Chronic diarrhea

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Sixth stage

Diarrhea, defined as increased total daily stool output, is usually associated with increased stool water content and frequency.

For infants and children, stool output >10 g/kg/24 hr, or more than the adult limit of 200 g/24 hr

Chronic diarrhea lasts >2 wk.

Diarrhea results from altered intestinal water and electrolyte transport

Diarrhea is a symptom not disease.

PATHOPHYSIOLOGY.

1- osmotic diarrhea

2- secretory diarrhea

3-mutations in apical membrane transport proteins

4- reduction in anatomic surface area,

5-alteration in intestinal motility

6-inhibition of transport of electrolytes by inflammatory mediators .

Osmotic Diarrhea.

Osmotic diarrhea is caused by the presence of nonabsorbable solutes in the gastrointestinal tract.

-lactose intolerance due to lactose enzyme deficiency in which lactose is not absorbed in the small intestine and reaches the colon intact .The colonic bacteria ferment the nonabsorbed lactose to short-chain organic acids, generating an osmotic load and causing water to be secreted into the lumen

-excessive amounts of carbonated fluids that exceed the transport capacity, especially in toddlers.

- magnesium hydroxide and sorbitol, neither of which are absorbed, resulting in an osmotic load.

- Lactulose, a synthetic therapeutic disaccharide composed of galactose and fructose, is not digested in the small intestine and is fermented by the colonic bacteria to form organic acids, resulting in osmotic diarrhea.

-Osmotic diarrhea stops with fasting.

-has a low pH.

positive for reducing substances.

Causes of Osmotic Diarrhea

1-MALABSORPTION OF WATER-SOLUBLE NUTRIENTS

Glucose- malabsorption:

Congenital

Acquired

galactoseDisaccharidase deficiencies (lactase and sucrase-isomaltase)

Congenital

Acquired

Causes of Osmotic Diarrhea

2-EXCESSIVE INTAKE OF CARBONATED FLUIDS

3-EXCESSIVE INTAKE OF NONABSORBABLE SOLUTES

Sorbitol

Lactulose

Magnesium hydroxide1

Secretory diarrhea

-high volume; the stools are extremely watery.

- Stool analysis reveals high sodium and chloride content (>70 mEq/L).

-Secretory diarrhea continues with fasting.

Secretory Diarrhea.

The mechanisms for secretory diarrhea include

- activation of the intracellular mediators such as cAMP, cGMP, and intracellular calcium, which stimulate active chloride secretion from the crypt cells and inhibit the neutral coupled sodium chloride absorption.

Causes of Secretory Diarrhea

1-ACTIVATION OF CYCLIC ADENOSINE MONOPHOSPHATE

Bacterial toxins: enterotoxins of cholera, *Escherichia coli* (heat-labile), *Shigella, Salmonella, Campylobacter jejuni, Pseudomonas aeruginosa*

Hormones:vasoactive intestinal peptide, gastrin, secretin

Causes of Secretory Diarrhea

2-ACTIVATION OF CYCLIC GUANOSINE MONOPHOSPHATE

Bacterial toxins: *E. coli* (heat-stable) enterotoxin, *Yersinia enterocolitica* toxin

Causes of Secretory Diarrhea

3-CALCIUM-DEPENDENT

Bacterial toxins: *Clostridium difficile* enterotoxin

Neurotransmitters:acetylcholine, serotonin

Paracrine agents:bradykinin

Differential Diagnosis of Osmotic Vs Secretory Diarrhea

	OSMOTIC DIARRHEA	SECRETORY DIARRHEA
Volume of stool	<200 mL/24 hr	>200 mL/24 hr
Response to fasting	Diarrhea stops	Diarrhea continues
Stool Na^+	<70 mEq/L	>70 mEq/L
Reducing substances[*]	Positive	Negative
Stool pH	<5	>6

Mutational Defects in Ion Transport Proteins.

Congenital defects of sodium-hydrogen exchange, chloride-bicarbonate exchange, and sodium–bile acid transport proteins result in secretory diarrhea presenting at birth.

Reduction in Anatomic Surface Area.

-Short bowel syndrome results from resection of the bowel secondary to surgical indications such as necrotizing enterocolitis, midgut volvulus, or intestinal atresia .

Reduction in Anatomic Surface Area.

- Celiac disease results in flattening of the proximal intestinal surface area with marked decrease in the digestive and absorptive function of the villus epithelium . Diarrhea is characterized by loss of fluids, electrolytes, macronutrients, and micronutrients.

Alteration in Intestinal Motility.

The causes of altered intestinal motility include

- malnutrition, scleroderma, intestinal pseudo-obstruction syndromes, and diabetes mellitus. Malnutrition, in general, results in hypomotility, allowing bacterial overgrowth that leads to deconjugation of bile salts, resulting in an increase in the intracellular mediator cAMP and leading to secretory diarrhea.

Etiology of Chronic Diarrhea

INTRALUMINAL FACTORS

MUCOSAL FACTORS

INTRALUMINAL FACTORS

1-PANCREATIC DISORDERS

-Cystic fibrosis

-Shwachman-Diamond syndrome

-Johannson-Blizzard syndrome

-Isolated pancreatic enzyme deficiencies

-Chronic pancreatitis

-Pearson syndrome

INTRALUMINAL FACTORS

2-**BILE ACID DISORDERS**

-Chronic cholestasis

-Terminal ileum resection

-Bacterial overgrowth

-Chronic use of bile acid sequestrants

-Primary bile acid malabsorption

INTRALUMINAL FACTORS

3- **INTESTINAL DISORDERS**

-Intraluminal osmolarity

-Carbohydrate malabsorption

-Congenital and acquired sucrase, lactase deficiencies

-Congenital and acquired monosaccharide deficiency

- Excessive carbonated fluid intake

-Excessive intake of sorbitol, Mg (OH)2, and lactulose

MUCOSAL FACTORS

1- **ALTERED INTEGRITY**

-Infections:bacterial, viral, fungal

- Infestations:parasitic

-Cow's milk and soy protein intolerance

-Inflammatory bowel disease (ulcerative colitis, microscopic colitis, Crohn)

MUCOSAL FACTORS

2-ALTERED IMMUNE FUNCTION

-Autoimmune enteropathy

-Eosinophilic gastroenteropathy

-AIDS Combined immunodeficiency syndromes

-Immunoglobulin A and G deficiencies

3-ALTERED FUNCTION

Defects in C1-/HCO3, Na+/H+, bile acids, acrodermatitis enteropathica, selective folate deficiency, abetalipoproteinemia

4-ALTERED DIGESTIVE FUNCTION

Enterokinase deficiency

Glucoamylase deficiency

5-ALTERED SURFACE AREA

Celiac disease, postgastroenteritis syndrome

Microvillus inclusion disease

Short bowel syndrome

MUCOSAL FACTORS

6-ALTERED SECRETORY FUNCTION

Enterotoxin-producing bacteria

Tumors secreting vasoactive peptides

7-ALTERED ANATOMIC STRUCTURES

Hirschsprung disease

Partial small bowel obstruction

Malrotation

Common Causes of Chronic Diarrhea

INFANCY

Postgastroenteritis malabsorption syndrome

Cow's milk/soy protein intolerance

Secondary disaccharidase deficiencies

Cystic fibrosis

Common Causes of Chronic Diarrhea

CHILDHOOD

Chronic nonspecific diarrhea

- Secondary disaccharidase deficiencies
- Giardiasis

Postgastroenteritis malabsorption syndrome

- Celiac disease
- Cystic fibrosis

Common Causes of Chronic Diarrhea

ADOLESCENCE

Irritable bowel syndrome

Inflammatory bowel disease

Giardiasis

Lactose intolerance

Evaluation of Patients with Chronic Diarrhea

PHASE I

- Clinical history including specific amounts of fluids ingested per day.

- Physical examination including nutritional assessment .

- Stool exam (pH, reducing substances, smear for white blood count, fat, ova, and parasites) .

Evaluation of Patients with Chronic Diarrhea

-Stool cultures .

-Stool for *Clostridium difficile* toxin. -

-Blood studies (complete blood count, erythrocyte sedimentation rate, electrolytes, blood urea nitrogen, creatinine)

Evaluation of Patients with Chronic Diarrhea

PHASE II

-Sweat chloride

-72 hr stool collection for fat determination

- Stool electrolytes, osmolality

- Stool for phenolphthalein, magnesium sulfate, phosphate

-Breath H2 tests

Evaluation of Patients with Chronic Diarrhea

Phase III

- Endoscopic studies

-Small bowel biopsy

-Sigmoidoscopy or colonoscopy with biopsies -

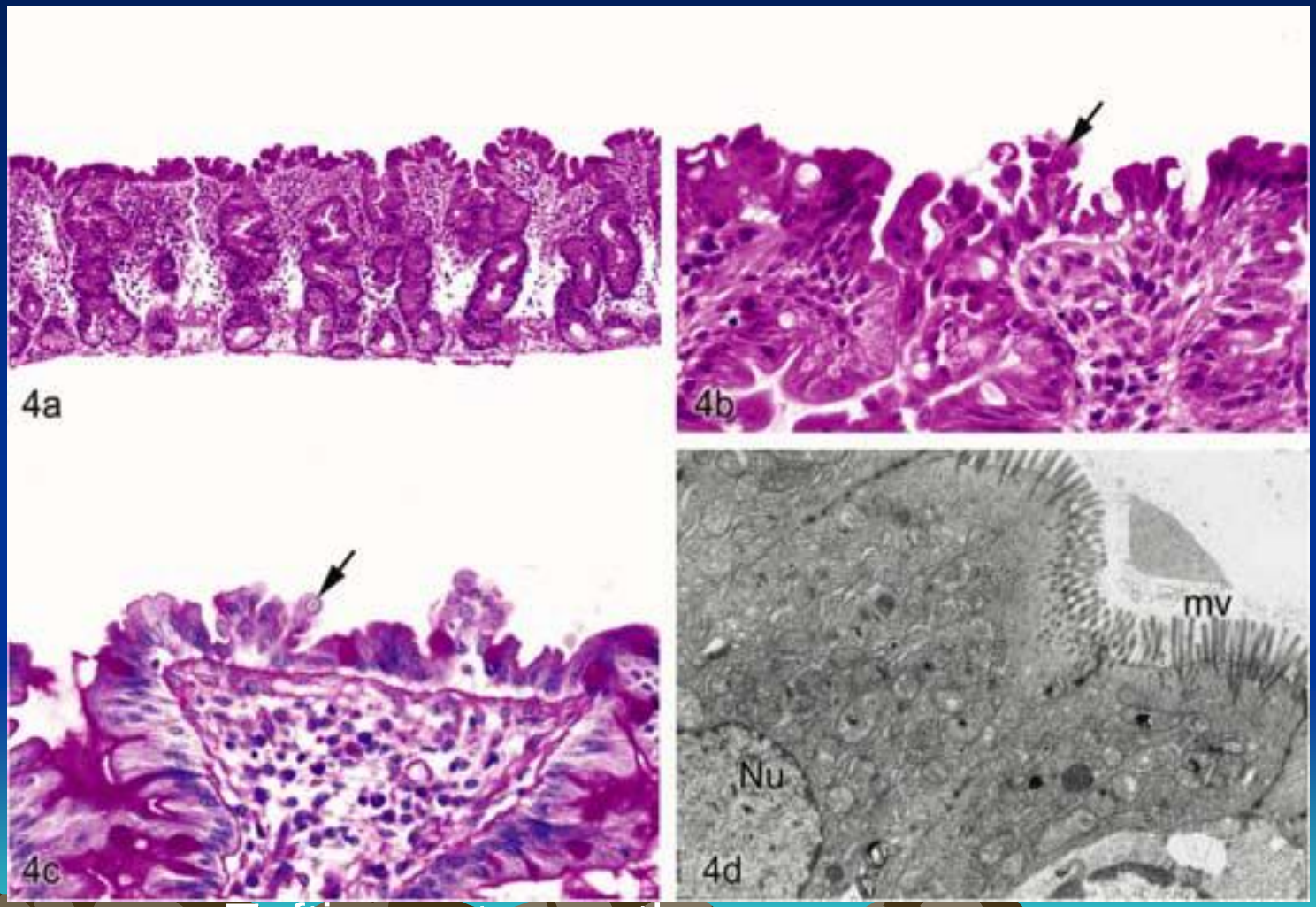
- Barium studies

Phase IV

Hormonal studies

vasoactive intestinal polypeptide, gastrin, secretin, 5-hydroxyindoleacetic assays

Small bowel biopsy



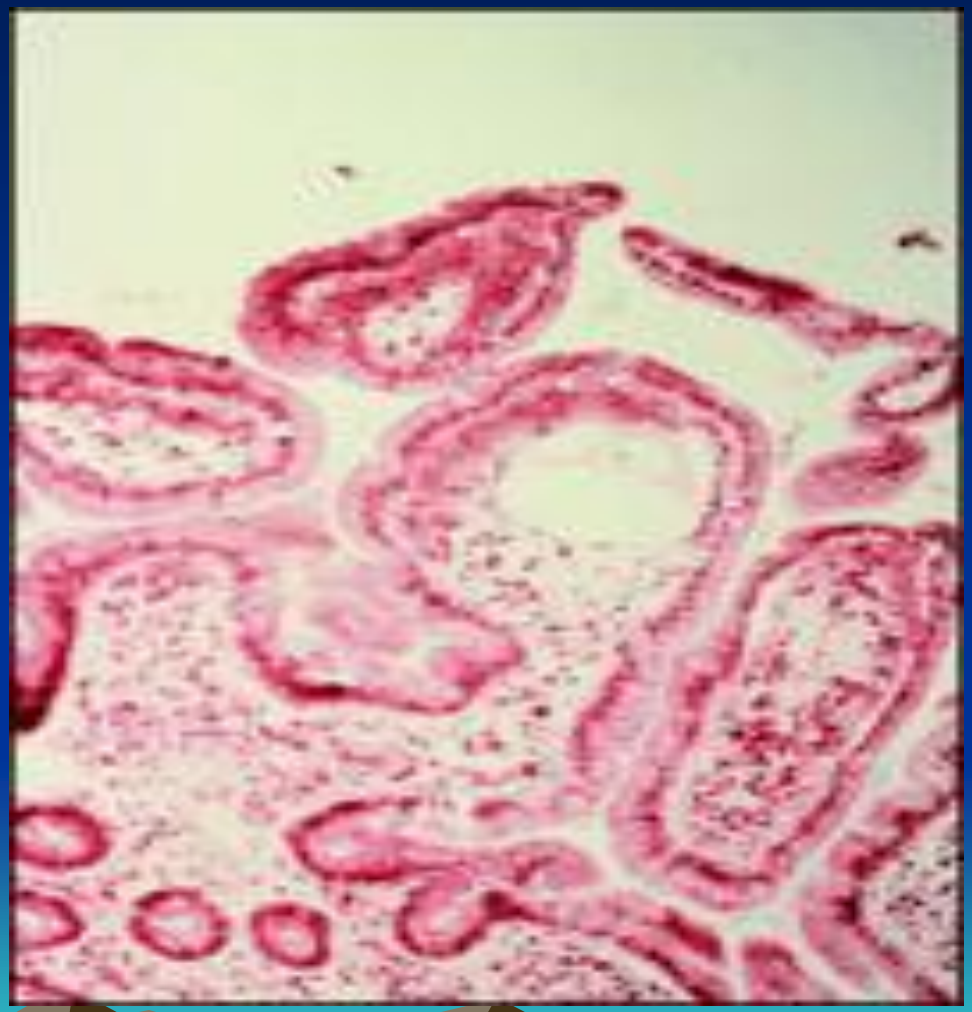
Tufting enteropathy
No effective tx

Small bowel biopsy

congenital
Lymphectasia

Protein losing enteropathy.

Villous clubbing
Subepithelial bleb
MCT and high protein diet



TREATMENT

The 1st principle is to maintain adequate nutritional intake to permit normal growth and development. The height, weight, and nutritional status of the patient must be documented.

-If nutritional parameters, including **weight** and **height, are normal.and stool examination does not show any fat**.

the possibility of chronic nonspecific diarrhea - needs to be considered.

Chronic nonspecific diarrhea

-1 and 3 yr of age (toddler's diarrhea).

-The diarrhea is often brown and watery, without fever,pain,or growth failure.

Pathophysiology

-excessive carbonated fluid intake.

-nondigestible carbohydrate malabsorbtion from excssive juice ingestion.

-low fat intake

-If the dietary history suggests that the child is ingesting significant amounts of fruit juices, then the offending juices should be decreased.

-If due to excessive intake of carbonated fluid - decrease fluid to no more than 90ml/kg /24hr.

-If due to low fat intake ,increase fat to 35 - 40% in diet.

Carbohydrate intolerance

-If the diarrhea is secondary to carbohydrate intolerance, sucrose intolerance decrease sucrose intake or add sacrosidase if no response:sucrose free diet.

Lactose intolerance decrease lactose intake or add Lactase if no response: lactose –free diet. Alternatively, breath hydrogen tests can document the presence of lactose or sucrose intolerance. A glucose or lactulose breath hydrogen test can be used for the diagnosis of bacterial overgrowth

If the patient presents with **weight loss and the stool examination shows fat,** the possibility of chronic diarrhea secondary to a malabsorption syndrome needs to be considered. The most common cause of chronic diarrhea associated with the malabsorption is postgastroenteritis malabsorption syndrome.

postgastroenteritis malabsorption syndrome.

Common persistance diarrhea following sever GE

Clinical manifestation is sever watery diarrhea that appears on refeeding with milk.

postgastroenteritis malabsorption syndrome

Etiology : Multifactorial

– Intestinal villous injury .

– Secondary CHO intolerance, bacterial overgrowth .

– Relative pancreatic insufficiency .

postgastroenteritis malabsorption syndrome

Risk factors

– Age : < 3 months .

– Nutrition : Lack of breast feeding, malnutrition ,

nutrition during acute GE .

– Severity of the preceding gastroenteritis .

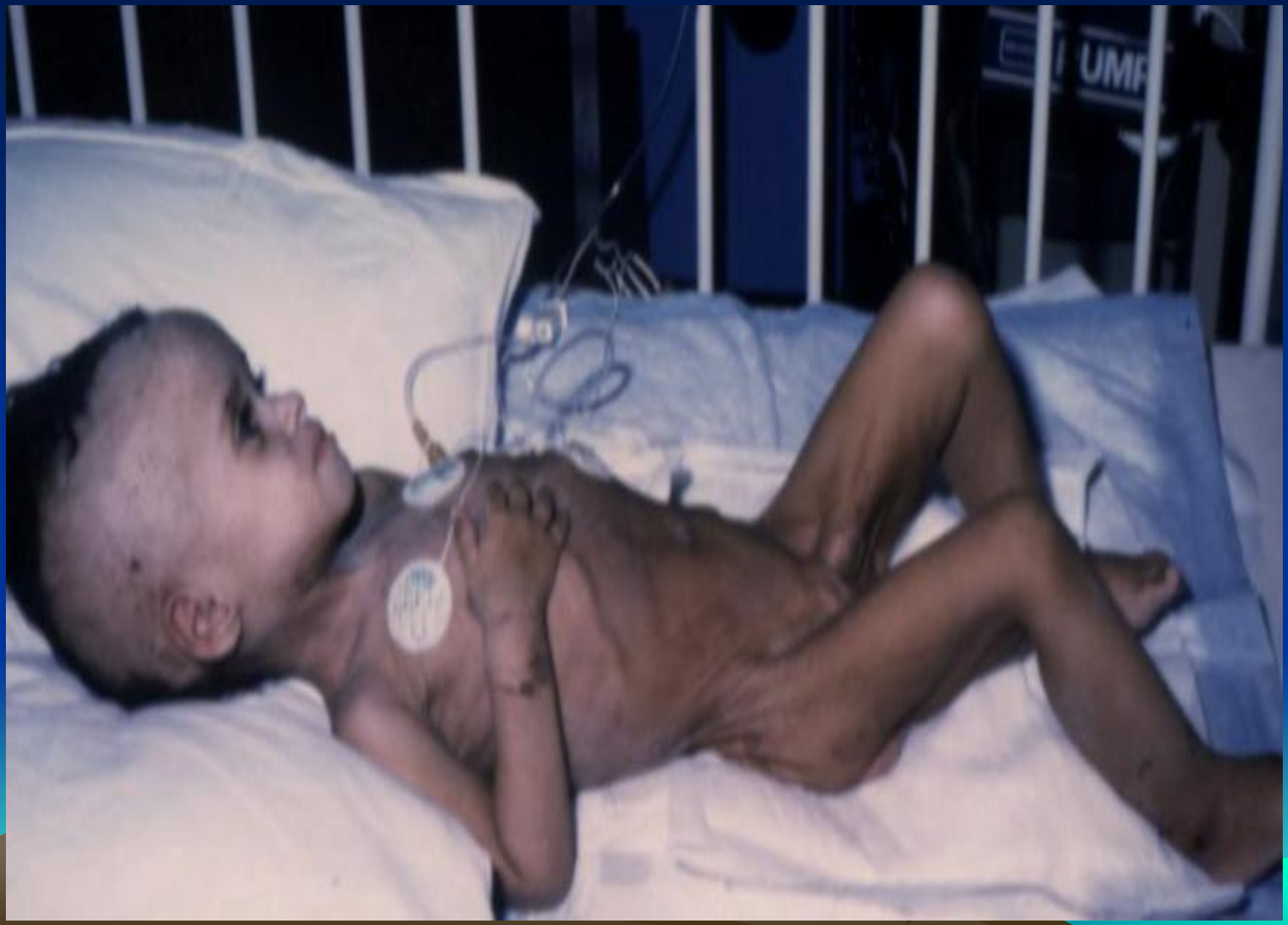
postgastroenteritis malabsorption syndrome

- Diagnosis : clinical . DDx chronic enteritis .
- Management :

– Nutrition : provide sufficient calories as tolerated .

– Drugs : Limited indication (cholestyramine, ASA ,

peptobisthmol, loperamide, antibiotics)



A patient presenting with suspected small intestinal bacterial overgrowth should undergo evaluation for surgical, medical, and nutritional support.

Surgical treatment is indicated if the patient has malrotation or partial small bowel obstruction. Antibiotic therapy is usually initiated with metronidazole in combination with ampicillin or trimethoprim-sulfamethoxazole

Giardiasis

Most common presenting symptom

-asymptomatic carrier state

-chronic malabsorbtion with steatorrhea and failure to thrive

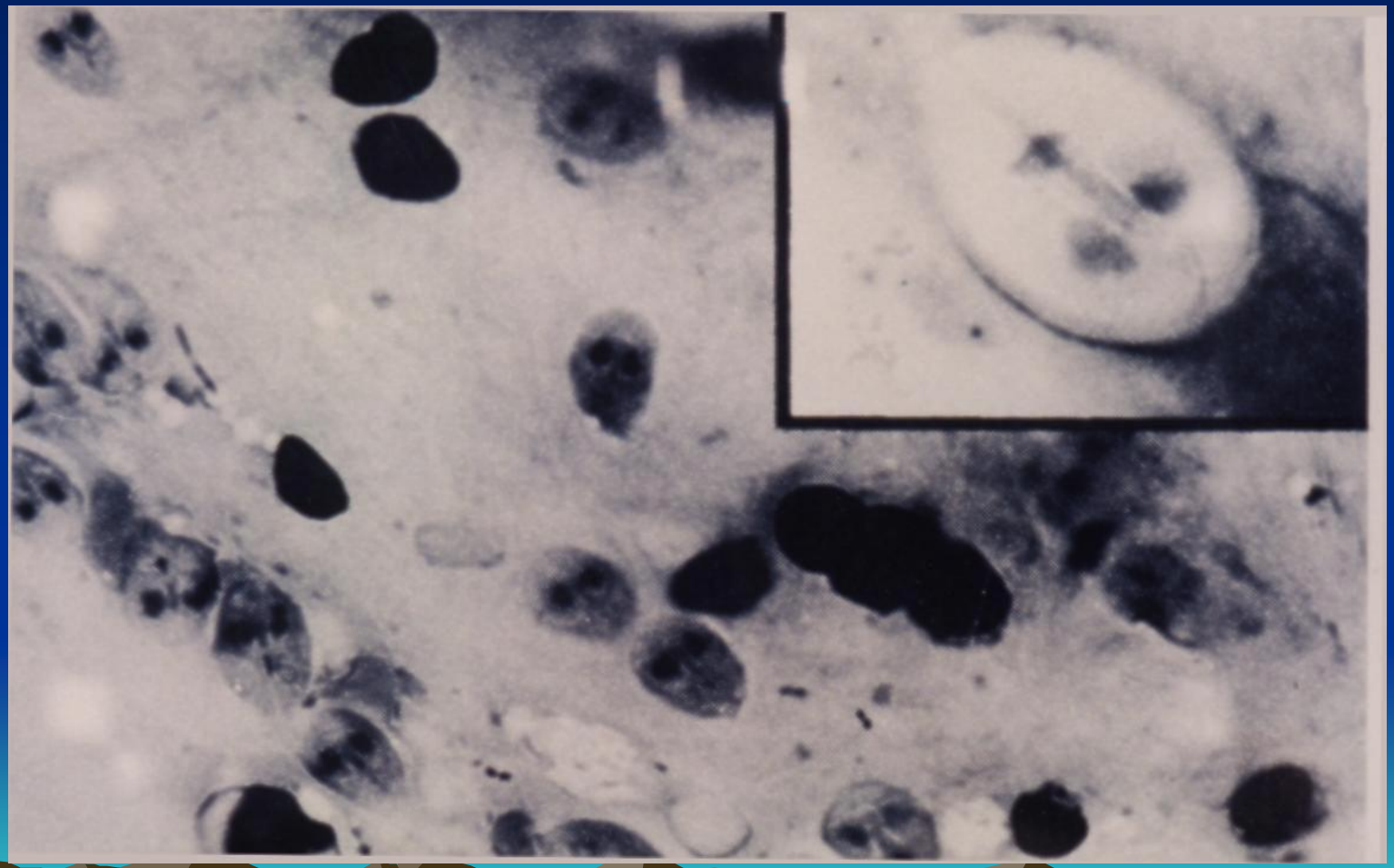
Acute gastroenteritis with diarrhea

Wt loss

Abdominal cramps and distention

Nausea and vomiting

Giardiasis



Giardiasis

- Risk factors
  - Well water
  - Daycare
  - Public pools, summer camp
  - Immunodeficiency

Giardiasis

Diagnosis

–Stool antigen test

–Often overlooked

Fever, WBC, eosinophiliar are rare

Treatment

Flagyl15 mg/kg/d X 10 d

Albendazole, furazolidone

Patients presenting with secretory diarrhea, especially during the 1st mo of life, need to be considered for nutritional support, because the most likely cause is acongenital defect in transport protein.

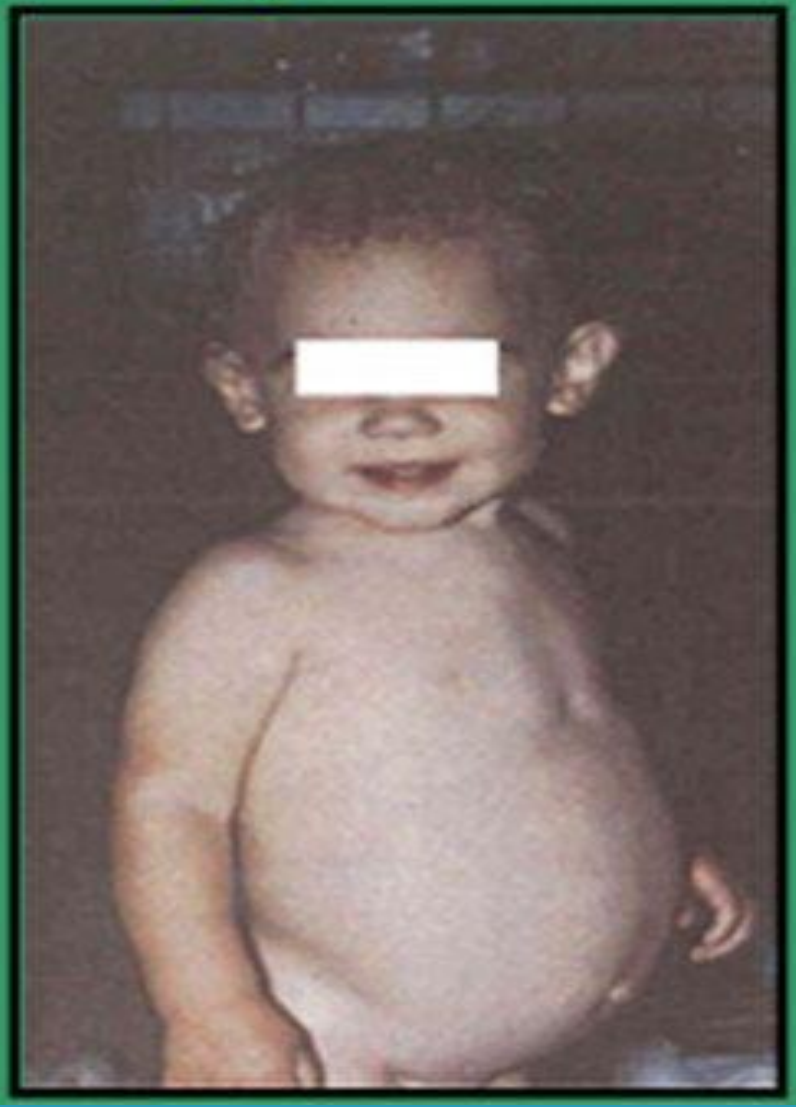
In older children with secretory diarrhea, the cause needs to be identified 1st, and therapeutic consideration is directed toward the cause of the secretory diarrhea.

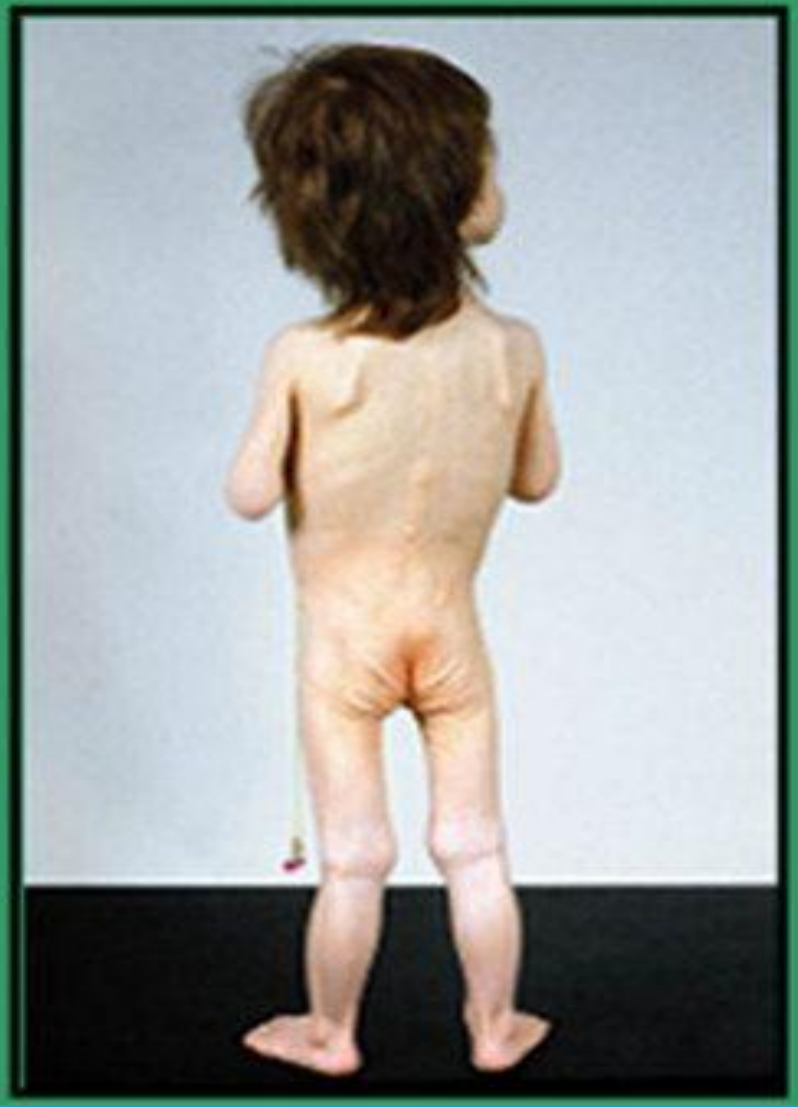
Gluten-sensitive enteropathy CD

- Clinical presentation :
- Ch. diarrhea, abdominal distension , muscle wasting .
- Anorexia, irritability, apathy .

- Laboratory findings :
- Anemia, hypocalcemia, hypoalbuminemia .
- Increased antigliadin and antiendomysiumabs(IgG,IgA)
- Histopathology: villous atrophy, crypt hyperplasia, Inflammatory Infiltrate .

Typical Celiac Disease





Gluten-sensitive enteropathy CD

Atypical presentation

-Short stature, aphtous stomatitis .

– Intractable seizures .

– Enamel hypoplasia, osteoporosis .

– Unexplained anemia/ ALT elevation .

– Alopecia .

– Lymphoma .

– Infertility .

Gluten-sensitive enteropathy CD

Diagnostic criteria : simplified approach :

– Clinical features and histopathology of CD on glutencontaining

diet .

– Marked clinical (± histopathology) improvement on G.F.D.

– Relapse (clinical ± histopathology) on challenge

.

– Future role for antigliadin + antiendomysial Abs: Replace

small bowel biopsy and histopathology.

Gluten-sensitive enteropathy CD

Management :

– G.F.D : eliminate ALL sources of gluten in the diet .

– Nonresponse :

• Noncompliance with the G.F.D.

• consider other diagnoses :

– sensitivity to other proteins or food .

– Immune deficiency (IgA) .

– Intestinal lymphoma .

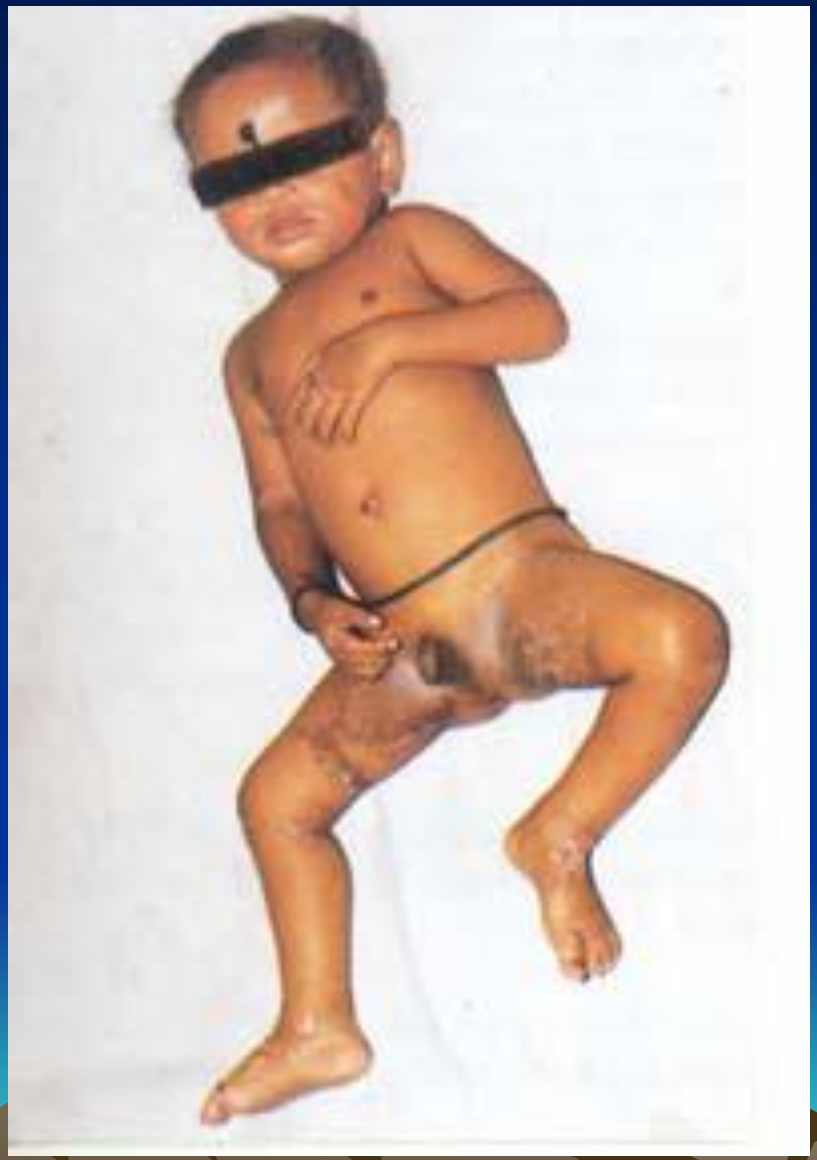
Zinc deficiency

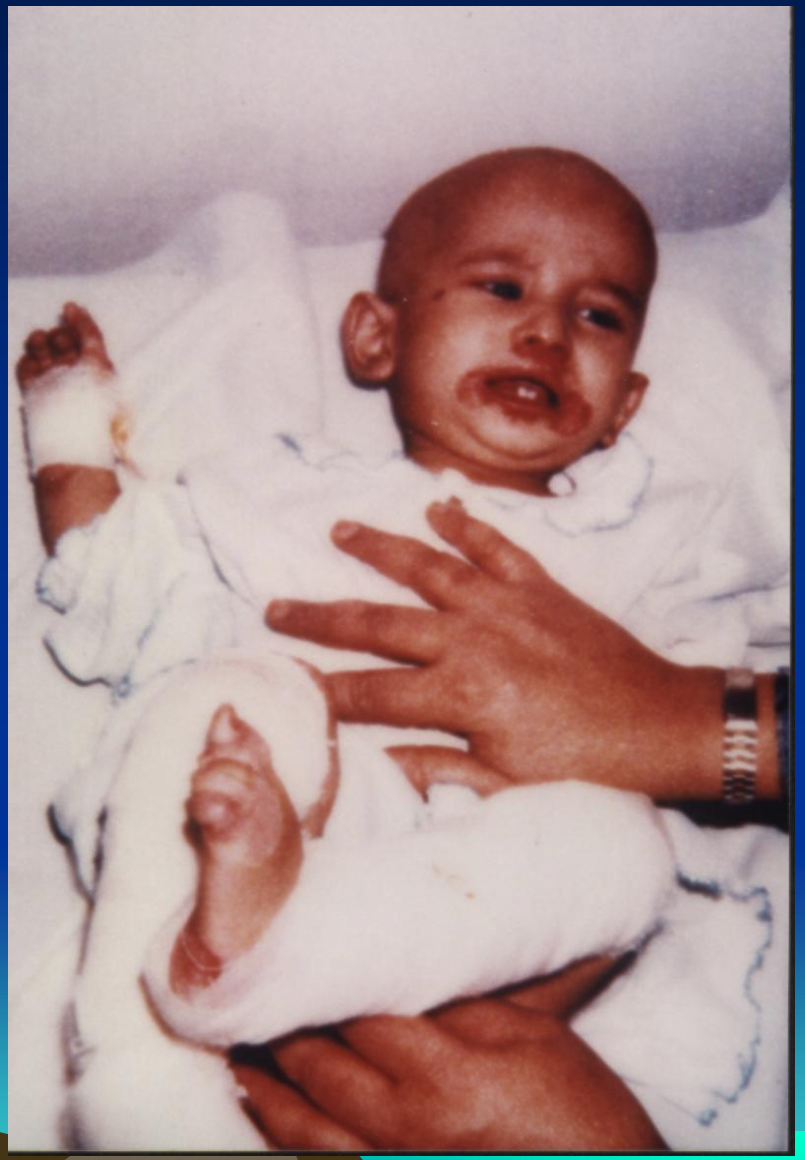
- Acrodermatitis enteropathica
  - Perineal and perioral rash
  - Chronic diarrhea & undernutrition
  - Low serum Zn and alkphos
  - Primary
- Rare, recessive, mutation in Zn transporter

Zinc deficiency

–Secondary
- CF
- Crohn's
- Anorexia nervosa
- Dialysis
- Chronic TPN
- Exclusively breastfed preterms

–Tx= longtermZn supplementation





REFERENCES

1. Kliegman:Nelson Textbook of pediatric.the19th e-dition
2. Ludan AC. A practical guide to pediatric fluid therapy. Medical Currents October-December 1982.
3. Ludan AC. Current management of acute diarrheas. Medical Currents September-October, 1983.
4. Ministry of Health. Module on Management and Prevention of Diarrhea. Diarrheal Diseases Control Committee, September,
1980
5. Diagnosis and Management of Acute Diarrhea. Report of the 13th Ross Round table Report, Columbus, Ohio, 1982
6. Del Mundo F, Estrada Felix, Santos-Ocampo Perla. Textbook of Pediatrics and Child Health, Second Edition, 1982
7. Nelson WE. Textbook of Pediatrics, 11th Edition, 1979
8. Rudolph AM. Textbook of Pediatrics, 16thEdition, 1977
9. Gryboski J. Gastrointestinal Problems in the Infant. In: Major Problems in ClinicalPediatric 1975; 13: 565-683.
10. Roy C, Silverman A. Pediatric Clinical Gastroenterology, Second Ed 1975. pp 12-13, 193-197, 276-277.
11. Tiongson-Castillo P, Corazon V, et al. A clinical study of chronic diarrhea in Filipino infants and children. Phil J Pediatr 1981


Thank You