Consequences of Changes in the Dietary Reference Intakes for Nutrient Databases

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USDA National Nutrient Database for Standard Reference (SR)

- 6,661 food items in SR16.1
- More than 2,600 used in the USDA Food and Nutrient Database for Dietary Studies (FNDDS)
  - Complete nutrient profiles for 61 food components (nutrients)
    - If analytical data are not available for any of these nutrients, NDL imputes a value

Folate

- 💻g Total folate
- 💻g Food folate
- 💻g Folic acid
- 💻g Dietary Folate Equivalents (DFE)

DFE = (💻g Folic acid * 1.67) + 💻g Food folate

Folate Methods

- Microbiological
  - Measures total folate
- HPLC
  - Folic acid
  - 5 methyltetrahydrofolate
  - 5 formyltetrahydrofolate
  - 10 formylfolic acid
  - 10 formyldihydrofolate

Calculation of DFEs for Cooked Rice

Total folate	58 μg		
Food folate	- 3 μg	* 1	= 3
Folic Acid	55 μg	* 1.7	= 94

97 μg DFE

Determination of Food Folate by Microbiological Assay

Total Folate – Folic acid = Food Folate

(1.7 X μg folic acid) + μg food folate = μg DFE

Folates reported in SR

- g Total folate
- g Food folate
- g Folic acid
- g Dietary Folate Equivalents (DFE)

Folate DRI

EAR for adults 320 g/day DFE

RDA for adults 400 g/day DFE

UL for adults 1,000 g/day from fortified foods or supplements

Vitamin A Activity

	International Units **IU**	Retinol Equivalents **RE**	Retinol Activity Equivalents **RAE**
Retinol g	.3	1	1
-carotene g	.6	6	12
Other active carotenoids g	1.2	12	24

Vitamin A Conversions

Spinach 9,377 IU/20 =

469 RAE

938 RE/2 =

Chicken 137 IU/3.33 =

41 RAE

41 RE/1 =

Calculating Vitamin A in μg RAE for Cheddar Cheese

vitamin A	278 RE
carotene	- 20 RE/2 = 10 RAE
retinol	258 RE/1 = 258 RAE
	268 RAE

Carotenoids in Database

Vitamin A active carotenoids

- α-carotene
- β-carotene
- β-cryptoxanthin

- Lycopene
- Lutein+zeaxanthin

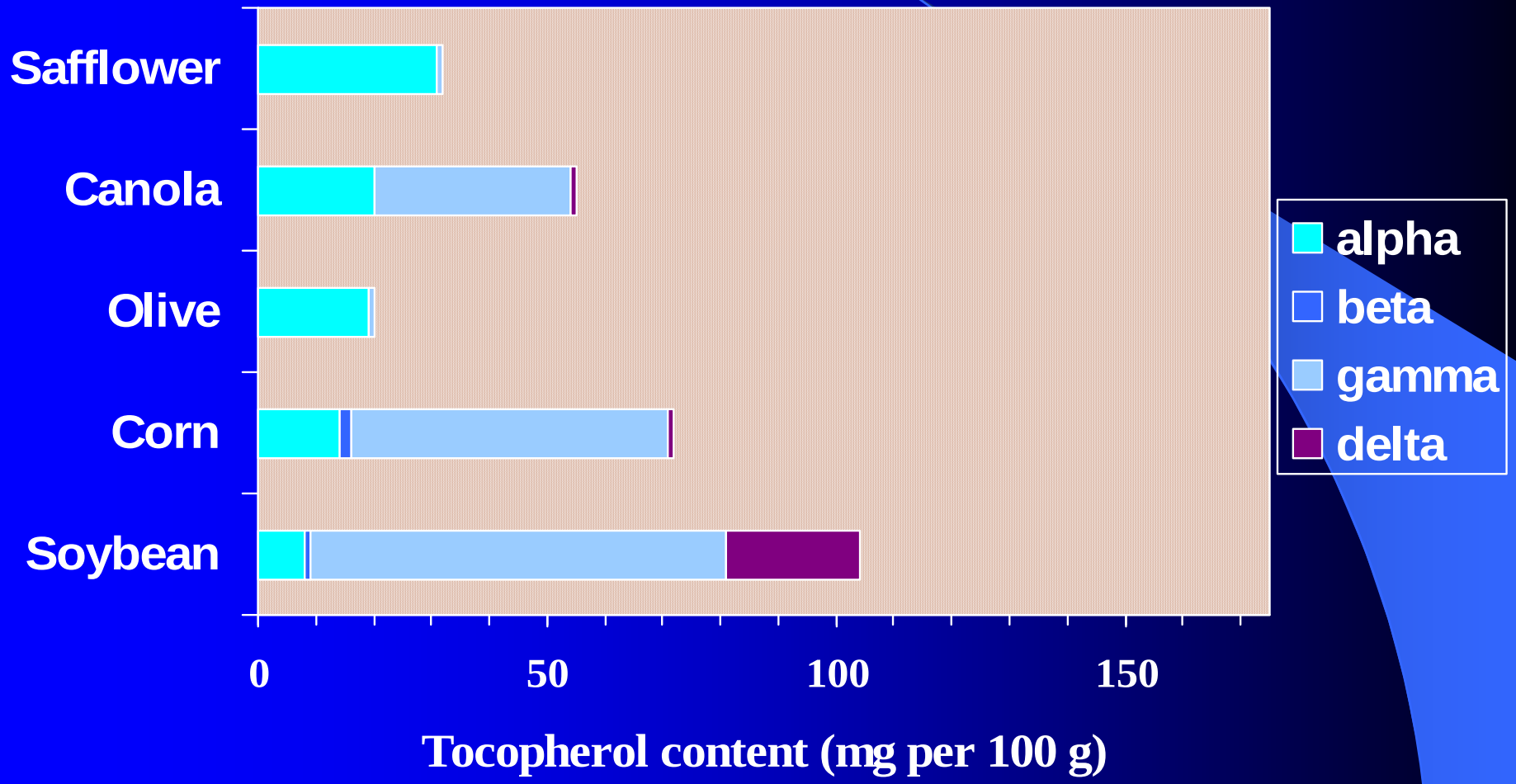
Vitamin A DRI

EAR	Men	625 □g RAE/day
	Women	500 □g RAE/day
RDA	Men	900 □g RAE/day
	Women	700 □g RAE/day
UL	Adults	3,000 □g/day of preformed vitamin A

Vitamin E

- ✂-tocopherol equivalents
  - ✂-tocopherol
  - ✍-tocopherol
  - ☎-tocopherol
  - ✉-tocopherol
  - tocotrienol
- mg ✂-tocopherol

Vitamin E isomers in various vegetable oils



Soybean oil example

(values per 100g)

8 mg	α-tocopherol	x 1	=	8
1 mg	β-tocopherol	x 0.5	=	0.5
72 mg	γ-tocopherol	x 0.1	=	7.2
23 mg	δ-tocopherol	x 0.03	=	0.69
Vitamin E, ATE				**16.39**

Added Vitamin E

- *All rac*-✂-tocopherol (Historically and incorrectly labeled *dl*-✂-tocopherol)
  - IU * 0.45
- RRR-✂-tocopherol (Historically and incorrectly labeled *d*-✂-tocopherol)
  - IU * 0.67

Identification of Added Vitamin E on Ingredient Labels

Breakfast cereals, infant formulas, peanut butter, breakfast powder:

- Vitamin E acetate
- Alpha-tocopherol acetate
- Tocopheryl acetate

Identification of Added Vitamin E on Ingredient Labels

Energy/protein bars:

6 no vitamin E added

7 vitamin E acetate

5 alpha tocopherol acetate

6 dl-alpha-tocopheryl acetate

1 d-alpha-tocopheryl acetate

1 natural vitamin E acetate

1 d-alpha tocopheryl acetate & dl-alpha tocopheryl acetate

Vitamin E DRI

EAR for adults 12 mg/day of ✂-tocopherol

RDA for adults 15 mg/day of ✂-tocopherol

UL for adults 1,000 mg/day of any form of supplementary ✂-tocopherol

Conversions for Added Vitamin E

- Synthetic vitamin E also called *All rac* or *DL* ✂-tocopherol
  - Comparison to RDA or EAR
    - IU * 0.45
  - Comparison to UL
    - IU * 0.90
- Natural vitamin E also called RRR or D ✂-tocopherol
  - Comparison to UL same as RDA and EAR
    - IU *.67

Vitamin B-12 DRI

EAR for adults* 2 □g /day

RDA for adults* 2.4 □g /day

UL for adults none established

*For adults ages 51 years and older it is recommended that B-12 fortified foods or supplements be used to meet the requirements.

DRI for Niacin

EAR	Men	12 mg/day niacin equivalents
	Women	11 mg/day niacin equivalents
RDA	Men	16 mg/day niacin equivalents
	Women	14 mg/day niacin equivalents
UL	Adults	35 mg/day of niacin*

* Intake of niacin as a supplement or food fortificant

Units for RDAs

	Folate	Vit. A	Vit. E	Vit. B12	Niacin
1968	mg	IU	IU	g	mg NE
1974	g	RE	IU	g	mg
1980	g	RE	-TE	g	mg NE
1998 - 2001	DFE	RAE	mg	g	mg NE

SR Nutrients

Before New DRI	After New DRI
Folate, total	Folate, total
	Food folate
	Folic acid
	Folate, total DFE
Vitamin A, IU	Vitamin A, IU
Vitamin A, RE	Vitamin A, RAE
	Retinol
	✂-carotene
	✍-carotene
	✍-cryptoxanthin
Vitamin E, ✂-TE	Vitamin E, ✂-tocopherol

When did you say they are going to start the next revision of the DRIs?!!

Differences in Units for Reporting Nutrients

Nutrient	Current DV	Proposed DV*
Folate	400 □g	314 DFE
Vitamin A	5,000 IU	529 RAE
Vitamin E	30 IU	12 mg
Vitamin B-12	6 □g	2 □g

*DRI Guiding Principles for Nutrition Labeling and Fortification