

# *Nutrition for Patients with in Thalassemia*

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# Outline

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- Why are patients at risk for deficiency?
- Importance of some key nutrients
  - Vitamin D, Zinc, Vitamin C
- Supplementation
- Practical suggestions

# Why are Patients with Thalassemia at Risk for Nutritional Deficiencies?

## Intake

- Tired – poor appetite / intake
- Consumption of empty calories
- Food intolerances (e.g. lactose) leads to decreased consumption
- Avoidance of certain foods (iron) limits zinc & protein intake
- Replacement of nutrient dense beverages with tea
- Nausea, cramping from use of oral chelators leads to missed meals

## Expenditure

- Increased energy expenditure
- Increased losses of minerals (Zinc) from chelation therapy
- Increased iron in the body leads to increased oxidative stress & uses up antioxidants (Vit C, E)

**Intake < Expenditure**

# Vitamin D: The “Sunshine Vitamin”



“Schlitz with Sunshine Vit D gives you the sunny source of energy you need the whole year round.

Beer is good for you,  
but Schlitz with Sunshine  
vitamin D is  
extra good for you.”



# Vitamin D: Why is it so Important?

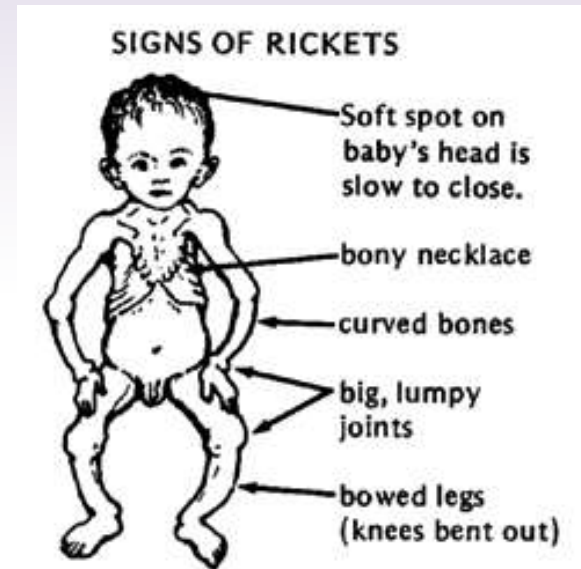
## Skeletal:

Mineralization of osteoid-  
requires 1,25 OH

Severe deficiency: Rickets → children  
Osteoporosis & fracture → adults

Osteomalacia → bone pain

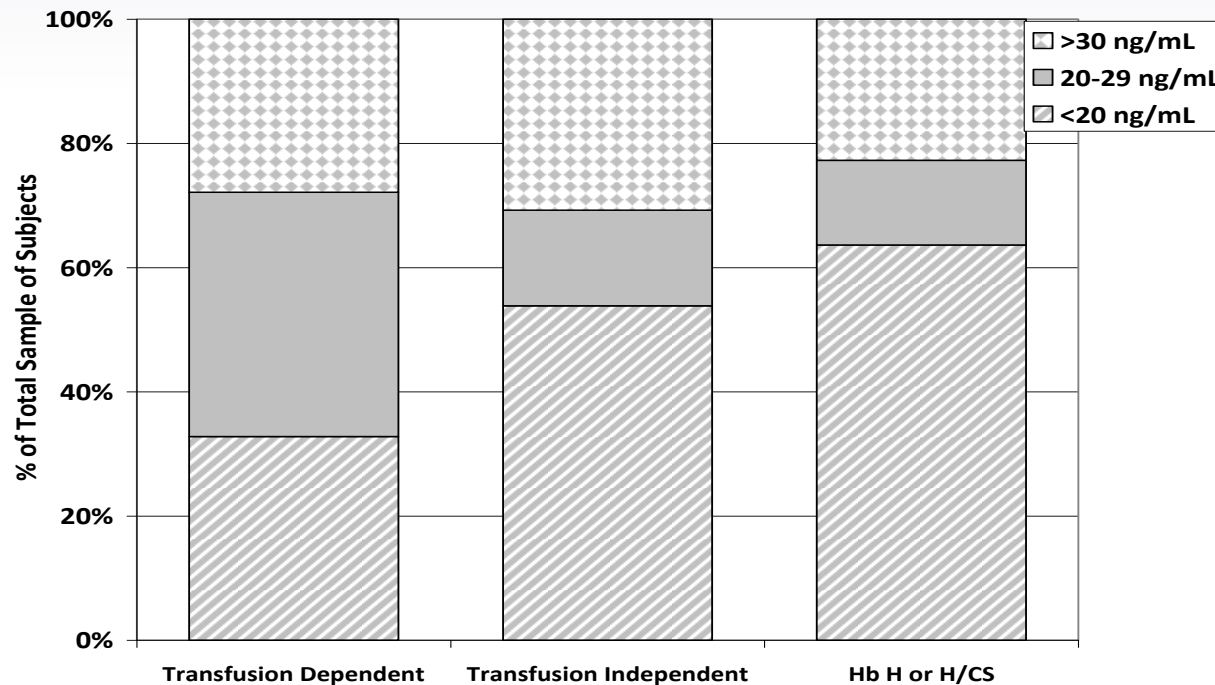
Maternal vitamin D levels linked to infant &  
childhood bone mass



# Vitamin D & Bone Health in Thalassemia

- Patients with Thalassemia are deficient in Vitamin D
- Patients with low levels of vitamin D have lower bone mass

*Vogiatzi, 2008; Soliman 2013*



*Fung EB et al, AJH2011*

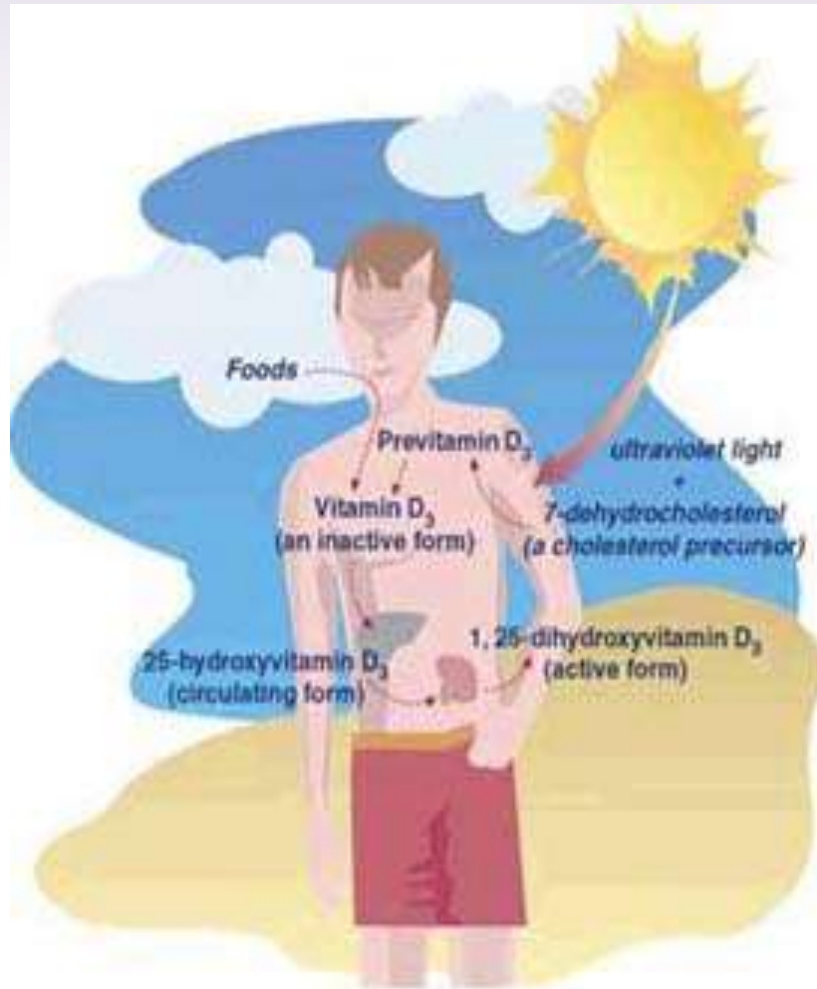
Similar results in TCRN Study n=361

VDD=12%; Sufficient only 18% no difference by diagnosis

Higher in Summer months, lower in adolescents & Asians

*Vogiatzi BJH 2009*

# Where do we get Vitamin D?

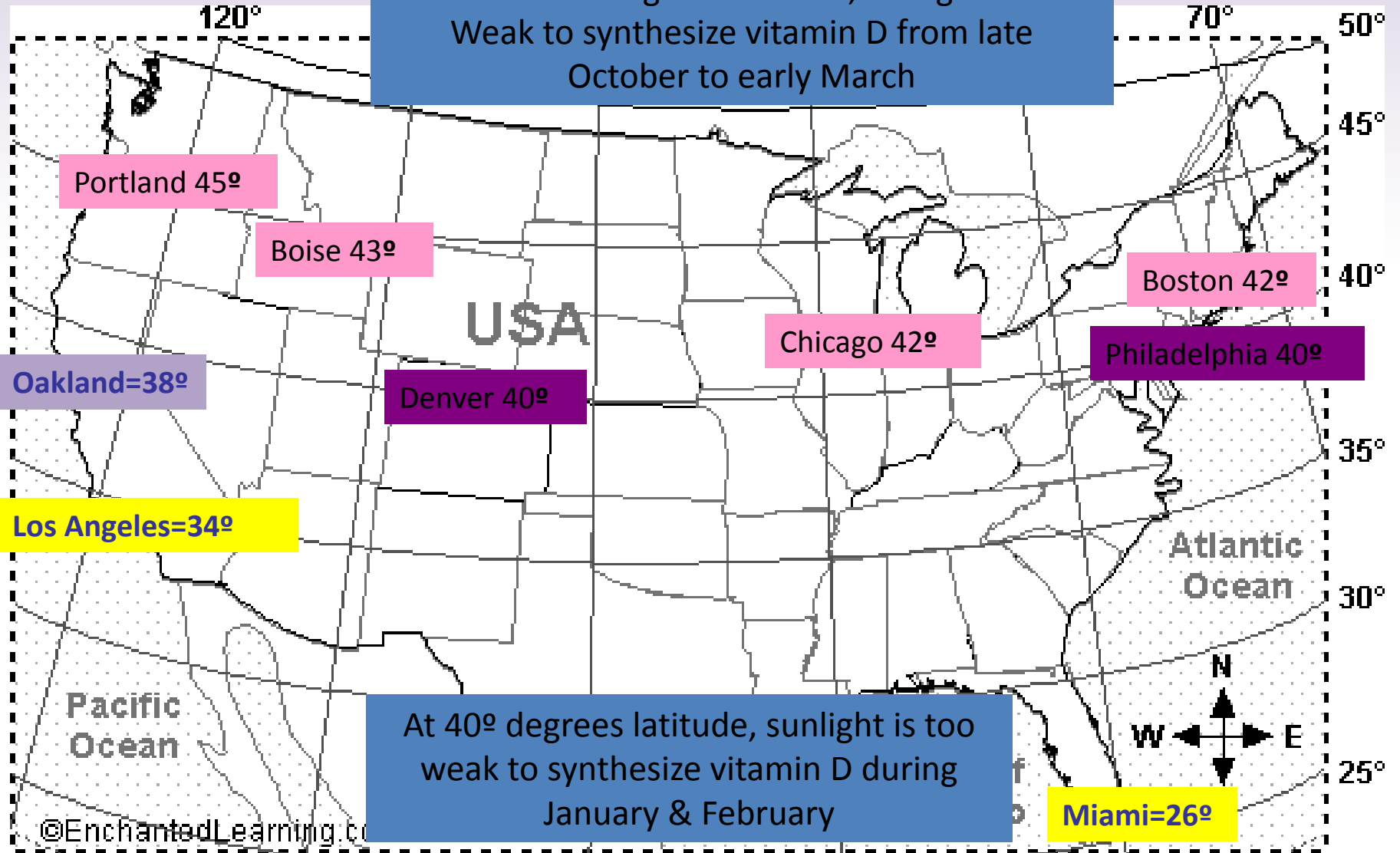


80-90% vitamin D synthesized  
10-20% from the diet

Factors to consider:

- latitude, season, altitude
- cloud cover, air quality
- time of day, clothing
- skin pigmentation
- sun screen use

North of 42° degrees latitude, sunlight is too weak to synthesize vitamin D from late October to early March



At 40° degrees latitude, sunlight is too weak to synthesize vitamin D during January & February



# Where is Vitamin D in our Food?



100 IU/cup

Swordfish 566 IU/serving  
Salmon 350 IU/ serving  
Cod Liver Oil 1360 IU / Tbsp



60 IU/serving

100 IU/cup



100 IU/cup



# How Much Vitamin D Intake to reach Sufficiency?

80 nmol/L (32 ng/mL)

Mean vitamin D Status of Healthy U.S. population in winter months at lower latitudes...

- Males 12-29 yrs

- White 83.4 nmol/L -----
- Black 50.0 nmol/L 1714 IU/day

- Females 12-29 yrs

- White 74.8 nmol/L 297 IU/day
- Black 42.3 nmol/L 2154 IU/day

*Translation... with Dark Skin need 1700 – 2200 IU/day*

# Vitamin D Supplementation in Thalassemia

## Regimen:

Test annually

If <20 ng/mL

Supplement

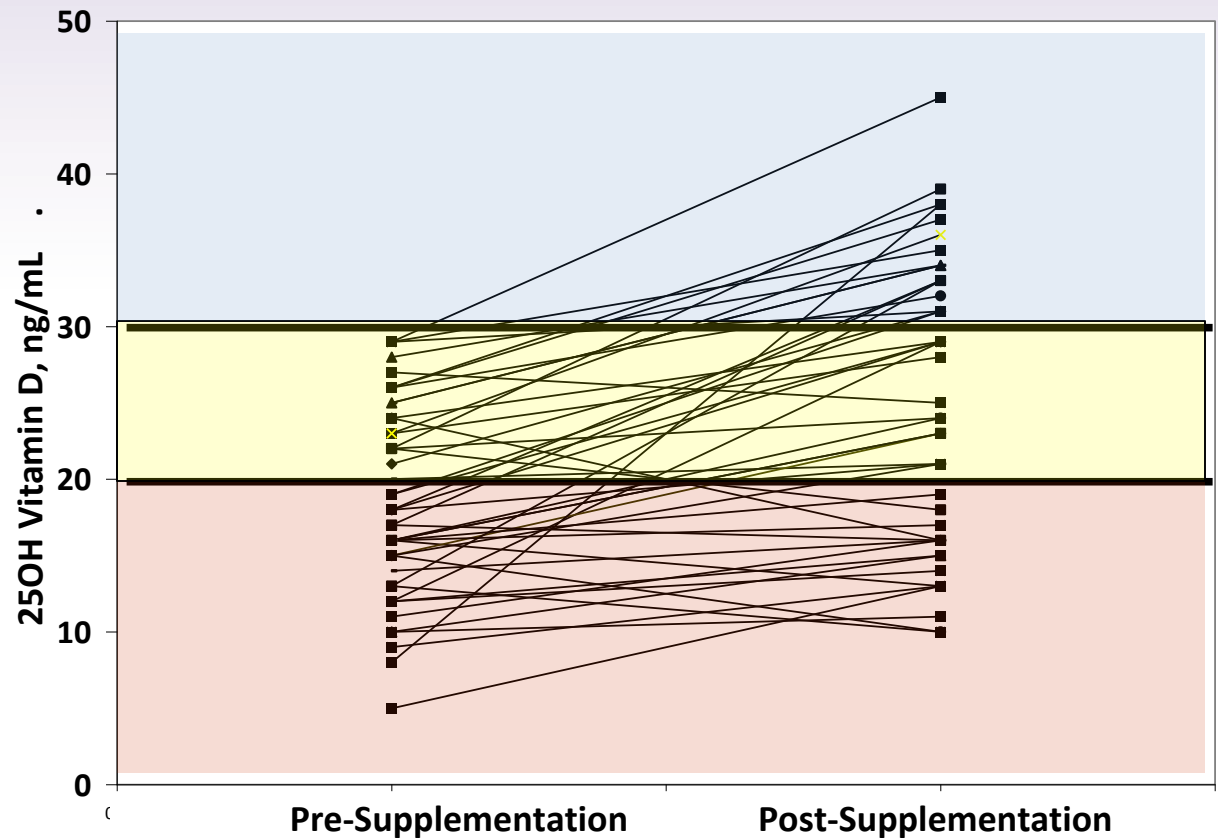
with **50,000 IU D2**

q 3 weeks

at time of transfusion

**(2,380 IU/d)**

Repeat Vitamin D level  
after 6-8 doses



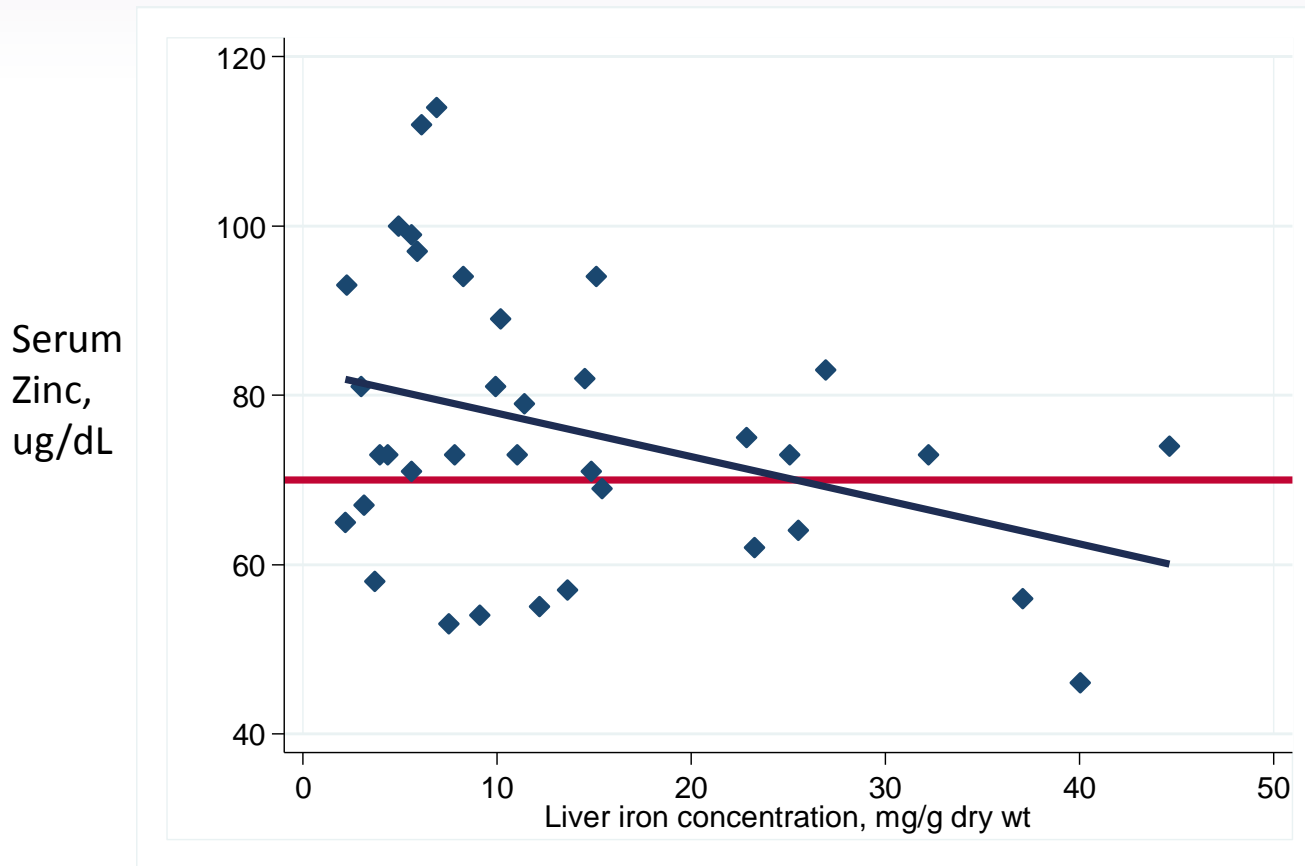
10 ng/dL = 10 doses of D2 to > 30 ng/dL

# Zinc: "For the Common Cold"



# Zinc Deficiency in Thalassemia

- Zinc Deficiency is common...~25% of patients have low zinc levels



*A significant  
inverse correlation  
was observed  
between  
LIC &  
serum zinc  
 $r = -0.34$ ,  $p = 0.037$*

# Zinc: Why is it Important for Thalassemia?

- Optimal Immune Function
- Optimal Growth
- Bone Health / Bone Density ~ Fracture Reduction?
- Pubertal Development
- Glucose Homeostasis ~ Diabetes Prevention?

*Arcasoy, 1987; Fung, 2013; Fung, 2015; Bekheirnia 2004 & 2007  
Dehshal 2007; Shamshirsaz 2007*

# Where is Zinc in our Food?



**DRI Zinc Males: 11 mg**  
**Females: 8 mg**

*How much do you Thal need?*  
**15-25 mg/day**

Oysters: 74 mg/serving

Crab: 6.5 mg/3 oz

Cereal: 3.8 mg/serving

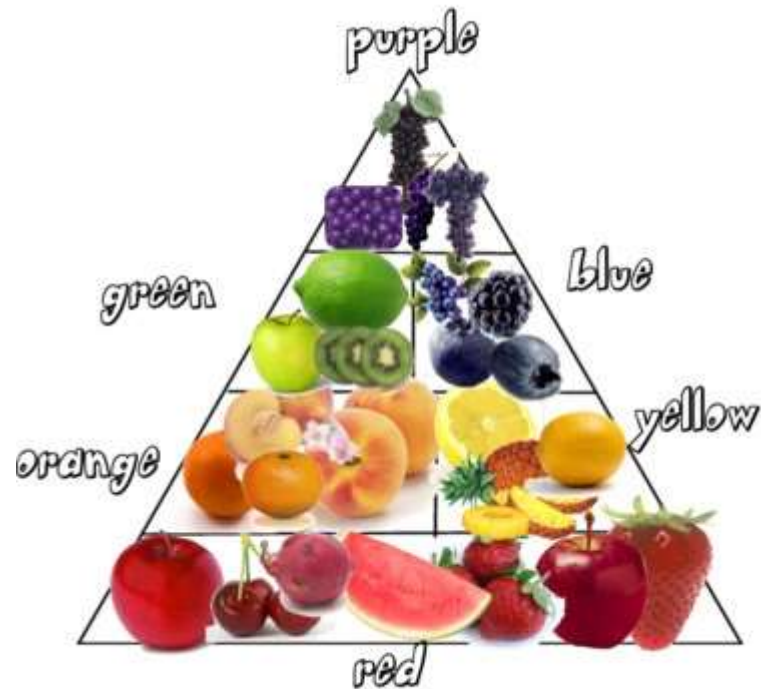
Chicken: 2.4 mg/serving

Yogurt: 1.7 mg/8 oz

Peanuts: 1.6 mg

# Vitamin C: Why is it so Important?

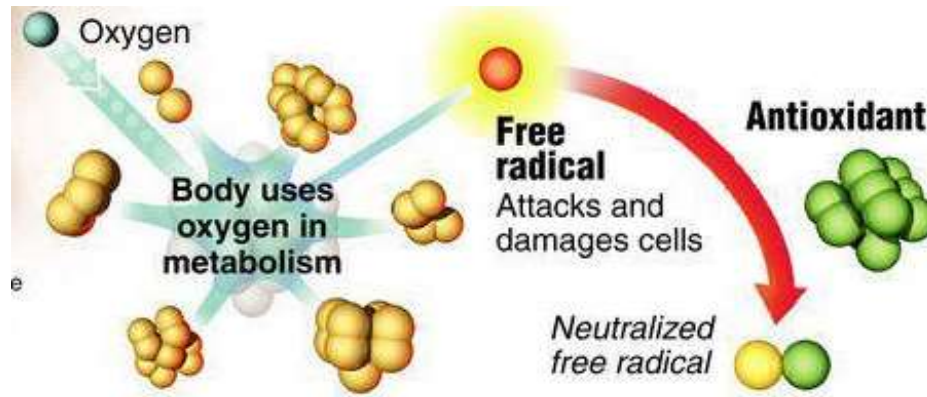
- Antioxidant Functions
- Iron Metabolism





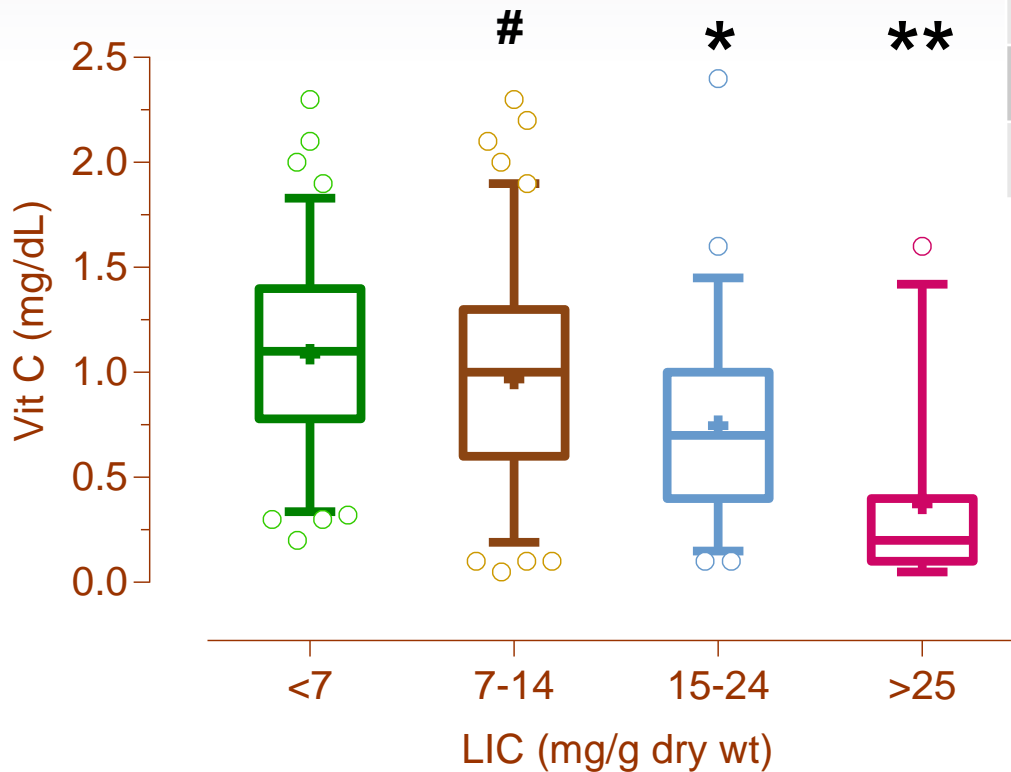
# Vitamin C as an Antioxidant

- “Free Radicals” are small, cell-damaging molecules produced by the body as waste products
- Antioxidants neutralize them



Patients with Thalassemia have more Free Radicals and Oxidative Stress due to high levels of iron in the body

# Vitamin C & Iron



LIC (mg/g)	Vitamin C (mg/dL)	Observations
<7	1.09 ± 0.44	86
7-14	0.97 ± 0.50	99
15-24	0.75 ± 0.42	49
>25	0.37 ± 0.43	37

**Steep decline in Vitamin C when LIC exceeds 15 mg/g dry wt**

# Vitamin C & Iron Metabolism

## *Negative*

- Vitamin C:**
- 1) essential for non-heme iron absorption
  - 2) stimulates ferritin synthesis

## *Positive*

- Vitamin C:**
- 1) required to mobilize iron from tissues  
e.g. to remove liver iron stores
  - 2) vitamin C def is associated with ineffective chelation

*(Elalfy et al Eur J Heme, 2016)*

*\*\*Suggested that any patient with an unsatisfactory response to chelation be tested for vitamin C*

# Where is Vitamin C in our Food?



## Foods Sources

V Valencia Orange  
I Issai Kiwi Fruit  
T Turnip Greens  
A Apricots  
M Mango  
I Ivy Gourd  
N Nori  
C Cantaloupe

Apricots  
Beans, Yellow Snap  
Bell Pepper  
Blackberries  
Broccoli  
Brussels Sprouts  
Cabbage, Green  
Cabbage, Pe-Tsai

Cabbage, Red  
Cantaloupe  
Carambola  
Cauliflower  
Cauliflower, Green  
Collard Greens  
Chili Pepper, Hot  
Gooseberries  
Grapefruit  
Guavas  
Kiwifruit  
Lemon  
Lime  
Nori  
Mango  
Melon, Honeydew  
Okra  
Onion

Orange  
Papaya  
Pineapple  
Potato  
Prickly Pears  
Pummelo  
Radishes  
Raspberries  
Rutabagas  
Spinach  
Squash, Summer  
Strawberries  
Sweet Potato  
Tangerines  
Tomato  
Watermelon

Dietitians-Online©



On April 4, 1932 Vitamin C was first isolated by CC King at the University of Pittsburgh.

# Should Patients Take Supplements?

*YES. Patients should consider taking a complete multivitamin/mineral supplement that does not contain iron*

- Some nutrients can be obtained from diet alone, and are absorbed most efficiently from their natural food source
- A well-balanced diet is important for other non-essential nutrients such as fiber, phytochemicals etc.
- At this time, there is not sufficient evidence to suggest that a high dose antioxidant supplement would be beneficial above what is found in a multivitamin

**SPECIAL NOTE: Not a substitute for adequate chelation ~ AND ~ a healthy well balanced diet**

# What not to eat...



**This is NOT FOOD.**  
**This is a Chemistry Experiment.**

Don't waste your calories on these foods- 'empty calories'

# Practical Meal / Snack Suggestions



***Poached Eggs with Avocado,  
Roasted Sweet Potatoes & Chicken  
Apple sausage***

Rich In: protein, vitamin A, zinc, B-6,  
Fiber, potassium, Vit C, MUFA

*\*Photo Posted on Instagram: Nutrition Simply*



***Oatmeal with Cranberries, Blueberries  
Coconut flakes, Almond Milk***

Rich in: Antioxidants, Fiber, Zinc,  
Protein, Calcium

*\*Photo on Instagram by: Healthfest*

# Meal / Snack Suggestions, Cont'd



***Whole Wheat Pasta, Broccoli,  
Sundried Tomatoes, Feta Cheese,  
Olive Oil***

Rich In: Vitamin C, E, Calcium,  
Protein, Fiber

*\*Photo posted on Instagram by Alicia Somma  
Happy\_healthy\_holistic*



***Quinoa, Kale, roasted Brussels Sprouts,  
Feta, Cherries, Walnuts  
Olive oil, balsamic vinegar***

Rich In: Protein, zinc, PUFA, Vit A, C, E, K  
Calcium, folate

*\*Photo posted on Instagram by Nutritionssimply*



# Summary Take Home Message

- Many patients with Thal may be at risk for nutritional deficiencies
- An adequate level of **vitamin D** is important for bone health
- Optimal **zinc** intake may be beneficial for growth, bone health and improving glucose tolerance for those at greatest risk.
- **Vitamin C**, an important antioxidant, has a complex role in thalassemia which may change depending upon the degree of iron overload and may modulate chelator efficacy.
- A daily **multi-vitamin / mineral supplement** without iron is suggested, but should NOT take the place of a healthy, diverse diet, and adequate chelation

# Looking for Nutrition Help?

## The Web...

EatRight.org  
Academy of Nutrition & Dietetics

## Nutrition Apps



Lifesum, 5.5.0  
Platform: Apple, Android  
What: Food & Fitness Tracker



Food4Bones, 1.0.6  
Platform: Apple, Android  
What:  
Food to support Bone Health



Zipongo, 5.6  
Platform: Apple, Android  
What: Meal-planning

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