web Resources: *reviewed

***Just Take A Bite – Easy, Effective Answers to Food Aversions and Eating Challenges!** by Lori Ernspenger, Ph.D.; Tania Stegen-Hanson, OTR/L with forward by Dr. Temple Grandin

***Food Fights – Winning the Nutritional Challenges of Parenthood Armed With Insight, Humor, And a Bottle of Ketchup** by Laura A. Jana, MD, FAAP; Jennifer Shu, MD, FAAP

***Poor Eaters: Helping Children Who Refuse to Eat** by Joel Macht, PhD

***Food Chaining – The Proven 6-Step Plan to Stop Picky Eating, Solve Feeding Problems, and Expand Your Child’s Diet** by Cheryl Fraker, CCC-SLP; Mark Fishbein, MD; Sibyl Cox, RD, LD; Laura Walber, CCC-SLP, CLC

***Gluten-Free Diet – A Comprehensive Resource Guide** by Shelley Case, B.Sc., RD.

* <http://www.gfediet.com> or www.foodallergy.org

Can’t Eat, Won’t Eat: Dietary Difficulties and Autistic Spectrum Disorder by Brenda Legge (2002)

Diet Intervention and Autism: Implementing a Gluten Free and Casein Free Diet for Autistic Children and Adults: A Guide for Parents by Marilyn Le Breton and Rosemary Kessick. 2001

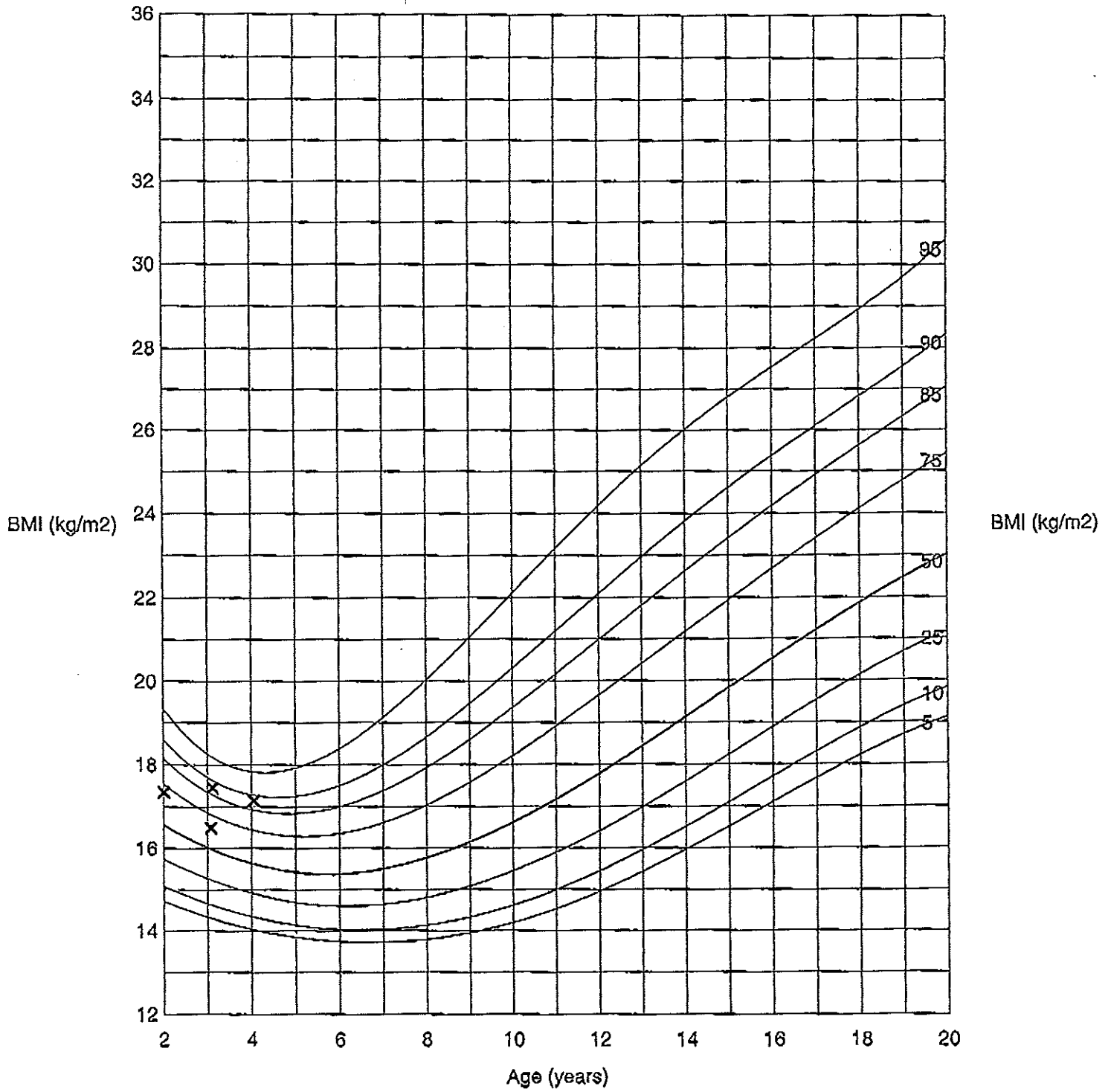
How to Eat Well Again on a Wheat, Gluten and Dairy-Free Diet by F. Crosthwaite. 2006

The Kid-Friendly ADHD and Autism Cookbook: The Ultimate Guide to the Gluten-Free, Casein-Free Diet by P. Compart and D. Laake. 2006

Special Diets for Special People: Understanding and Implementing a Gluten-Free and Casein-Free Diet to Aid in the Treatment of Autism and Related Developmental Disorders by Lisa S. Lewis. 2005

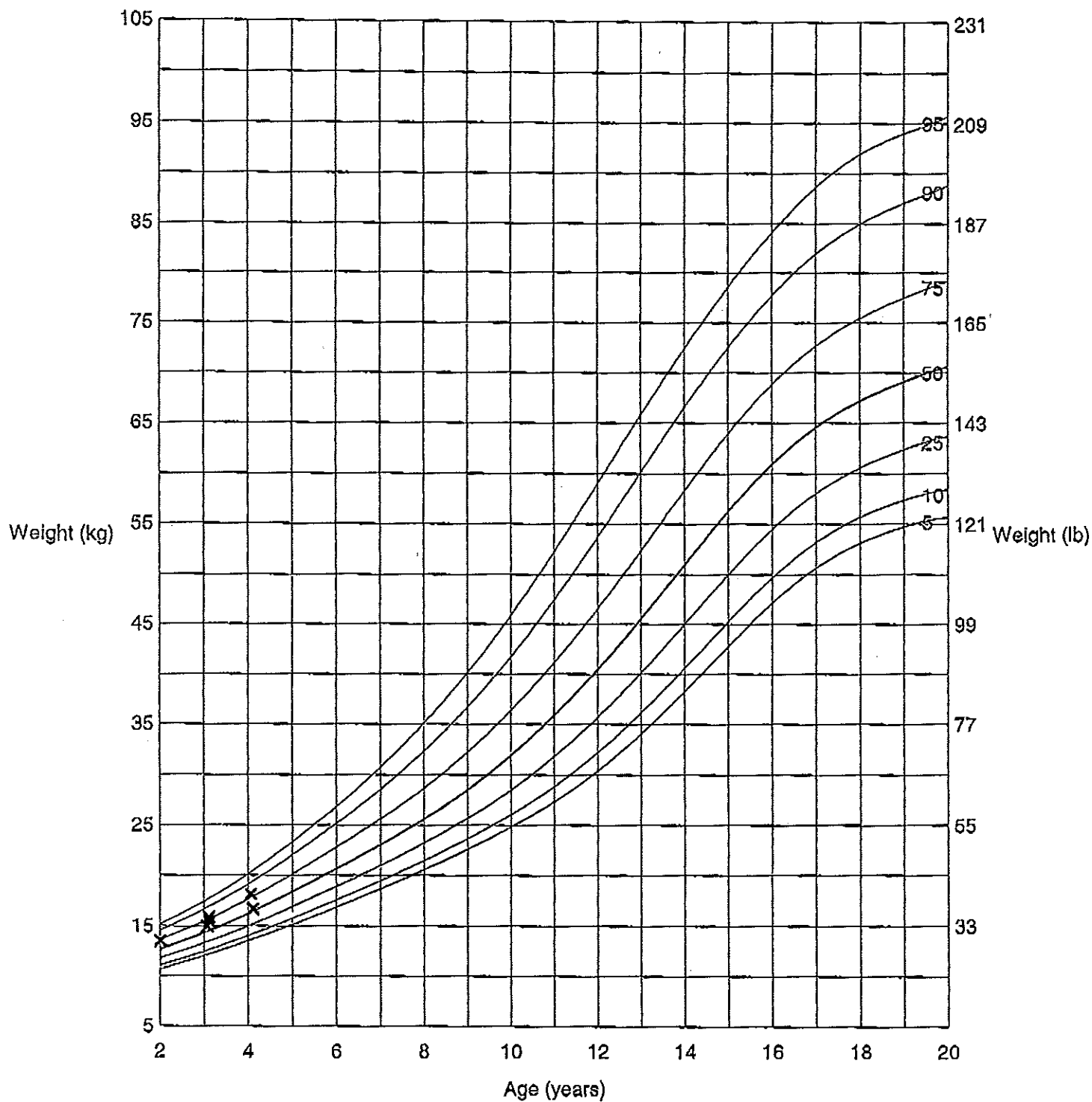
Growth Chart: United States

Body Mass Index-for-age Percentiles (Boys, 2 to 20 years)



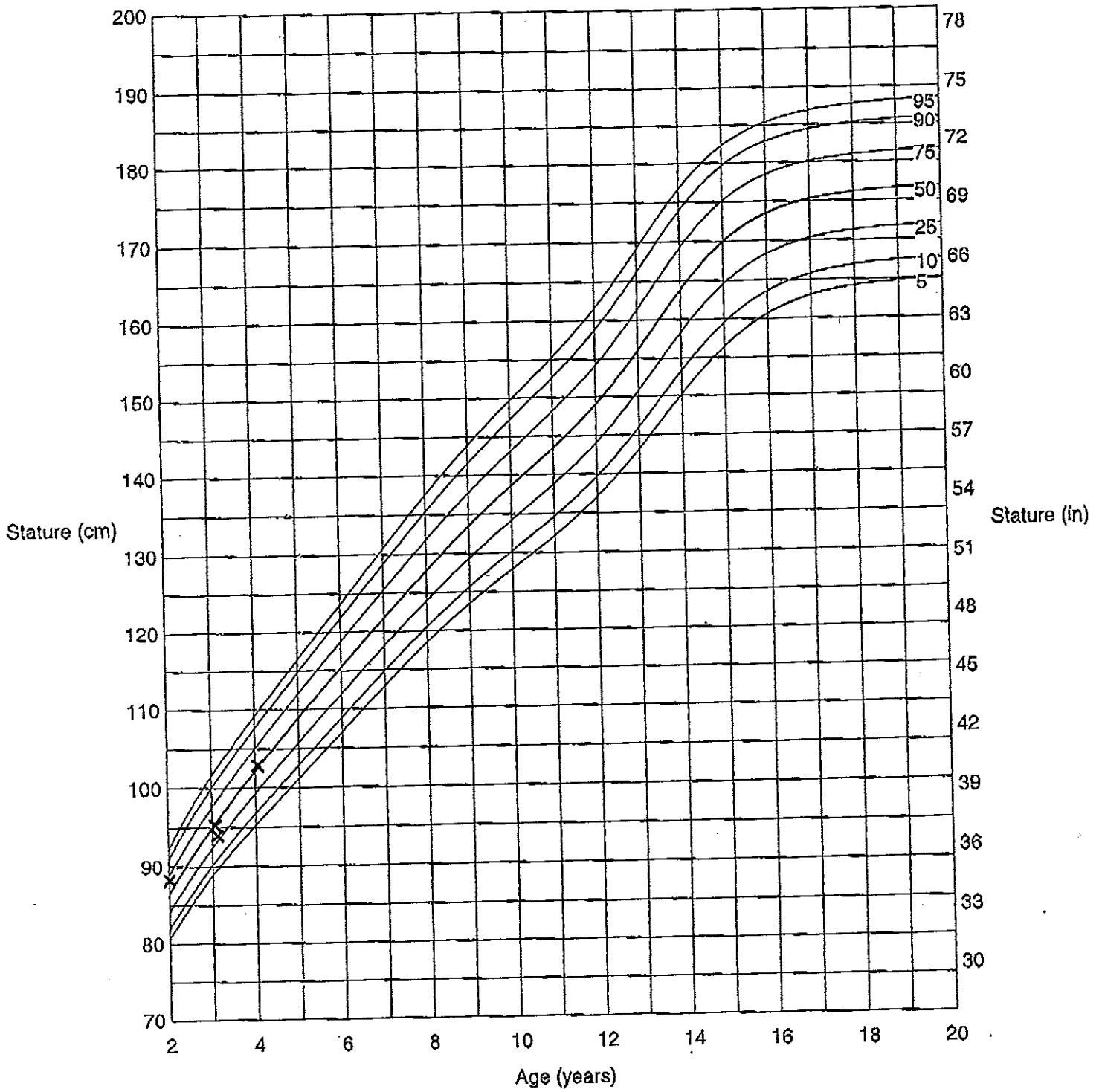
Growth Chart: United States

Weight-for-age Percentiles (Boys, 2 to 20 years)



Growth Chart: United States

Stature-for-age Percentiles (Boys, 2 to 20 years)



Growth Chart: United States
Weight-for-stature Percentiles (Preschoolers, Boys, 2 to 5 years)

