

Formulas and Vitamins- Oh My!

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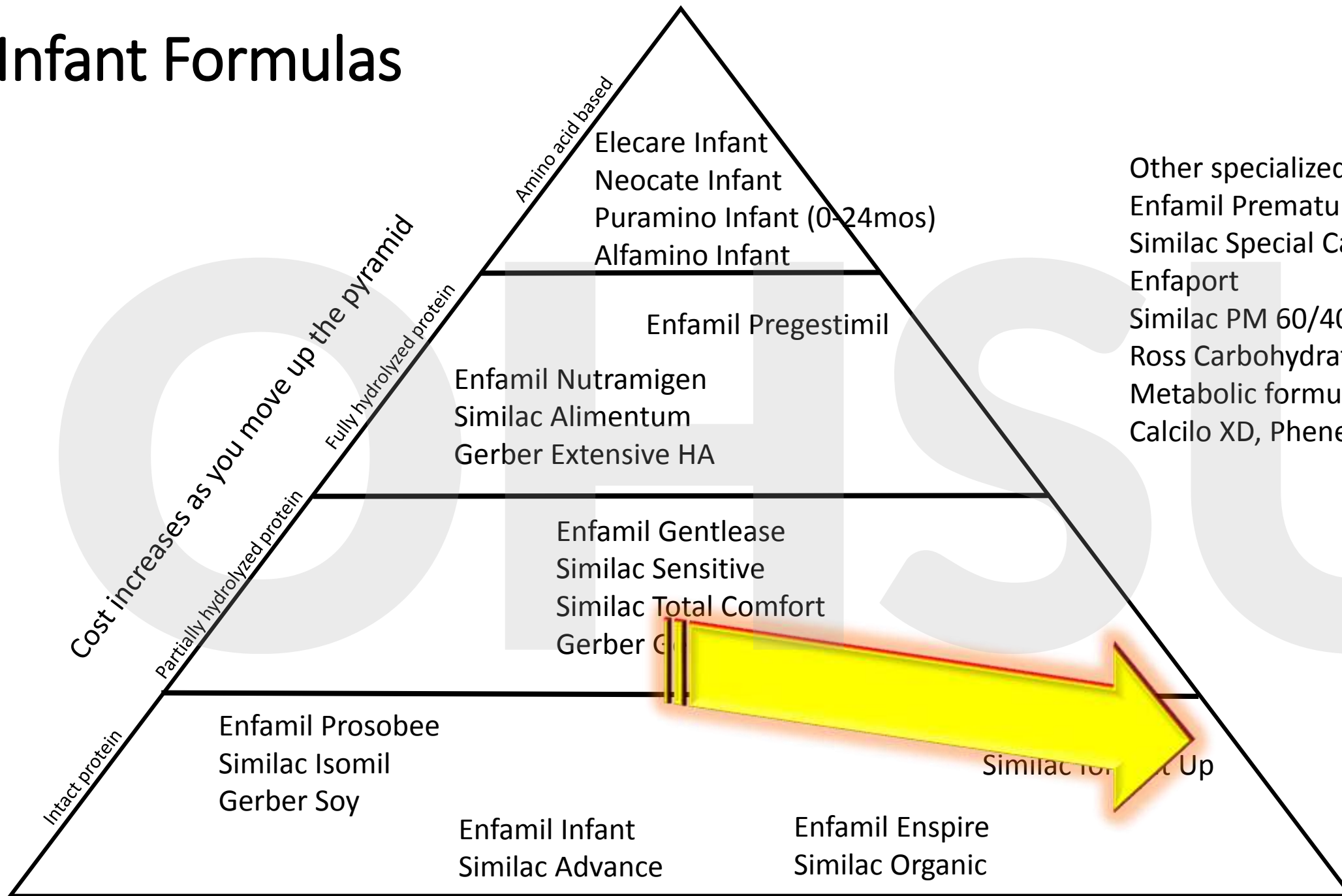
Objectives

- Understand infant and pediatric formulas and their appropriate uses
- Understand main vitamins and minerals of concern
- Review case study

Infant Formulas

- Breastmilk is best! But sometimes not available
- FDA regulated
- Standard concentration is 20 calories per ounce for majority of formulas
 - Special recipes to make formulas higher in calories if needed
 - Premature discharge formulas are 22calories per ounce standard mixing
- Main formula companies: Enfamil and Similac

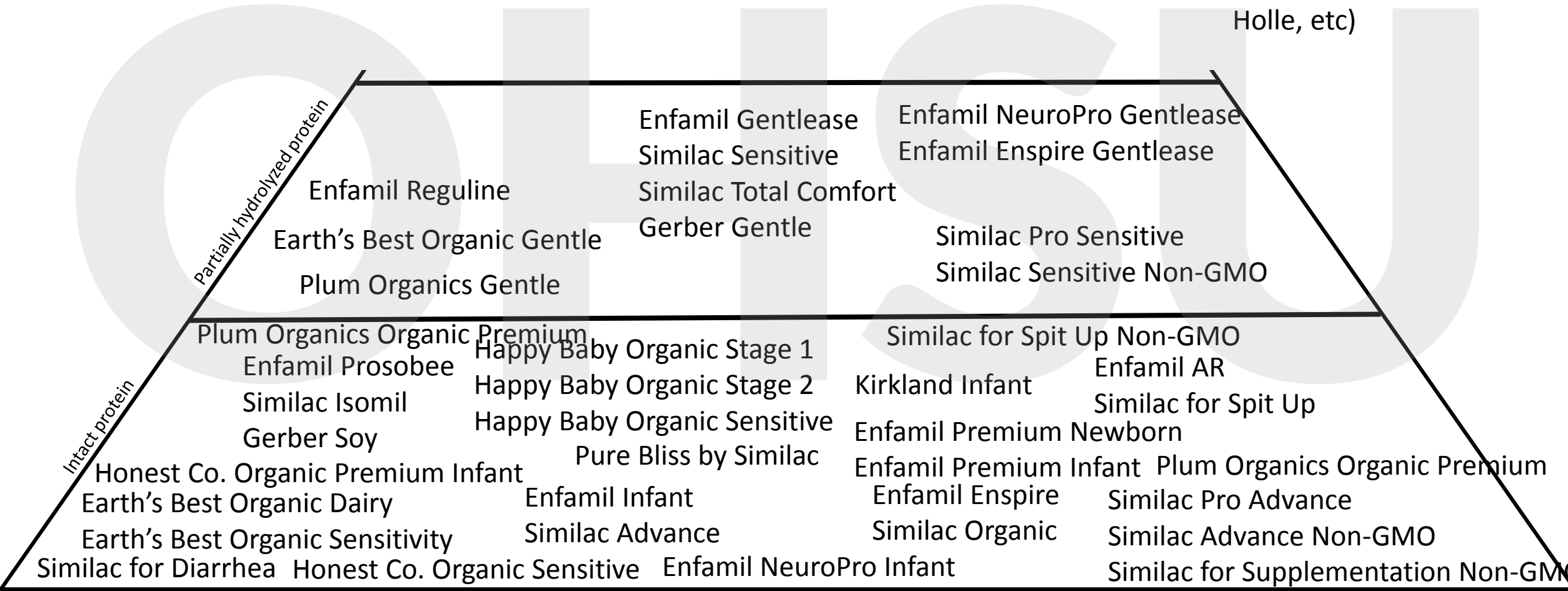
Infant Formulas



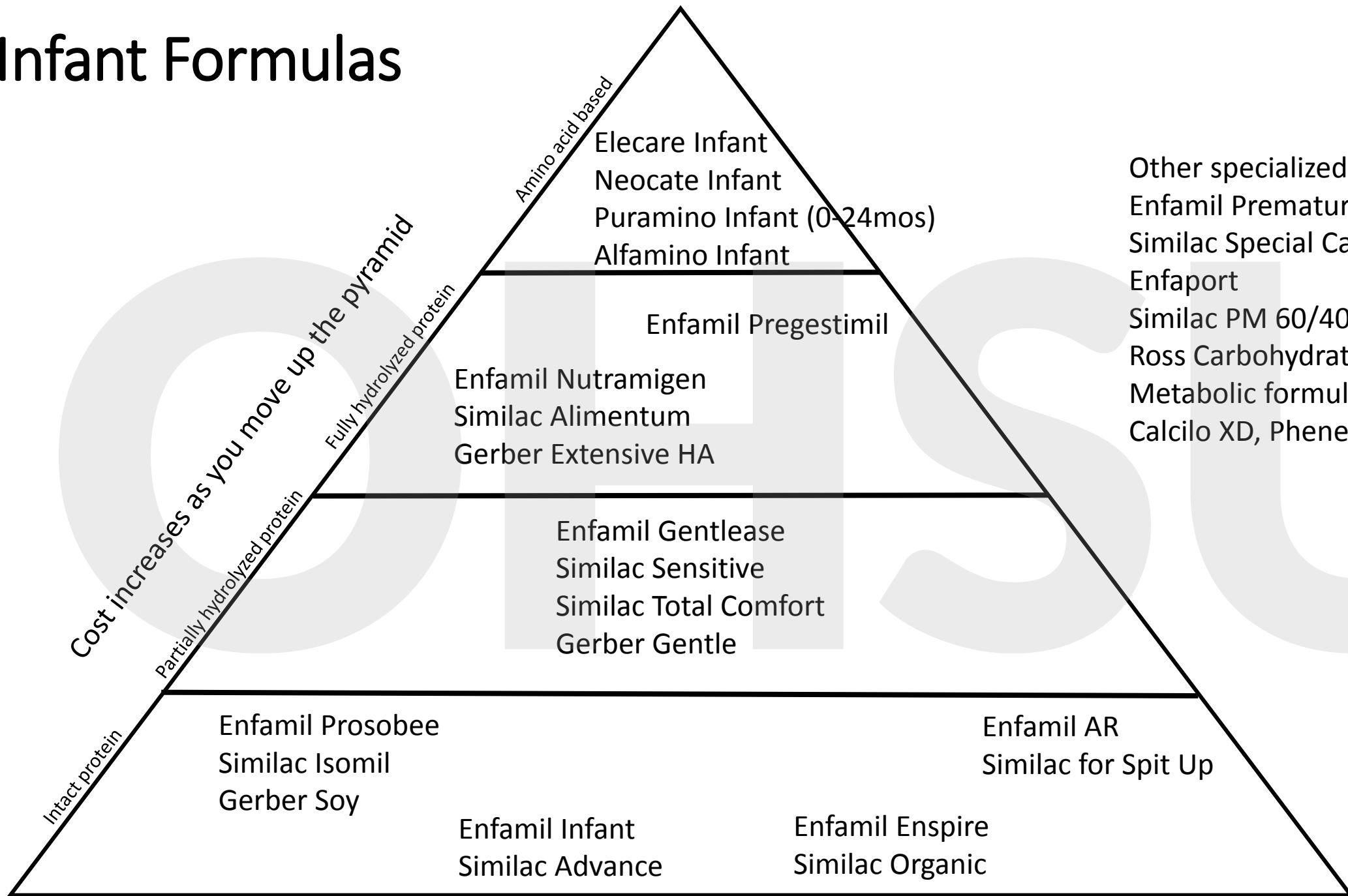
Other specialized formulas:
Enfamil Premature and EnfaCare
Similac Special Care and Neosure
Enfaport
Similac PM 60/40
Ross Carbohydrate Free Soy
Metabolic formulas (examples:
Calcilo XD, Phenex-1, LMD)

The bottom half of the pyramid really looks like this...

*Not included: Non-US formulas (such as HiPP, Holle, etc)

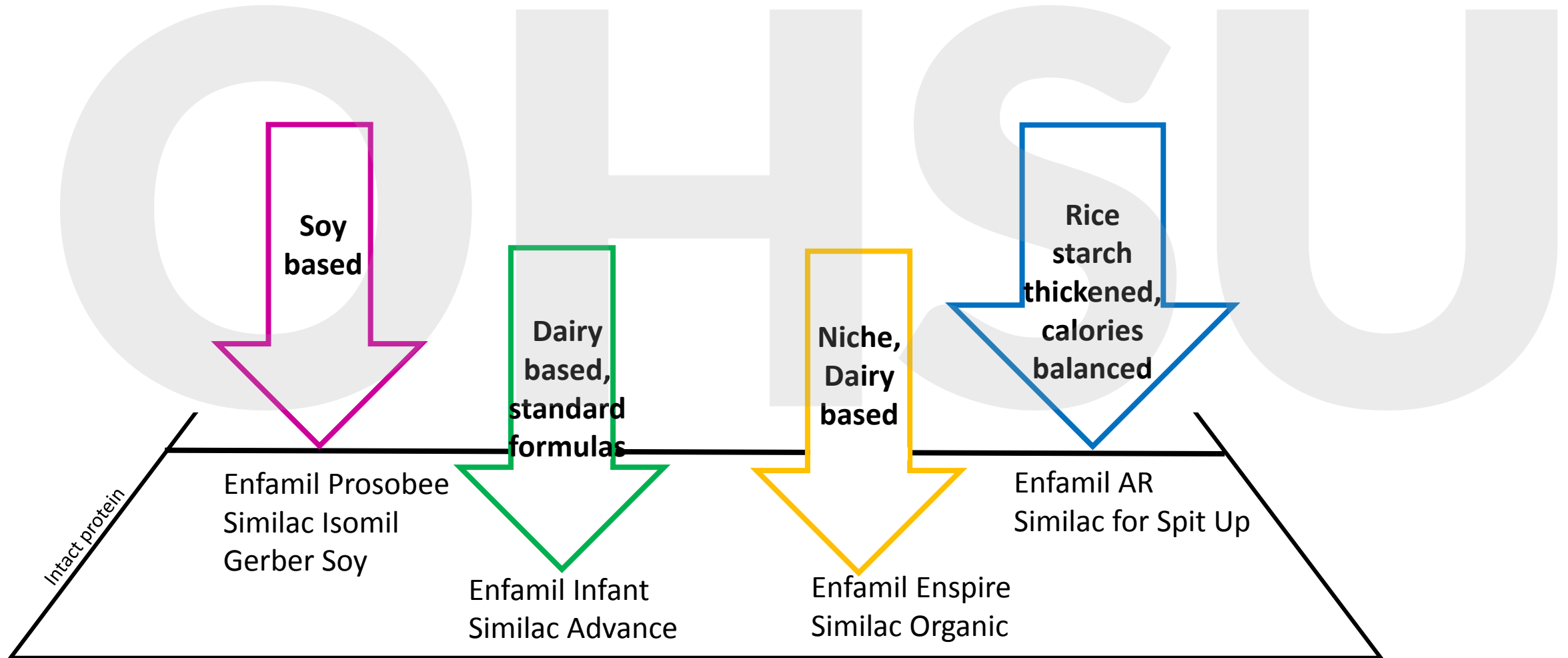


Infant Formulas

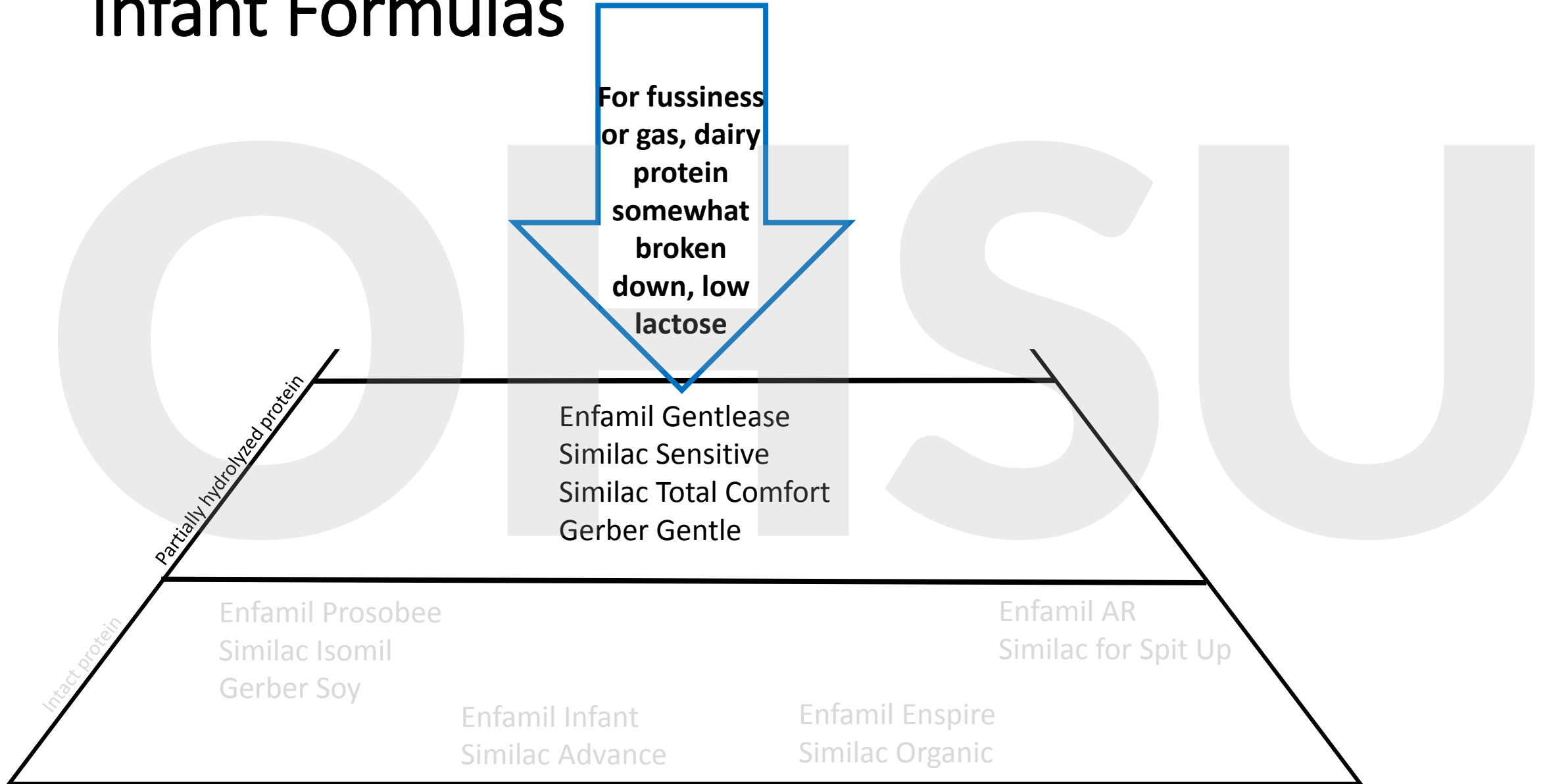


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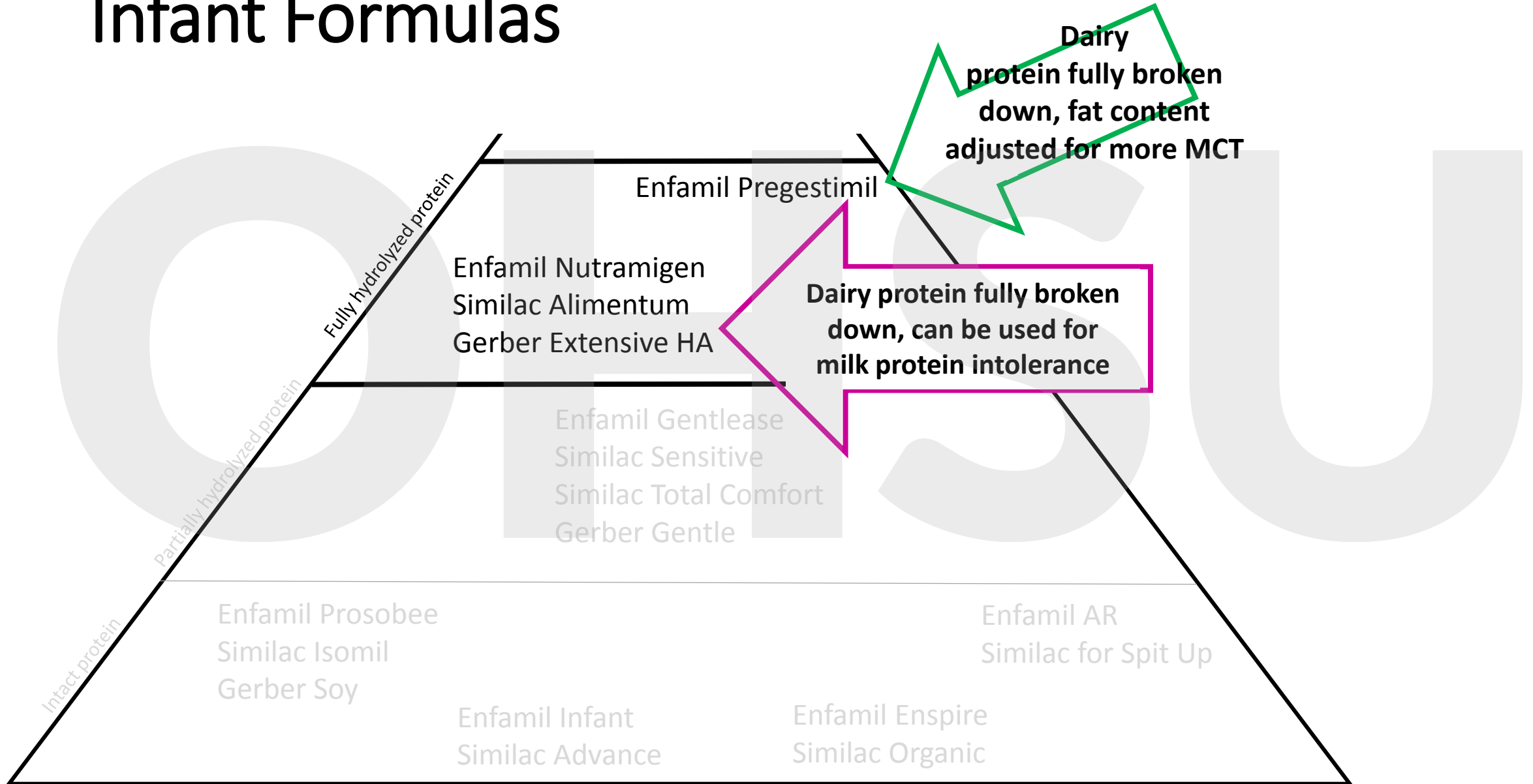
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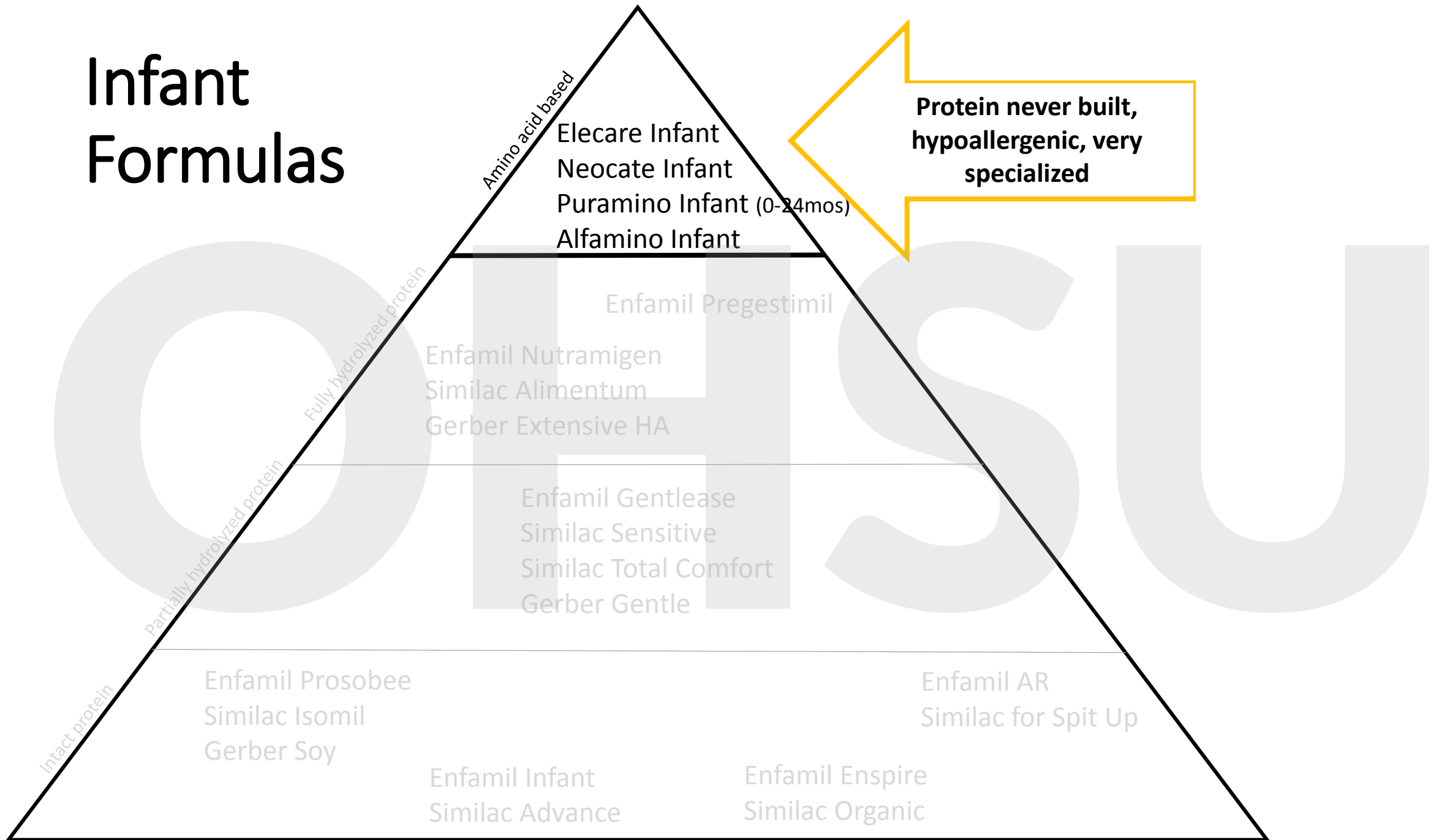
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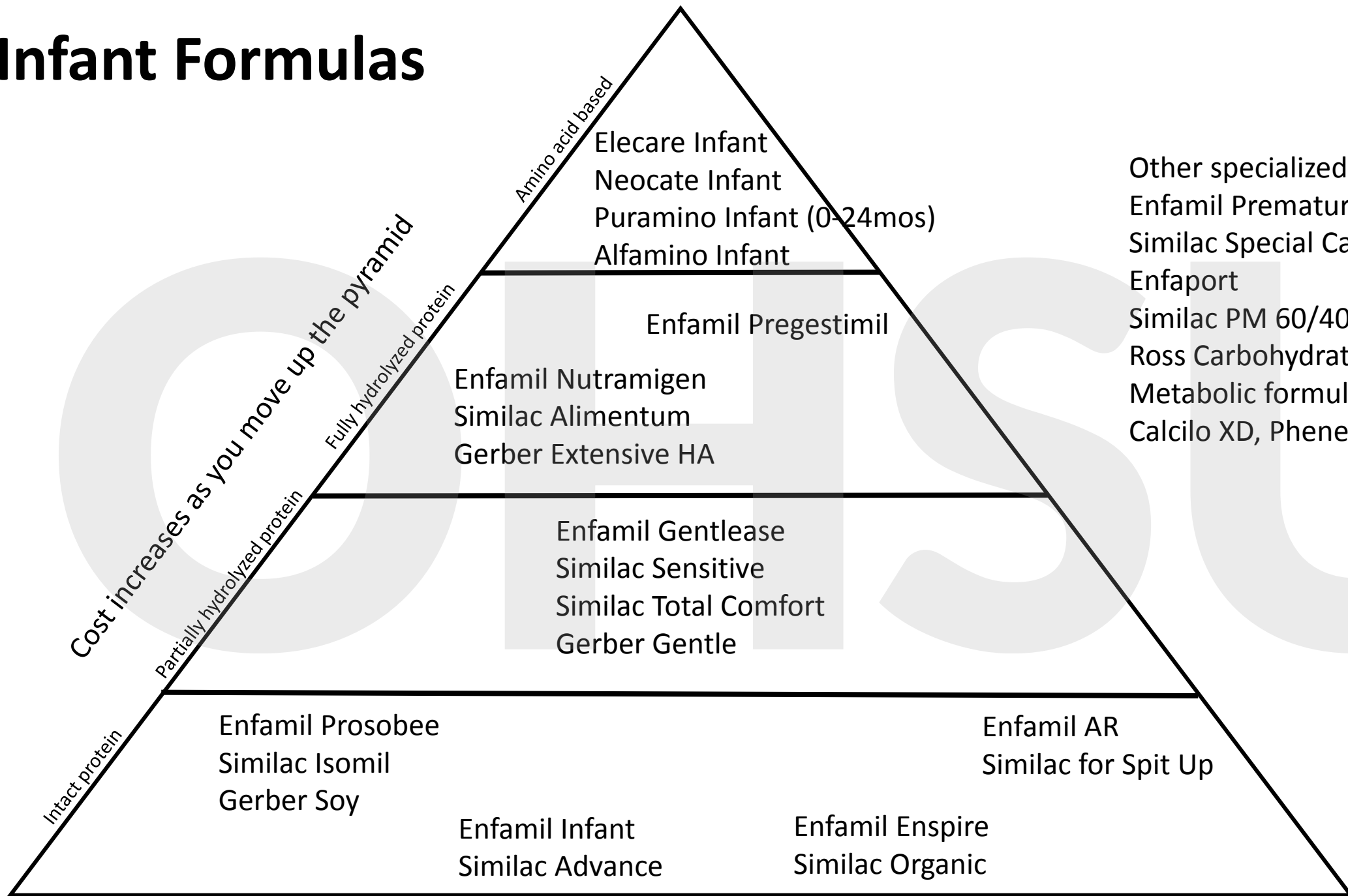
Infant Formulas



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Inappropriate Infant Milks

- Friend's breastmilk or Craigslist breastmilk
- Goat milk
- Homemade "infant formulas"
- Milk alternatives



Oh Dr. Google...



Google

ideos : More Settings Tools

best when it
the best choice

MATERNITYLEAGUE.COM
THE BEST BREAST MILK ALTERNATIVE
THE UNIVERSAL BREAST MILK ALTERNATIVE FOR HOME-BONDING MAMMALS
www.maternitylea...

Best Milk Alternatives for Babies -
www.faithful-to-nature.co.za > blog > the-b

Also ask

- a good substitute for breastmilk?
- milk is most like breast milk?
- milk closest to breastmilk?
- the most natural baby formula?

About goat milk...

- Goat milk is most similar in composition to cow's milk
- Goat milk is **NOT** like breastmilk
- Goat milk is not safe for any baby, but especially not for cow's milk protein intolerant/sensitive babies
- Homemade formulas using goat milk are NOT safe or nutritionally complete
- Raw goat milk can contain dangerous bacteria, including E. Coli, Salmonella, Listeria, Campylobacter
- If an infant is on goat milk, counsel about the dangers and send referral to Registered Dietitian

Nutrition Content Comparison

Per 100 calories	Breastmilk	Standard Infant Formula	Goat Milk
Calories per ounce	20	20	21
Protein	1.47g	2g	5.16g ↑
Calcium	46mg	78mg	194mg ↑
Folate	7μg	16μg	1μg ↓
Magnesium	4mg	8mg	20mg ↑
Potassium	73mg	108mg	296mg ↑
Sodium	24mg	27mg	72mg ↑

Nutrition Content Comparison

- Recommend Intake for Age: 1.6-2.2g/kg/day protein, 200-260mg/day of calcium, 65-80µg/day of folate, 30-75mg/day of magnesium, 400-700mg/day of potassium, and 120-370mg of sodium
- If baby drinks 800calories per day:

	Breastmilk	Standard Infant Formula	Goat Milk
Protein	12g	16g	41g ~3x more
Calcium	368mg	624mg	1,552mg ~4x more
Folate	56µg	128µg	8µg Only 12% of need
Magnesium	32mg	64mg	160mg ~5x more
Potassium	584mg	864mg	2,368mg ~4x more
Sodium	192mg	216mg	576mg ~3x more

International Formulas

- HiPP, Holle, etc are popular
- Unable to recommended at this time
- Per article: “The potential dangers are numerous. Children can fall ill or become malnourished if parents inadvertently use an incorrect formula-to-water ratio; unofficial formula vendors may not store the powdered formula properly, raising the possibility of bacterial contamination, product deterioration or loss in nutrient density; there is no system in place to notify consumers in the United States if any of these formulas are recalled; and while many European formulas contain the nutrients required in the United States, some do not. In addition, parents in the United States may not realize that European formulas labeled hypoallergenic aren’t meant for children with cow’s milk allergies.”



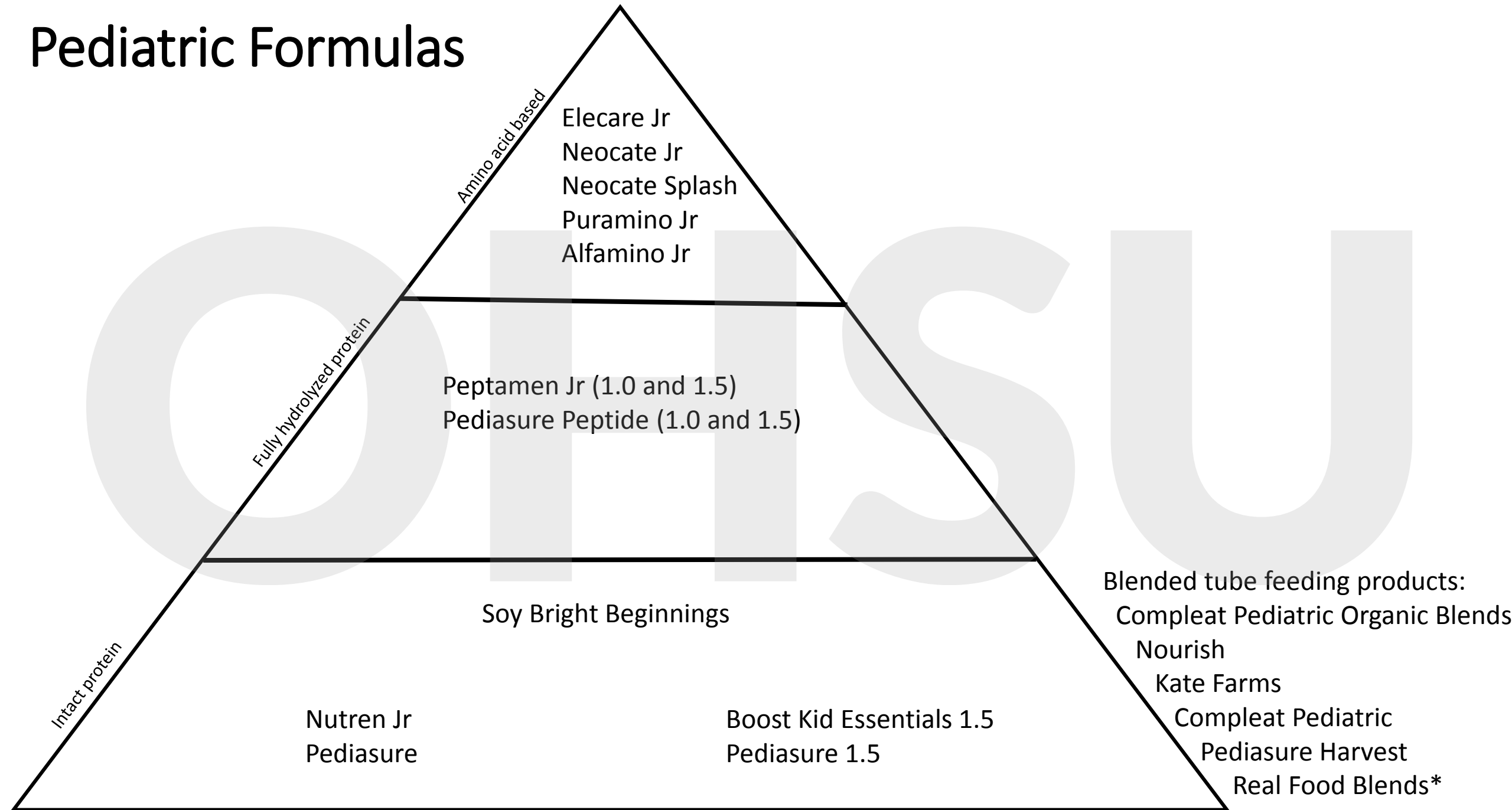
The image is a screenshot of a web page from 'Parenting' magazine. At the top, the logo 'Parenting' is displayed in a serif font. Below the logo, there are navigation links: 'Stages', 'Life as a Parent', 'All Topics', 'Guides', and 'Milestones'. The main content area features a teal-colored header 'FEEDING & NUTRITION'. The article title is 'European Baby Formula That Is Illegally Sold in the United States Carries Risks, Pediatricians Warn'. Below the title, the text reads: 'HiPP, Holle and other brands are not registered with the F.D.A., but that hasn't stopped parents from buying them from third-party vendors.' The author information is 'By Christina Caron and Jessica Grose' and the date is 'June 11, 2019'.

Source: <https://parenting.nytimes.com/feeding/european-baby-formula>

Pediatric Formulas

- Oral supplements or tube feeds
- Complete nutrition source
- Most formulas are 30 calorie per ounce or 45 calorie per ounce
- Main formula companies: Abbott and Nestle
- Blended tube feeding products are gaining in popularity

Pediatric Formulas



Elecare Jr
Neocate Jr
Neocate Splash
Puramino Jr
Alfamino Jr

Peptamen Jr (1.0 and 1.5)
Pediasure Peptide (1.0 and 1.5)

Soy Bright Beginnings

Nutren Jr
Pediasure

Boost Kid Essentials 1.5
Pediasure 1.5

Blended tube feeding products:
Compleat Pediatric Organic Blends
Nourish
Kate Farms
Compleat Pediatric
Pediasure Harvest
Real Food Blends*

Thankfully
only expands
a little more...

Not included are “toddler beverages”
or metabolic formulas

Amino acid based

Elecare Jr
Neocate Jr
Neocate Splash
Puramino Jr
Alfamino Jr

Fully hydrolyzed protein

Peptamen Jr (1.0 and 1.5)
Pediasure Peptide (1.0 and 1.5)
1.0 comes in unflavored,
vanilla, strawberry
1.5 comes in vanilla

Other specialized formulas:
Portagen
KetoCal
KetoVie
RCF

Intact protein

Pediasure powder
Pediasure with Fiber
Pediasure Sidekicks
Pediasure Enteral
Pediasure Enteral with Fiber
Nutren Jr
Pediasure

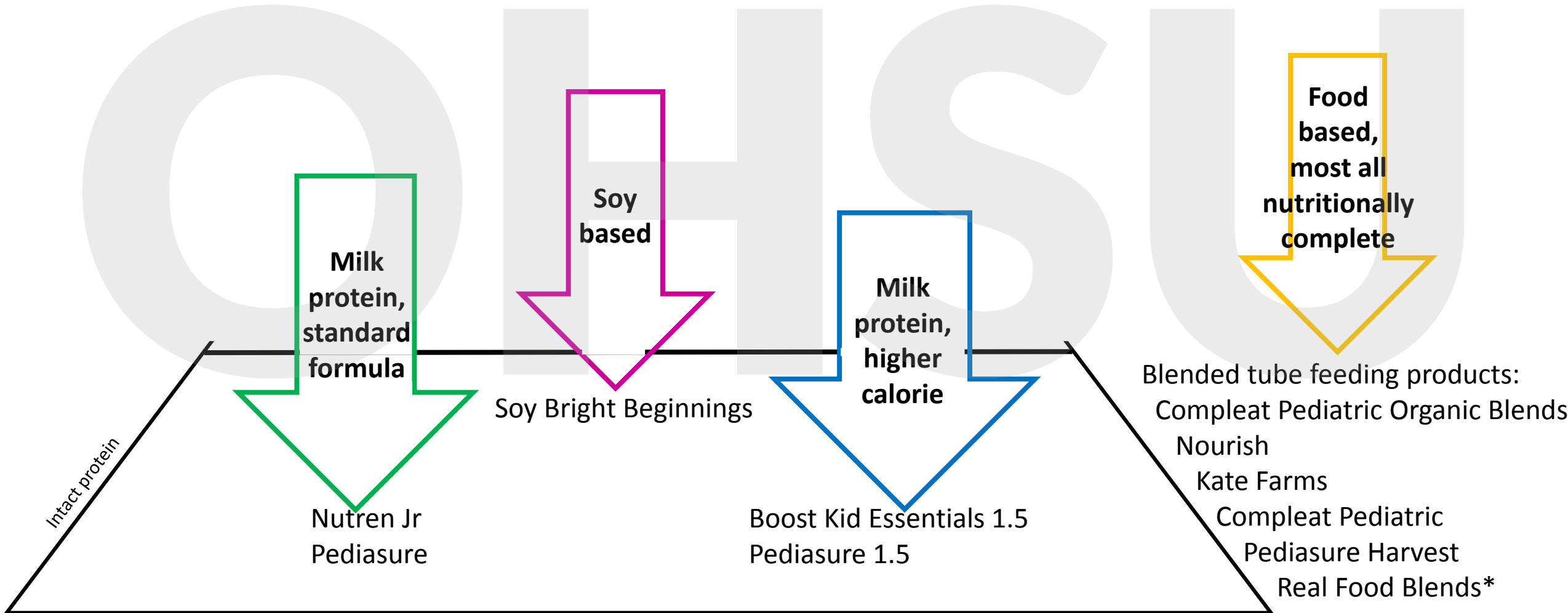
Soy Bright Beginnings

Pediasure 1.5 with Fiber

Boost Kid Essentials 1.5
Pediasure 1.5

Blended tube feeding products:
Compleat Pediatric Organic Blends
Nourish
Kate Farms
Compleat Pediatric
Pediasure Harvest
Real Food Blends*

Pediatric Formulas



Pediatric Formulas

Dairy protein broken down

Fully hydrolyzed protein

Peptamen Jr (1.0 and 1.5)
Pediasure Peptide (1.0 and 1.5)

Soy Bright Beginnings

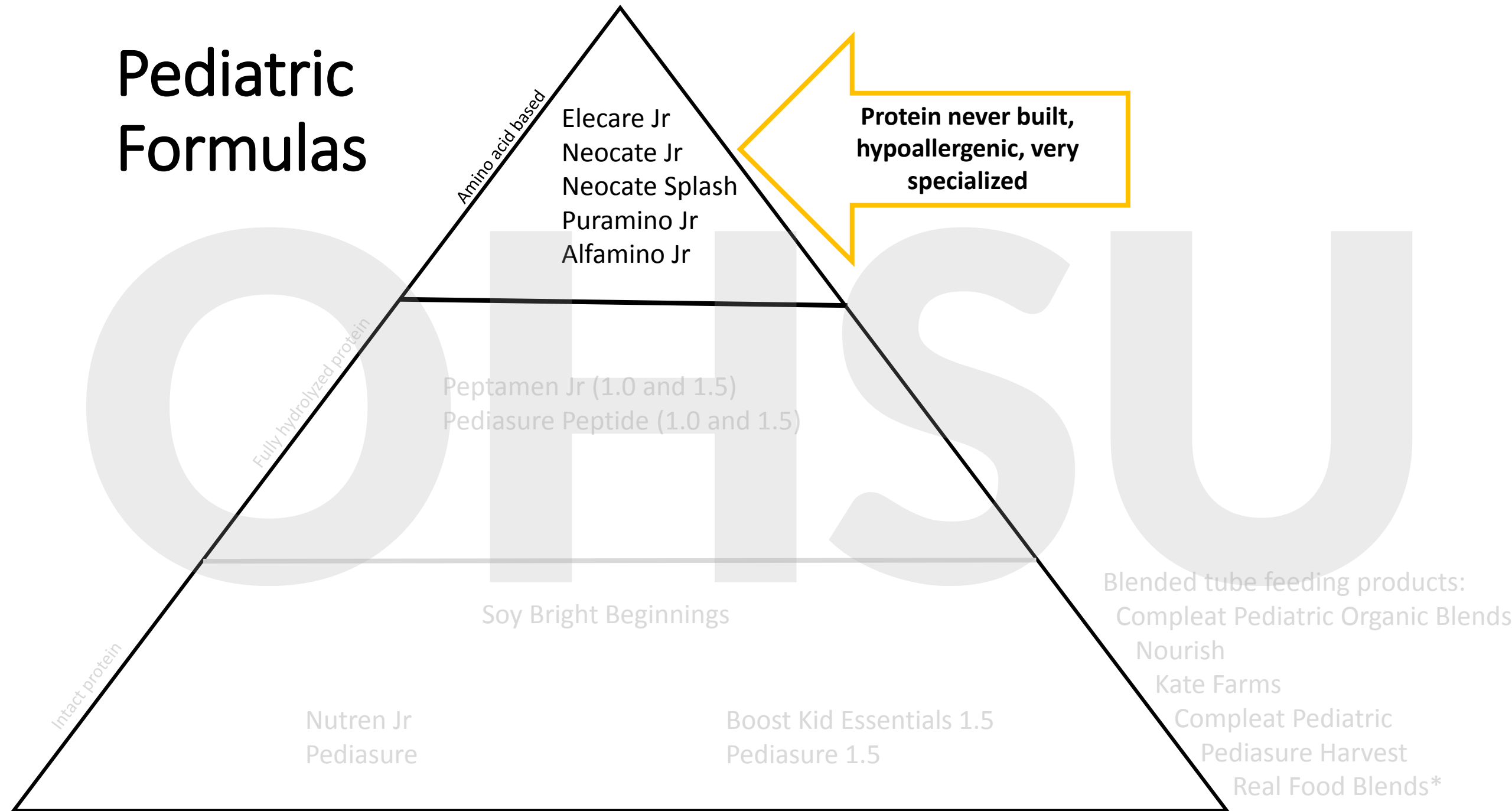
Intact protein

Nutren Jr
Pediasure

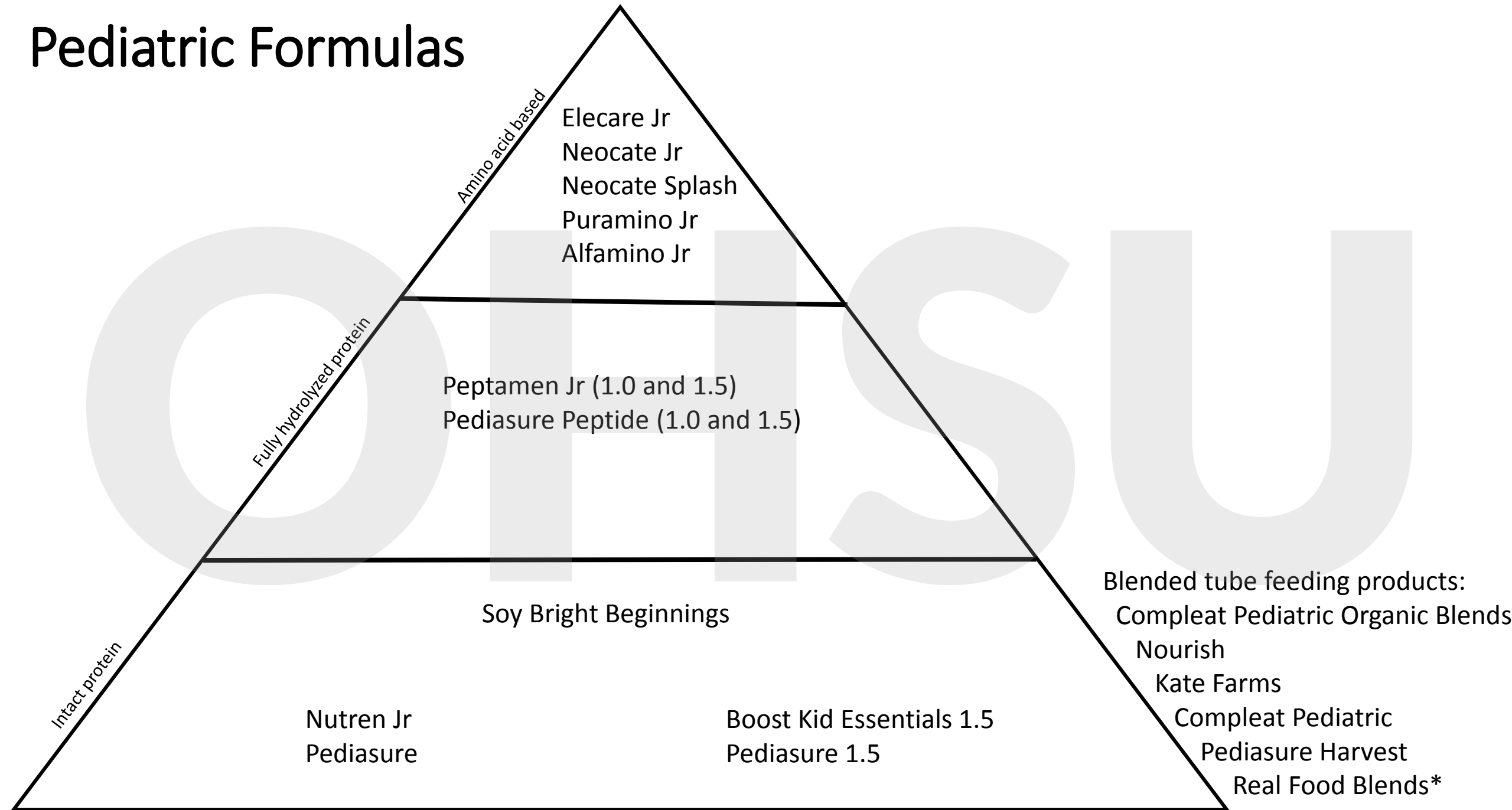
Boost Kid Essentials 1.5
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Pediatric Formulas



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Peptamen Jr (1.0 and 1.5)
Pediasure Peptide (1.0 and 1.5)

Soy Bright Beginnings

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Vitamins

- Not all diets are nutritionally complete
- Malnutrition can come in many forms
- Vitamin supplements are sometimes needed
 - Limited diets due to picky eating, medical conditions, choice
 - Conditions that cause malabsorption
 - Geography
 - Increased nutrient needs, metabolic conditions

Dietary Supplement Regulation

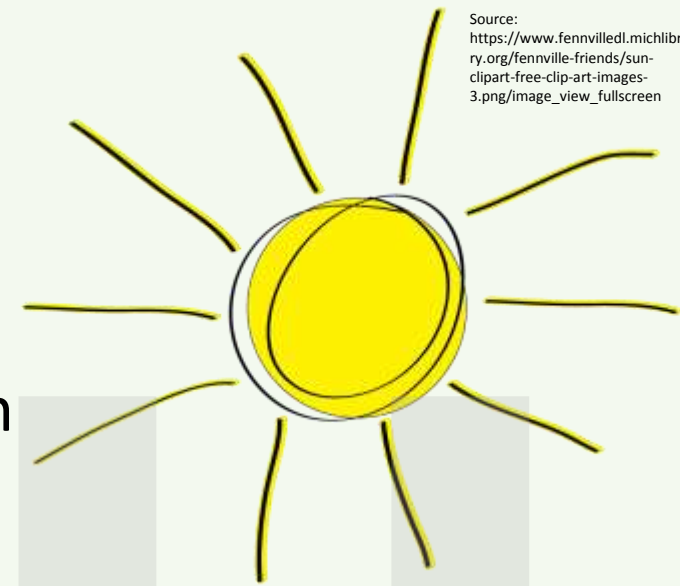
- Dietary Supplement Health and Education Act of 1994 (DSHEA)
- Manufacturers and distributors prohibited from marketing adulterated or misbranded products
 - **Manufacturers and distributors are responsible for evaluating the safety and labeling of their products**
- FDA will take action against adulterated or misbranded dietary supplements **after it reaches the market**

Vitamin Supplements

- Ensure that it's age appropriate
- Not excessive
- Iron or no iron?
- Supplement specific vitamins based on lab values
 - Vitamin D (25HD Vitamin D)
 - Iron (CBC, Iron panel, ferritin)

Vitamin D

- Important for calcium absorption and bone mineralization
- Naturally in very few foods
- Breastfed infants require 400 international units daily of vitamin D
- Formula fed infants may need additional vitamin D depending on volume of formula consumed
- Older children, vitamin D should be supplemented based on lab values
 - Deficient vs. insufficient
 - Age of patient
 - Ergocalciferol (D2) or Cholecalciferol (D3)
- Recheck lab after 2-3mos of supplementing



Source:
https://www.fennvilledl.michlibrary.org/fennville-friends/sun-clipart-free-clip-art-images-3.png/image_view_fullscreen

Iron

- Important for formation of hemoglobin and other blood and muscle proteins as well as enzymes
- Food sources:
 - Heme: beef, poultry, shrimp, eggs
 - Non-heme: instant oatmeal, kidney beans, tofu, spinach
- Iron absorption is increased with vitamin C
- Calcium can decrease iron absorption
- Iron be constipating, change stool color
- Supplementation based on lab values



Elimination Diets

- Many people are on elimination diets
- Personal choice vs. experience with food vs. medical diagnosis
- These are not without risks
- Diet is easy to change on own, but should be guided to ensure adequacy
- Counsel on substitutions

Foods	Main nutrients
Cow's milk	Protein, calcium, magnesium, phosphorus, vitamins A, B6, B12, D, riboflavin, pantothenic acid (iodine in some countries)
Soy	Protein, calcium, phosphorus, magnesium, iron, zinc, thiamin, riboflavin, vitamin B6, folate
Eggs	Protein, iron, selenium, biotin, vitamin A, B12, pantothenic acid, folate, riboflavin
Wheat	Carbohydrate, zinc, selenium, thiamin, niacin, riboflavin, folic acid, iron, magnesium, dietary fiber
Peanut/tree nut	Protein, selenium, zinc, manganese, magnesium, niacin, phosphorus, vitamins E, B12, alpha linolenic acid, linoleic acid
Fish/shellfish	Protein, iodine, zinc, phosphorus, selenium, niacin Fatty fish: vitamins A, D, omega-3 fatty acids

Case Study

- 14yo boy presents with fatigue
- Overall healthy and well nourished per growth charts
- Picky eater
- Blood tests found macrocytic anemia and low vitamin B12. No antibodies to intrinsic factor or tissue transglutaminase
- Given vitamin B12 injections and “dietary advice”

Case Study

- Now 15yo developed hearing loss followed by vision symptoms
- MRI and ophthalmology exam were normal
- 2yrs later: progressive vision loss found to have optic neuropathy with 20/200 vision
- Neurologic exam and another MRI were normal
- Genetic tests, GI scope/biospies, Fibroscan were all normal

	Result	Reference Range
Hemoglobin, g/L	148	130-160
Mean corpuscular volume, fL	100.4	83-100
Platelets, x10 ⁹ cells/L	250	150-450
Creatinine, mg/dL	0.5	0.7-1.2
Total bilirubin, mg/dL	1.3	<1.2
Alk Phos μ kat/L	4.2	1-2.7
Total protein, g/L	74	60-80
Adjusted calcium, mmol/L	2.23	2.2-2.6
CRP, nmol/L	<9.5	<57.1

	Result	Reference Range
Vitamin A, $\mu\text{mol/L}$	0.8	0.8-2.2
Vitamin E, $\mu\text{mol/L}$	14.3	10.2-39
25HD Vitamin D, nmol/L	10	>50
Vitamin B12, pmol/L	135	132.8-664
Ferritin, pmol/L	90.8	74.2-898.9
Serum folate, nmol/L	9.2	5.7-44.3
Zinc, $\mu\text{mol/L}$	26.8	11-23
Copper, $\mu\text{mol/L}$	9.8	12-23
Selenium, $\mu\text{mol/L}$	0.55	0.59-1.65
Manganese, nmol/L	91.8	72.8-218.5
Homocysteine, $\mu\text{mol/L}$	47.1	2-14.3
Methylmalonic acid (urine), $\mu\text{mol/mmol}$	7.2	0.7-3.2

Case Study

- Persistent macrocytosis with normal ferritin, folate, and B12
- Homocysteine and MMA levels elevated indicating functional B12 deficiency, which led to nutritional evaluation
- No alcohol or smoking
- Growth was good
- Since elementary school has avoided foods with certain textures
- Will eat French fries, chips, white bread, ham lunchmeat, and sausage
- Didn't finish previous vitamin B12 injections

Case Study

- Provided supplements and referred to mental health for an eating disorder
- Vision stabilized, but did not improve
- Delayed diagnosis possibly d/t treated vitamin B12 deficiency. Homocysteine and methylmalonic acid are more sensitive indicators of functional vitamin B12 deficiency
- BMI is not the only indicator of malnutrition

References

- Groetch M, Verter C, Skypala I, Vlieg-Boerstra B, Grimshaw K, Durban R, et al. Dietary Therapy and Nutrition Management of Eosinophilic Esophagitis: A Work Group Report of the American Academy of Allergy, Asthma, and Immunology. *J Allergy Clin Immunol* Mar/Apr 2017; 5(2), 312-324.e29
- Harrison R, Warburton V, Lux A, Atan D. Observation: Case Report: Blindness Caused by Junk Food Diet. *A of Internal Medicine* Sept 2019

Questions?



Thank you!