Addressing Childhood Malnutrition: Can We Measure Body Composition?

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The Challenge: Differences Between Treatments Will Be *Small*

- Example: malnourished infant weighing 5.0 kg on admission
- Gains 15% weight in 8 weeks = 750 grams
- Diet A causes weight gain 30% fat, 70% lean
  \[\Delta\text{lean} \, 525 \, g = 9.3 \, g/d\]
- Diet B causes weight gain 40% fat, 60% lean
  \[\Delta\text{lean} \, 450 \, g = 8.0 \, g/d\]
How can we measure body composition?

- **Gold standard imaging – DXA**
  - Little bias, but expensive, requires electricity, need to be motionless for scanning

- **2-compartment models**
  - eg air displacement plethysmograph, body water
  - 2-C methods only as good as their assumptions!
  - ADP relies on fixed density of fat and lean tissue
  - TBW relies on fixed hydration
How can we measure body composition?

- Gold standard imaging – DXA
- 2-compartment models e.g. air displacement plethysmograph, body water
- Simple derivative methods e.g. bioelectrical impedance

Simple field technique

Poor accuracy (relative to ADP (±200 g lean tissue))

May be suitable for x-sectional, not for changes over time
What Else Is There?

- Basic techniques – MUAC, skinfolds
- Functional tests (e.g. strength)
- Coming next – creatine dilution?
- Isotope dilution techniques…

Sensitive to field errors and differences across assessors

Potential to combine methods to estimate muscle (Jaswant & Nitish 2014)


![Graph showing the relationship between MRI muscle mass and creatine dilution method muscle mass.](image)