SUPPLEMENTS

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Dietary Supplements: A Brief History

What Is A Dietary Supplement?

*A product designed to ***supplement*** the diet

Contains one or more of the following dietary ingredients:

Vitamins

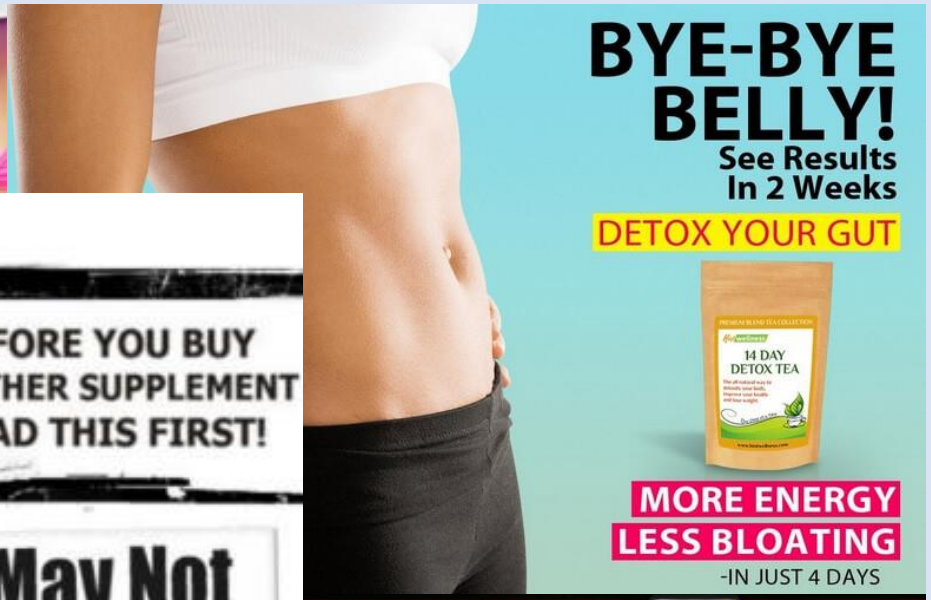
Minerals

Herbs or other botanicals

Amino acids

Concentrate, metabolite, extract

Dietary Supplement Misinformation



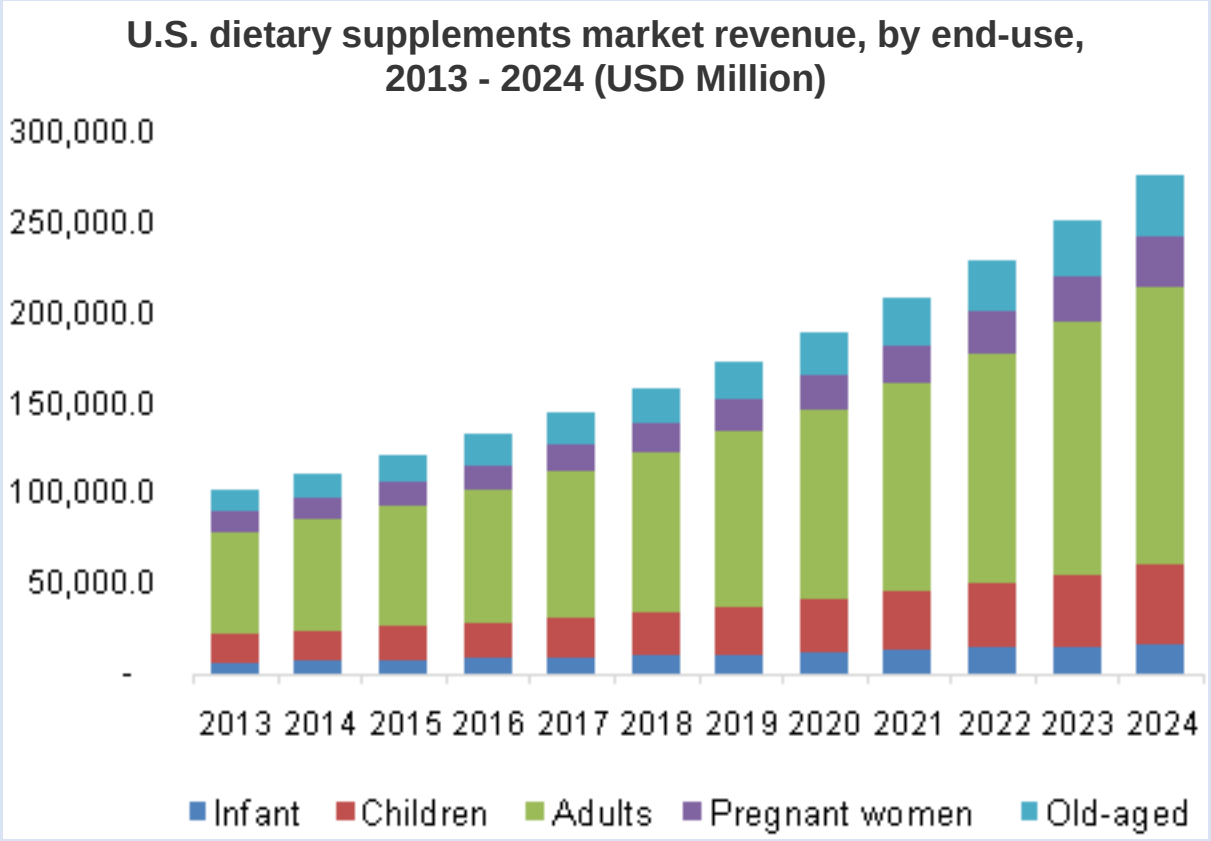
Dietary Supplement Use

2013 global sales = $104 Billion

- 1994 = $4 Billion
- 2012 = $33 Billion

> 55,000 different supplements on the market

> 49% of the population uses dietary supplements DAILY



Dietary Supplement Health and Education Act (1994)

A supplement is <u>not</u> a drug or food

(Drugs are used to diagnose, cure, mitigate, treat, or prevent disease.)

Ingredients sold prior to 1994 were "grandfathered" (e.g. vitamins, minerals, creatine, ephedra, hundreds of others…). ***After*** 1994 must provide reasonable evidence for safety and be reviewed by FDA prior to marketing.

Manufacturers of supplements do not have to provide proof of many product ingredients' safety or effectiveness*

FDA can only ban a substance ***AFTER*** proof is found that the product is ***DANGEROUS***.

This means many unsafe or ineffective supplements can be sold freely

FDA Regulations on Supplements

FDA Good Manufacturing Practices ("GMP")
Manufacturers, packagers, and labelers, of supplements must follow GMPs to ensure the quality and safety of their supplements

However….GMP violations are common

Report found *65% companies tested in violation*

Common Violations

Failure to conduct testing to verify dietary ingredients

Failure to establish purity and strength of products

Choosing Dietary Supplements

Why Do People Use Dietary Supplements?

- Improve or maintain health
- Enhance athletic performance
- Increase energy
- Compensate for poor nutrition
- Immune Support
- Manipulate Body Composition
- Prevent disease
- Correct deficiencies
- Weight loss

How to Choose Dietary Supplements?

CHOOSE SUPPLEMENTS WITH:

- USP on the label
- Consumer Lab seal of approval
- National Sanitation Foundation seal
- Reputable drug companies

Toxicity in Dietary Supplements

- **READ LABELS!**
- Avoid supplements with many ingredients and various doses
- Even if standards in quality are met, dosages may still be beyond daily recommendations
- Be aware that contamination occurs often – choose reputable companies that third party test for purity

Supplement Facts

Serving Size: Two Tablets

	Amount per Serving	% Daily Value
Vitamin A (as Beta Carotene)	25,000 IU	500
Vitamin C (as Ascorbic Acid)	1,000 mg	1670
Vitamin E (as Tocopheryl Succinate)	400 IU	1330
Zinc (as Zinc Gluconate)	50 mg	333
Copper (as Copper Gluconate)	2 mg	100
Selenium (as Selenomethionine)	50 mcg	71
Chromium (as Chromium Picolinate)	200 mcg	166
Citrus Bioflavonoid Complex	250 mg	*
Eyebright (Euphrasia officinalis)	50 mg	*
Alpha-Lipoic Acid	50 mg	*
Ginkgo Biloba	25 mg	*
L-Glutathione	10 mg	*
FloraGLO® Lutein (containing Zeaxanthin)	6 mg	*

*Daily Value not established

What’s Not Safe?

Vitamin Toxicity

Almost 60,000 instances of vitamin toxicity are reported annually to US poison control centers.

Toxicity often affects infants and children

Fat-soluble vitamins can accumulate in the body and can pose more risk than water-soluble vitamins.

Iron-containing vitamins are the most toxic, especially for children.

"All the News That's Fit to Print"

The New York Times

Late Edition

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"Vitamin Industrial Complex Swindles Americans!"

Unwilling to Continue Bowing to President

By CARL HULSE

WASHINGTON — The ranks of the House Republican revolt over the financial industry bailout were in an even more tragic situation Monday night as [illegible] quickly over the Bush administration's request for $700 billion to prevent an economic collapse.

In a message to members of the conservative Republican Study Committee, leaders of the bloc of more than 100 lawmakers solidified about calling for a "free-market alternative to the Treasury Department's proposal so that, regardless of how individual R.S.C. members vote on final passage, House conservatives have something to be for."

As the week progressed, it became abundantly clear that one thing conservative Republicans were most certainly not for was the Treasury plan, prompting them to begin searching for an alternative to avoid the perception of strictly being naysayers.

By the end of Friday, at least a portion of their alternative seemed likely to be included in the broader proposal as a measure for Republicans, although [illegible] negotiations continued into the evening on Friday, and the contours of the final package remained in flux.

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[illegible] people are according to the White House as a symbol of the [illegible]

"Avoid Toxic Vitamins!"

DEREGULATION FAULTED

A Voluntary Program to Supervise Wall St. Is Abolished

By STEPHEN LABATON

WASHINGTON — The chairman of the Securities and Exchange Commission, a longtime proponent of deregulation, acknowledged on Friday that his move in a voluntary supervision program for Wall Street's largest investment banks had contributed to the global financial crisis, and he abruptly shut the program down.

The S.E.C.'s oversight responsibilities will largely shift to the Federal Reserve, though the commission will continue to oversee the brokerage units of investment banks.

After Friday, the S.E.C.'s inspector general released a report strongly criticizing the agency's performance in monitoring Bear Stearns before it collapsed in March. Christopher Cox, the commission chairman, said he agreed that the oversight program was "fundamentally flawed from the beginning."

"The last six months have made it abundantly clear that voluntary regulation does not work," he said in a statement. The program "was fundamentally flawed from the beginning, inasmuch as it rested upon the assumption that investment banks and their holding companies, which were not subject to any regulation by the commission, would submit to it voluntarily," Mr. Cox said.

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"Avoid Toxic Vitamins!"

Senator John McCain and Senator Barack Obama during their first presidential debate Friday

"Vitamin Industrial Complex Swindles Americans!"

FIRST ENCOUNTER

Obama Assails Bush Policies as McCain Cites Experience

By ADAM NAGOURNEY and JEFF ZELENY

Across the economy to foreign affairs to the way they carried themselves on stage, Senators John McCain and Barack Obama offered a dramatic contrast to the nation in their first presidential debate on Friday night, hosting divided and often chaotic discourse on their views of how they would manage the country and confront America's adversaries abroad.

The two were not for 90 minutes against the backdrop of the nation's worst financial crisis since the Great Depression and [illegible] negotiations in Congress over a $700 billion federal plan for Wall Street.

Despite repeated prodding, Mr. McCain and Mr. Obama refused to point to any major achievements they would want to make in their governing agendas — like avoiding back-to-back recessions or upsetting programs — to accommodate what both men said would be very tough economic times for the next president.

For the first 30 minutes, Mr. Obama repeatedly sought to link Mr. McCain to President Bush, and Democrats [illegible]

Example: Ephedra

What is it?

Non-nutritive ergogenic aid

Central nervous system stimulant and decongestant

Claims to increase metabolism and increases body fat loss

Negative side effects

- irregular heart rate, elevated blood pressure, dizziness, headache, heart attack, stroke, seizure, psychosis
- 155 deaths and over 16,000 side effects

FDA banned in April 2004

Yet…Products still sell extracts from species of ephedra

Contain little or no ephedra

Unlikely to pose dangers but also don't work

Vitamin A

Vitamin A is considered safe when consumed in recommended dietary allowances (RDAs). Adults who eat fortified foods with vitamin A, such as low-fat dairy products and a lot of fruits and vegetables, lack the need for supplements or multivitamins that contain vitamin A.

Short-term toxicity: nausea, headache, fatigue, loss of appetite, dizziness, dry skin, and swelling in the brain.

Long-term toxicity: dry itchy and cracking skin, dry lips, scaling anorexia, headache, psychiatric changes, excess fluid, bone and joint pain, osteoporosis, and hip fracture.

Severe toxicity: eye damage, high levels of calcium, and liver damage.

Beta Carotene and Vitamin E

Evidence indicates that diets high in vitamin E and beta carotene, are associated with a reduced risk of lung cancer.

Study done (ATBC Trial) to determine whether daily supplementation with vitamin E, beta carotene, or both would reduce the incidence of lung cancer and other cancers
29,133 male smokers participated in trial over 8 years

RESULTS:
No reduction in incidence was observed.

Higher incidence of lung cancer in those who received beta carotene

Vitamin E had group had more deaths from hemorrhagic stroke observed

Total mortality was 8 percent higher among the participants who received beta carotene supplementation

Study was STOPPED

CONCLUSIONS:
These vitamins in supplement form may actually have harmful as well as beneficial effects.

MORE IS BETTER, RIGHT?

WELL…

NOT NECESSARILY…

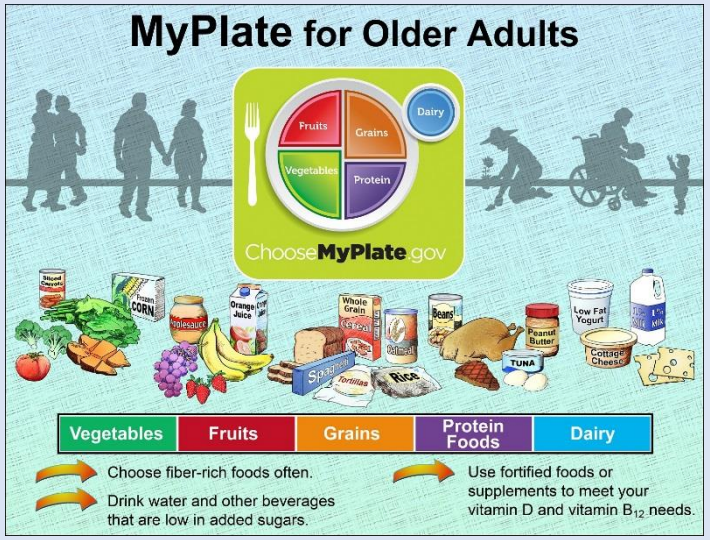
What’s Safe?

Older Adults

Why might an older adult need to supplement?

Common Nutrient Deficiencies

Protein
Vitamin B12
Vitamin D
Calcium



Limited variety in diet

Reduction in Calorie Intake

Prevent Falling and Fractures

Maintain Bone Mineral Density

Vegan/Vegetarian

Strengthen Immune System

Infants

Why might parents want to supplement their children?

Common Nutrient Deficiencies

Iron/Zinc
B12
Vitamin D
Omega 3 Fatty Acids
(EPA & DHA)

- Limited variety in diet
- Vegan/Vegetarian Infant
- Periods of Rapid Growth
- Cognitive Development
- Strengthen Immune System
- Breast Milk vs. Formula Fed

Athletes

Why might an athlete want to supplement?

Ergogenic Aids (Performance Enhancers)

Creatine
Beta-Alanine
Nitrate
Caffeine
Sodium Bicarbonate

Potential Nutrient Deficiencies

Vitamin D (deficiency widespread)
Vitamin B12 (vegetarians/vegans)
Calcium (some athlete populations 50%+)
Iron (25-30% of athletes)

Inadequate calorie intake	Limited variety/ Lots of restrictions in diet	Wanting to Enhance Performance
Vegan/Vegetarian	Injury	Female Athletes
Disordered Eating	Periods of Rapid Growth	Training at High Altitudes or Indoors

Calcium across the Lifespan

Life Stage	Recommended Amount
Birth to 6 months	200 mg
Infants 7–12 months	260 mg
Children 1–3 years	700 mg
Children 4–8 years	1,000 mg
Children 9–13 years	1,300 mg
Teens 14–18 years	1,300 mg
Adults 19–50 years	1,000 mg
Adult men 51–70 years	1,000 mg
Adult women 51–70 years	1,200 mg
Adults 71 years and older	1,200 mg
Pregnant and breastfeeding teens	1,300 mg
Pregnant and breastfeeding adults	1,000 mg

- **12th leading cause of disability in US: Fractures**
- Calcium plays a critical role in bone health
- Benefits across the lifespan
  - **Ages 1-18yrs = 700-1300mg/day**
  - **Ages 18-50yrs = 1,000mg/day**
  - **Ages 51+ = 1,200mg/day**
- Women 20+ years and Men 40+ years on average not meeting AI recommendations
- Many athletes also do not meet needs
- Adequate **LIFELONG** calcium intake is necessary to optimal bone health

Calcium: Very Attainable from Foods


+

+

+

+

= 1,116mg

1 cup
305mg

1 cup
191mg

1 cup
94mg

1 cup
345mg

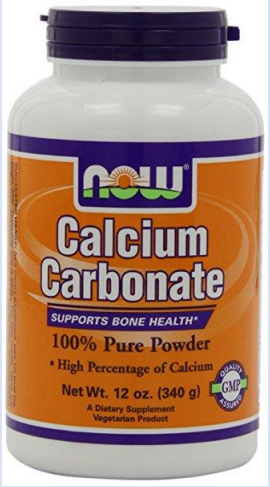
3 oz
181mg

Common Food Sources of Calcium			
Food	**Serving Size**	**Amount**	**%DV***
Yogurt, fruit, low fat	1 cup	345 mg	35%
Milk, low fat	1 cup	305 mg	31%
Orange juice, calcium fortified	1 cup	300 mg	30%
Sardines, canned with bone	3 ounces	325 mg	33%
Collard greens, boiled	1 cup	266 mg	27%
Cereal, cream of wheat, cooked	1 cup	232 mg	23%
Cheese, cheddar	1 ounce	204 mg	20%
Beans, white, boiled	1 cup	191 mg	19%
Fish, salmon, canned	3 ounces	181 mg	18 %
Soybeans, boiled	1 cup	175 mg	18 %
Cottage cheese, low-fat	1 cup	138 mg	14%
Kale, boiled	1 cup	94 mg	9%
Beans, pinto, boiled	1 cup	79 mg	8%
Almonds	1 ounce	75 mg	8%
Broccoli, boiled	1 cup	62 mg	6%
Figs, dried	2 figs	62 mg	6%
Oranges, raw	1 medium	52 mg	5%

Source: USDA Nutrient Database.
* Daily Value (DV) is the daily reference amount used on food and supplement labels.

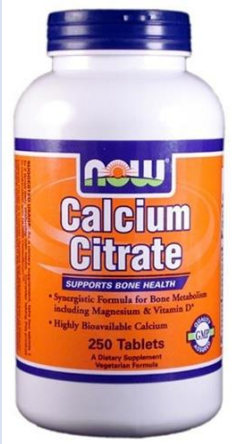
Calcium Supplementation

- Because dietary calcium intake is often inadequate, supplemental calcium may help deficiency to increase bone mineral density and prevent bone loss.
- Supplemental calcium includes fortified foods and calcium contained in dietary supplements.
- Individuals ***DEFICIENT*** in calcium, including those with osteopenia or osteoporosis, peri or postmenopausal women, mothers who breastfeed, vegans, and individuals who are lactose intolerant may all benefit from calcium supplementation



Always take with food

No More than 500mg at One Time



With or Without food

Vitamin D across the Lifespan

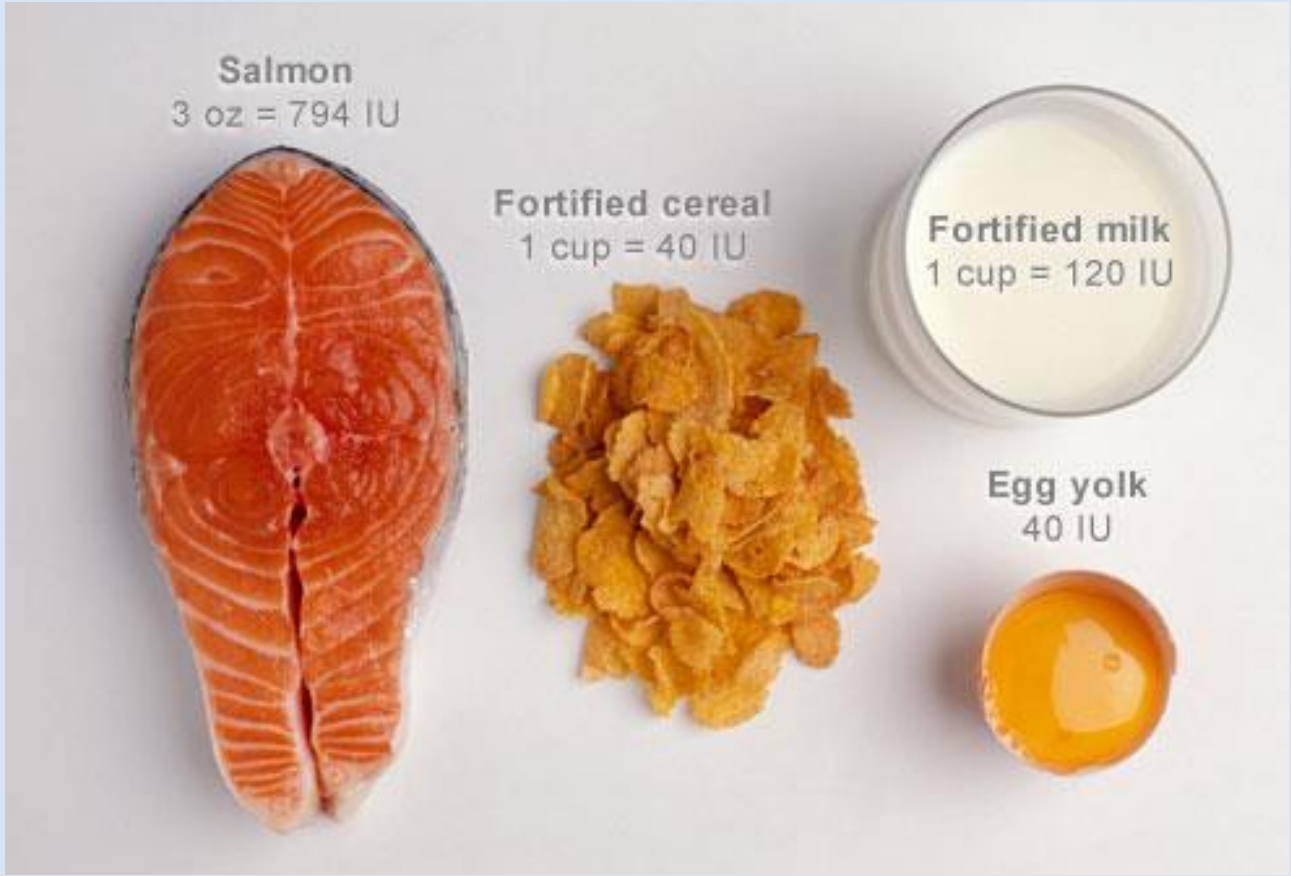
- **Over 50% of the global population is INSUFFICIENT (<50 nmol/L)**
- **77% of Americans considered INSUFFICIENT**
- Critical to bone health, prevention of fractures, falls, and immunity
- Synthesized in the skin via sunlight, found in few foods
- Adequate Intake (AI) Recommendations

Ages 0-70yrs = 400-600 IU/day

Recommended Dietary Allowances for Vitamin D				
Age	Male	Female	Pregnancy	Lactation
0–12 months*	400 IU (10 mcg)	400 IU (10 mcg)		
1–13 years	600 IU (15 mcg)	600 IU (15 mcg)		
14–18 years	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)
19–50 years	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)
51–70 years	600 IU (15 mcg)	600 IU (15 mcg)		
>70 years	800 IU (20 mcg)	800 IU (20 mcg)		

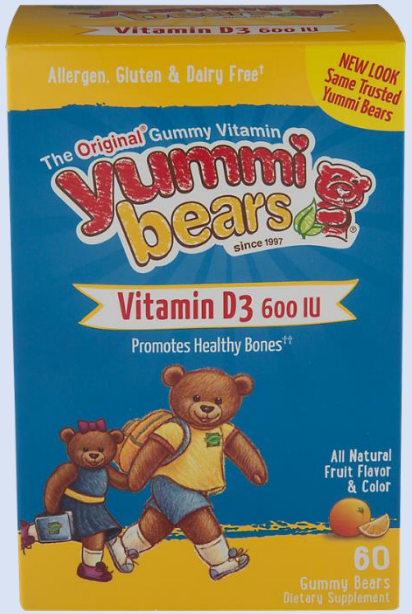
Vitamin D in Foods

- Vitamin D can be difficult to obtain from the diet alone.
- Only a few foods are a good source of vitamin D. Vitamin D supplementation can be beneficial if INSUFFICIENT.
- Those prone to insufficiency:
  - Breastfed infants, older adults, athletes, people with limited sun exposure, darker pigmented individuals, people with gastric bypass surgery



Vitamin D Supplementation

- Options are available for individual vitamin D supplements, including capsules, chewable tablets, liquids, and drops.
- Vitamin D_2 or vitamin D_3 can be used for the treatment and prevention of Vitamin D insufficiency



Omega 3 Fatty Acids

- Particularly important for ***INFANTS***
- Several omega-3s exist, but three are important: ALA, EPA, and DHA.
- ALA present in flaxseed, chia seed, soybean, and canola oils. DHA and EPA are present in fish, fish oils, and krill oils.
- Associated with reduction in CVD and inflammation, improved ***cognitive development***

Adequate Intakes for Omega-3s

Age	Male	Female	Pregnancy	Lactation
Birth to 6 months*	0.5 g	0.5 g		
7–12 months*	0.5 g	0.5 g		
1–3 years**	0.7 g	0.7 g		
4–8 years**	0.9 g	0.9 g		
9–13 years**	1.2 g	1.0 g		
14–18 years**	1.6 g	1.1 g	1.4 g	1.3 g
19-50 years**	1.6 g	1.1 g	1.4 g	1.3 g
51+ years**	1.6 g	1.1 g		

Omega 3 Fatty Acids

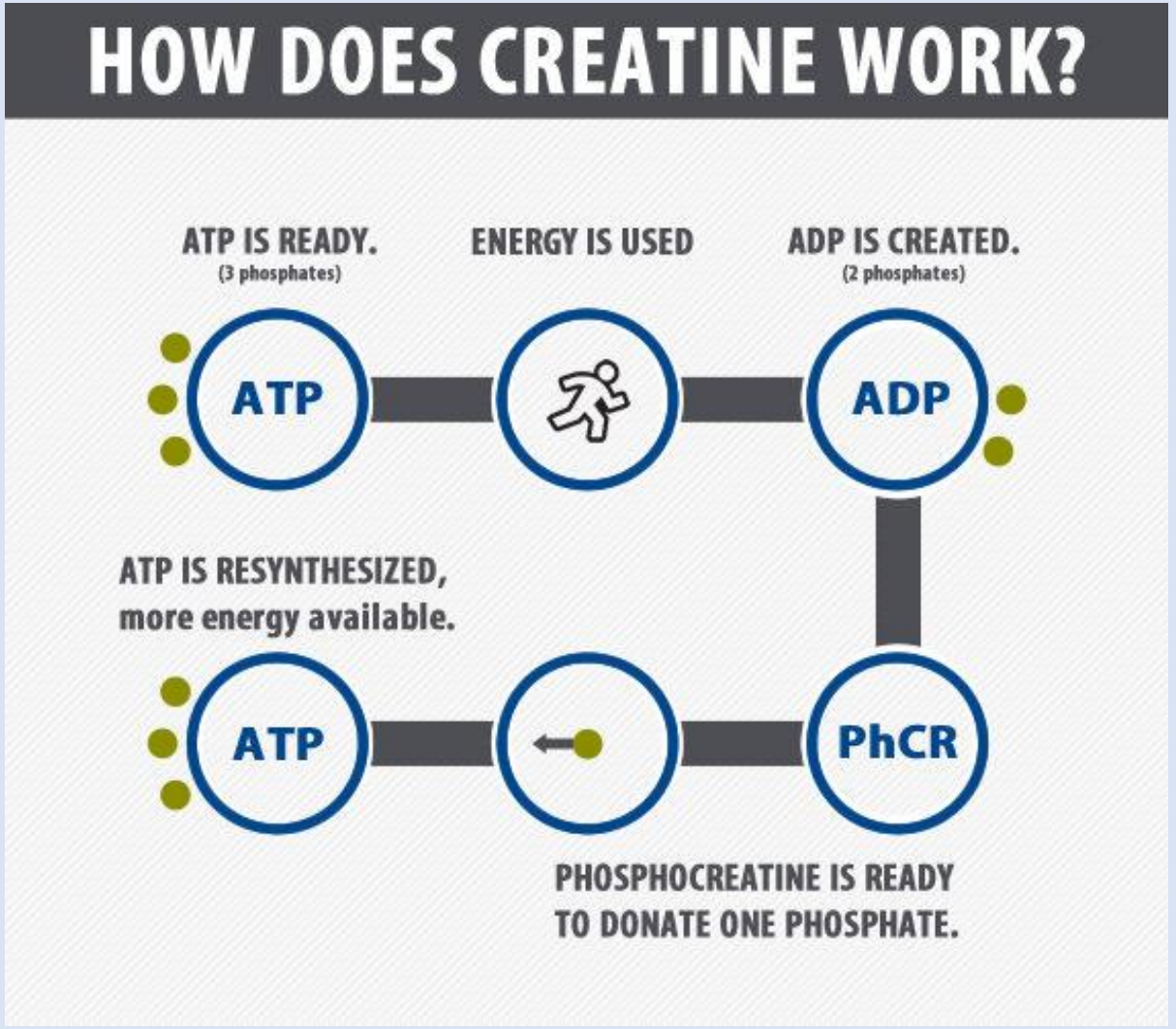
- Very Attainable in the Diet

Selected Food Sources of ALA, EPA, and DHA			
Food	Grams per serving		
	ALA	DHA	EPA
Flaxseed oil, 1 tbsp	7.26		
Chia seeds, 1 ounce	5.06		
Flaxseed, whole, 1 tbsp	2.35		
Salmon, Atlantic, farmed cooked, 3 ounces		1.24	0.59
Herring, Atlantic, cooked, 3 ounces*		0.94	0.77
Canola oil, 1 tbsp	1.28		
Trout, rainbow, wild, cooked, 3 ounces		0.44	0.40
Oysters, eastern, wild, cooked, 3 ounces	0.14	0.23	0.30
Shrimp, cooked, 3 ounces*		0.12	0.12
Lobster, cooked, 3 ounces*	0.04	0.07	0.10
Tuna, light, canned in water, drained, 3 ounces*		0.17	0.02
Tilapia, cooked, 3 ounces*	0.04	0.11	
Scallops, cooked, 3 ounces*		0.09	0.06
Cod, Pacific, cooked, 3 ounces*		0.10	0.04
Ground beef, 85% lean, cooked, 3 ounces**	0.04		
Bread, whole wheat, 1 slice	0.04		
Egg, cooked, 1 egg		0.03	
Milk, low-fat (1%), 1 cup	0.01		

Ergogenic Aids: Creatine

Ergogenic Aid: a performance enhancer

- Creatine is one of the most popular and widely researched supplements
- 95% of the body's creatine stores are found in the skeletal muscle.
- Creatine is predominately present in the diet from meats. (Vegetarians have lower creatine)
- Can enhance effects of resistance training for improving strength and hypertrophy
- Improves quality and benefits of high intensity intermittent speed training



Creatine Supplementation

- **Creatine Monohydrate is best**

- **Loading Phase**
  20 - 25 g CM/d or
  0.3 g CM/kg/d split into 4 to 5 daily intakes of 5 grams

- **Maintenance Period**
  3-5 g CM/d or
  0.03 g CM/kg/d

Alternatives to Dietary Supplements?

REAL FOOD!

Supplement	Risks	Food Equivalent
Multivitamin and Mineral	Potential toxicity if taken in amounts greater than recommended	Meats, poultry, fish, whole grains, vegetables, fruits, beans and peas, nuts, low-fat dairy
Caffeine	Potential anxiety, irritability, insomnia, headaches, gastrointestinal (GI) distress	Coffee, tea, chocolate **Note:** Consumed in high quantities, these foods can result in testing positive for a banned substance.
Creatine	GI distress, cramps, potential contamination	Meat, poultry, fish
Protein and Added Amino Acids	Potential contamination	Beef, pork, chicken, fish, turkey, beans, lentils, tofu, tempeh, nuts, low-fat dairy, eggs
Omega-3 Fatty Acids	Potential contamination	Fatty fish (salmon), flaxseed oil, walnuts, canola oil

In Review

- Dietary supplements are designed to supplement, not replace nutrients in the diet
- Contamination and purity issues are common with supplements – choose brands that are third party validated
- Be sure to read labels to prevent ingesting toxic levels of vitamins
- Choose whole foods whenever possible

QUESTIONS?