What's *really* in a diet?

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What should a diet deliver?

- A wide range of tasty foods - pleasure?
- All the nutrients you require – good health?

Obviously, these are interconnected

We want both!

Themes that will briefly be discussed

- Can we construct a precise, sustainable, economical, long-term diet based on meeting our precise nutrient needs?
- Why aren’t we already dead?

First, what do we want to achieve with a ‘diet’?

- Wellbeing
- Keep you
  - weight-stable
  - Energetic
  - Strong
  - Alert
  - …young
- These are difficult modalities to measure or achieve

So what do we do?

Work towards meeting “daily requirements” of nutrients

Measuring nutrient requirements: reductionism at its best

1. Reduce the problem of requirements to one nutrient at a time

2. For each nutrient, measure how much is ‘used up (lost)’ in a day

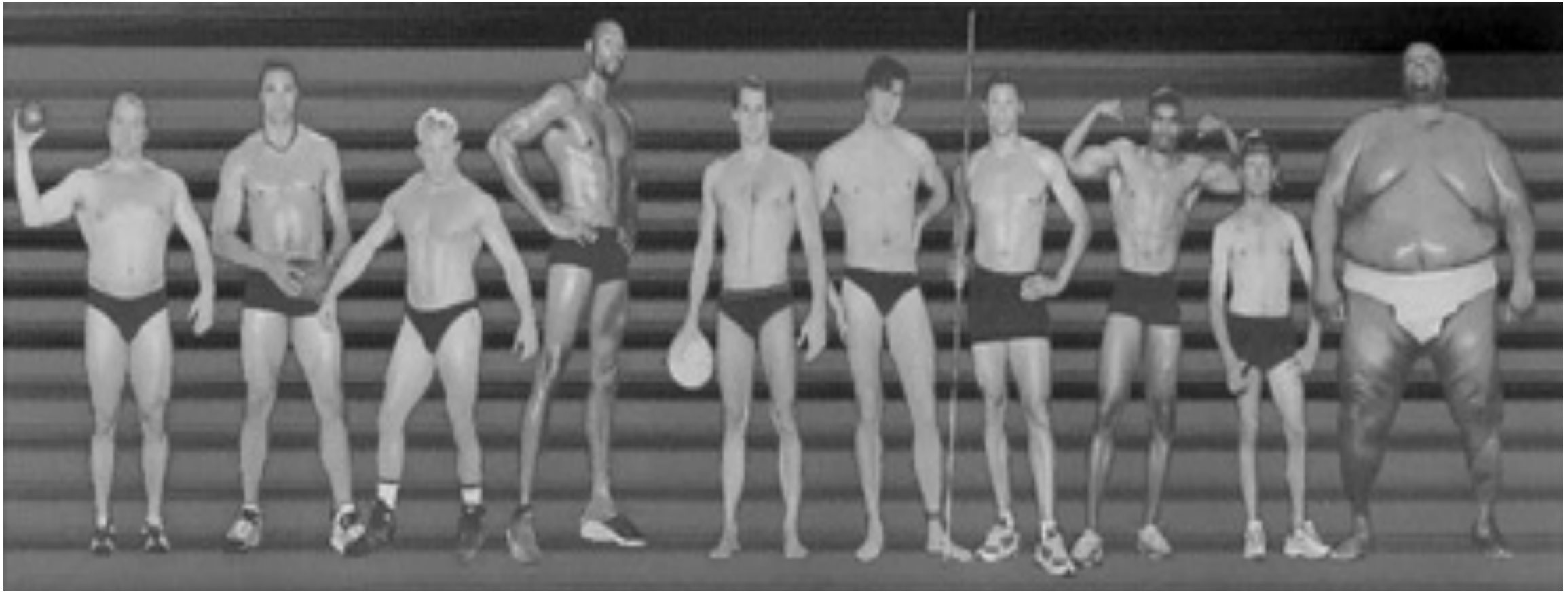
3. Figure out how to ‘replace’ that loss by daily dietary intake
   a) Adjusting for different foods (absorption)
   b) Cooking losses

Is the nutrient ‘need’ the same for all people or populations?

- No
- We are all different from one another
- We are all quite different from day-to-day
  - *No man ever steps in the same river twice, for it is not the same river and he is not the same man*.

    Heraclitus

Inter-individual variability makes planning a diet difficult



Do all these ‘elite’ and healthy athletes need to eat similarly?

From German et al, J Nutr, 2003

We also digest and use food variably

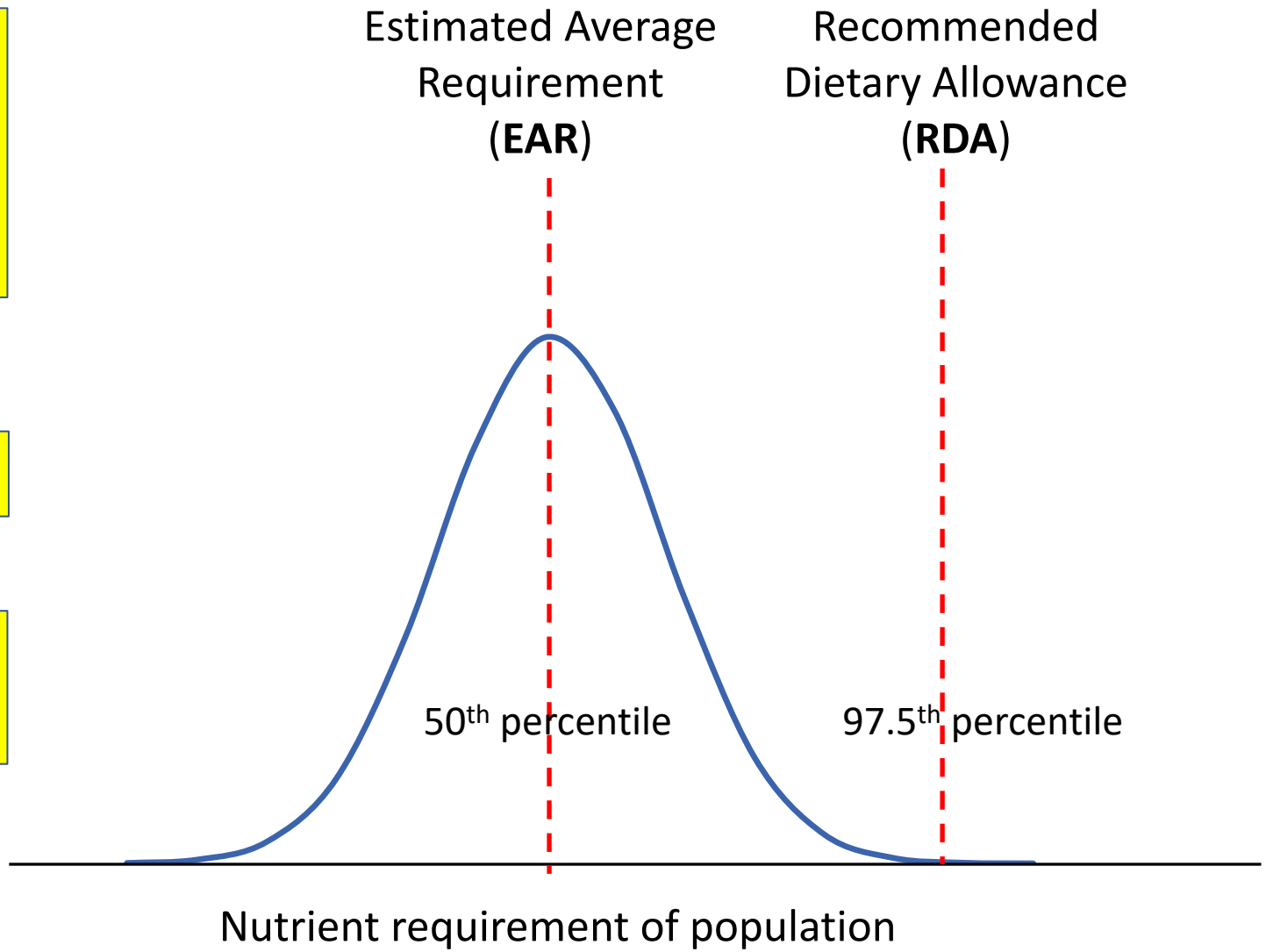
- 1 kg of food will be used differently by different people
- For example, a starving person will probably be very efficient

Back to the average for nutrients…

We make it easy for ourselves:
a **single** population nutrient requirement value

EAR: population requirement

RDA: Can ‘over-nourish’ populations



Important concept for ‘what’s in a diet’

The minimum nutrient content should be the EAR for individuals and populations

- We can never “know” the precise actual requirement of a person
- So, we can only evaluate the *risk of having a deficient intake*

Everyone wants a ‘zero risk of deficiency’ – but that is not necessary

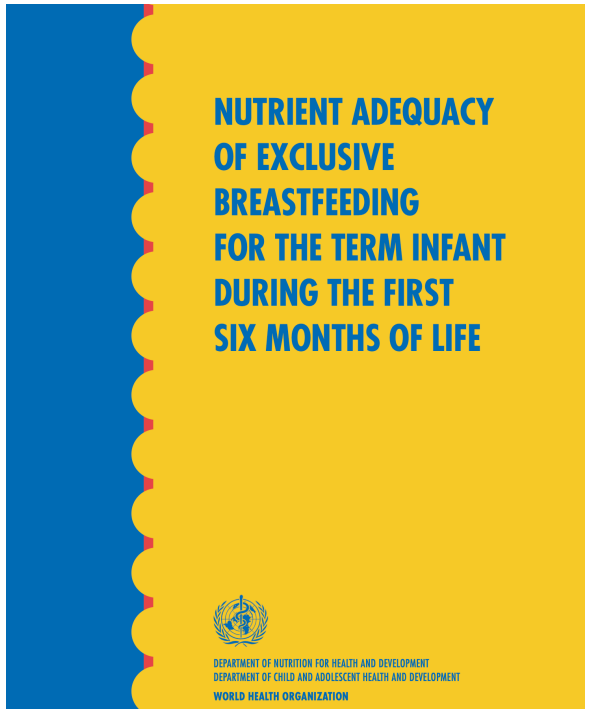
The RDA is used for almost zero risk (2.5% risk) – but this intake is excessive

The EAR is the right intake value- 50% risk

Three points for accepting this 50% risk concept

1. The breast fed infant (<6 mo)

- All babies who are EBF must be adequately nourished
- How does this translate into a risk framework?



Mean intakes of human milk meet

mean milk requirements during EBF

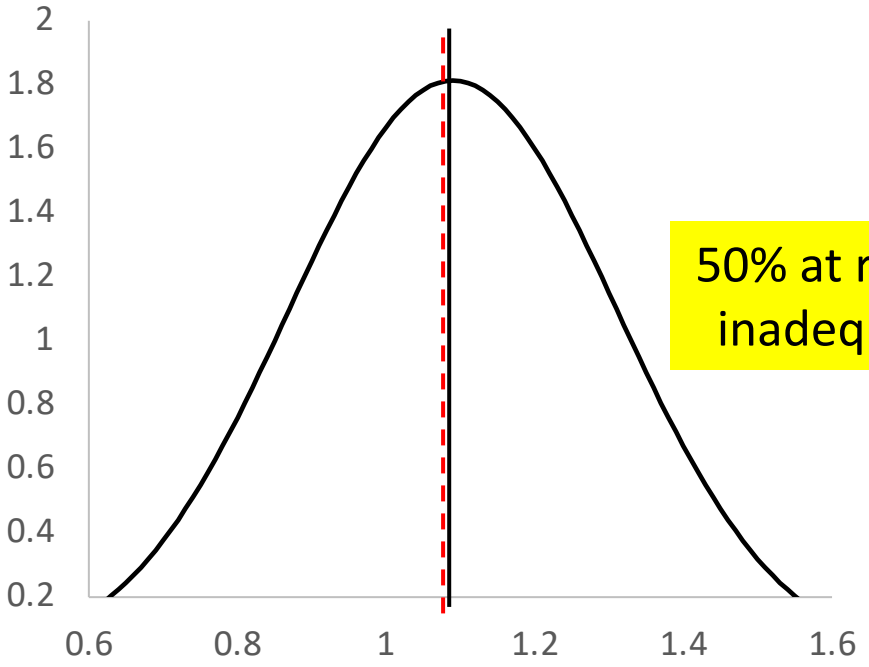
Exclusive Breast Feeding and protein: USA

Energy and protein intakes of breast-fed and formula-fed infants during the first year of life and their association with growth velocity: the DARLING Study[1–3]

M Jane Heinig, Laurie A Nommsen, Janet M Peerson, Bo Lonnerdal, and Kathryn G Dewey

Am J Clin Nutr 1993;58:152–61.

EAR or Average Intake = 1.1 g/kg/d



50% at risk of inadequacy

N = 73 Exclusive Breast Fed infants
BM measured at 3rd month.

Expected weight gain (0-3 mo) = 31 g/day
Observed weight gain (0-3 mo) = 28 ± 7 g/day

Protein EAR (based on growth) = 1.1 g/kg/day
Protein* intake at 3rd month = 1.1 g/kg/day

*: Including BM urea

2. The ‘risk’ of giving too much (RDA)

- Giving too much of a particular nutrient can *increase* the demand for another nutrient
  - Nutrients can be toxic, and need to be detoxified

- Excess EAA like methionine – excess methyl groups – detoxified by glycine – increases glycine demand
- Too much omega-3 requires extra antioxidants
- Too much calcium requires extra iron
- Too much iron requires extra glutathione (SAA)

3. It is not easy to meet the RDA in a reasonable diet. Eg: WRA

Nutrients
Iron
Calcium
Zinc
Magnesium
Vitamin B_1
Vitamin B_2
Vitamin B_3
Vitamin B_6
Vitamin B_{12}
Folate
Vitamin A
Vitamin C

Energy = 1660 kcal

Protein = 14% en

Fat = 27% en

Food	Amount (g) EAR	Amount (g) RDA
Cereals & Millets	170	150
Pulses & Legumes	55	50
Roots & Tubers	50	50
Green leafy vegetables	250	350
Other vegetables	75	150
Fruits	100	120
Milk & Curds	500	600
Sugar/Jaggery	40	40
Oil (Fortified)	25	25

425 vs 620 g F&V

Meets 100-200% EAR

Meets 100% RDA.

Retail cost = goes up by 20-25%

All that glitters is not gold…

JAMA Network Open

JAMA Network Open. 2024;7(6):e2418729

Original Investigation | Nutrition, Obesity, and Exercise

Multivitamin Use and Mortality Risk in 3 Prospective US Cohorts

Erikka Loftfield, PhD, MPH; Caitlin P. O'Connell, MPH; Christian C. Abnet, PhD, MPH; Barry I. Graubard, PhD; Linda M. Liao, PhD; Laura E. Beane Freeman, PhD; Jonathan N. Hofmann, PhD; Neal D. Freedman, PhD, MPH; Rashmi Sinha, PhD

390124 participants (median age 61.5 years).

MV use daily vs none

Up to 27 years follow up.

MV use was not associated with lower mortality risk

If there is theoretically a 50% risk of deficiency

Why are 50% of us not dead?

Risk is risk – not reality

Adaptation

The variable that confounds our attempts for uniformity

The question of adaptation is crucial to the understanding of nutritional problems. It is absurd to suppose that there is only one " normal " nutritional state of the organism.

Waterlow, Lancet, 1968

What's *really* in a diet?

- It is lazy to 'make' a diet-food-combination based on 2-3 macronutrients and then fill in the gaps with pills and potions
- Ideally, the diet be able to provide combinations of foods to meet at least 20-25 nutrient requirements
- Needs AI or some advanced computing ability: this is happening
- Embrace adaptation

Eat well, eat less, eat good food

Everything in moderation, including moderation

Learn to evaluate yourself for functionality