Thymus size in children with severe acute malnutrition

Maren Rytter; Hanifa Namusoke; Christian Ritz; Kim F Michaelsen;
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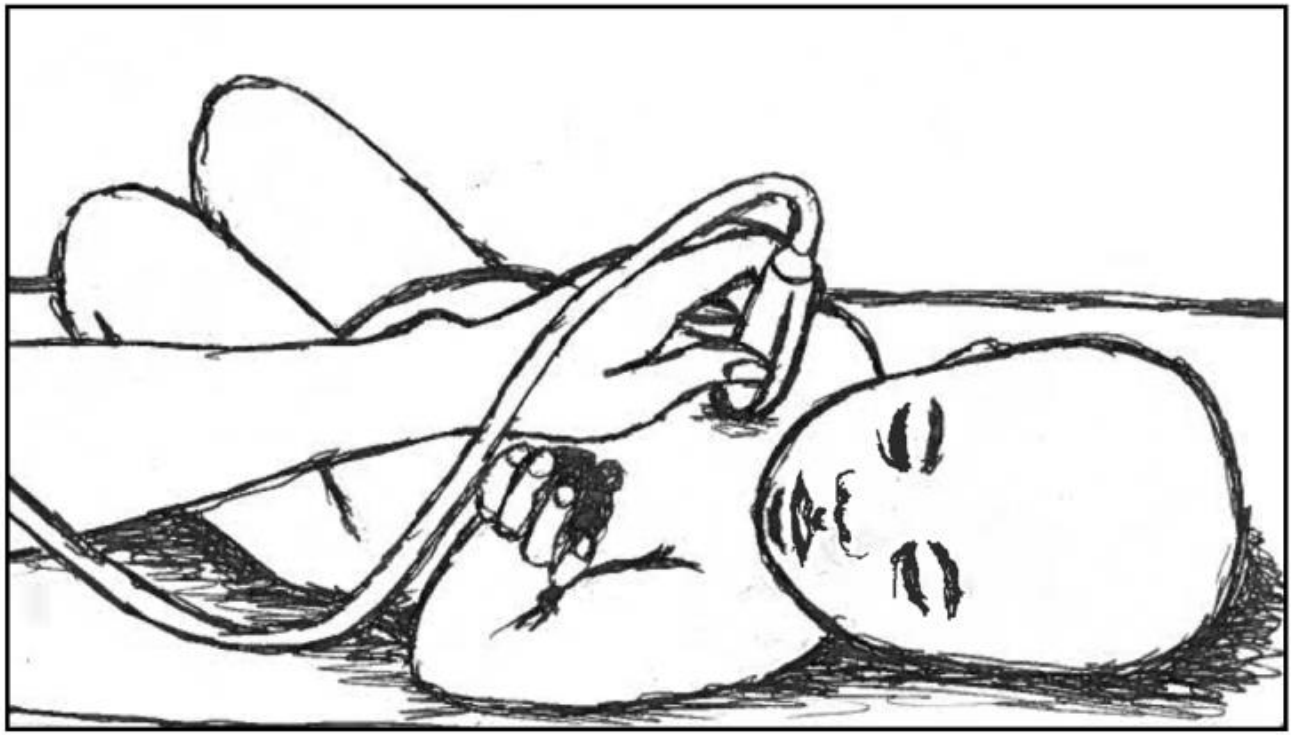

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Severe Acute Malnutrition

Photo: Kia Hee Schultz Kristensen

Non-oedematous malnutrition
”Marasmus”

Photo: Sofine Heilskov

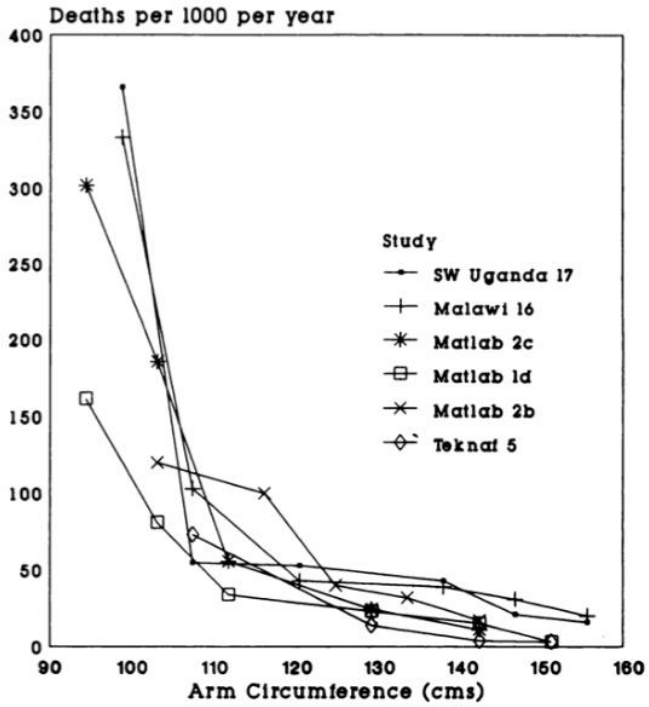
Oedematous malnutrition
”Kwashiorkor”

Severe acute malnutrition

- Definition: Weight-for-length z-score < -3
  or mid-upper-arm circumference < 11,5 cm
  or oedema

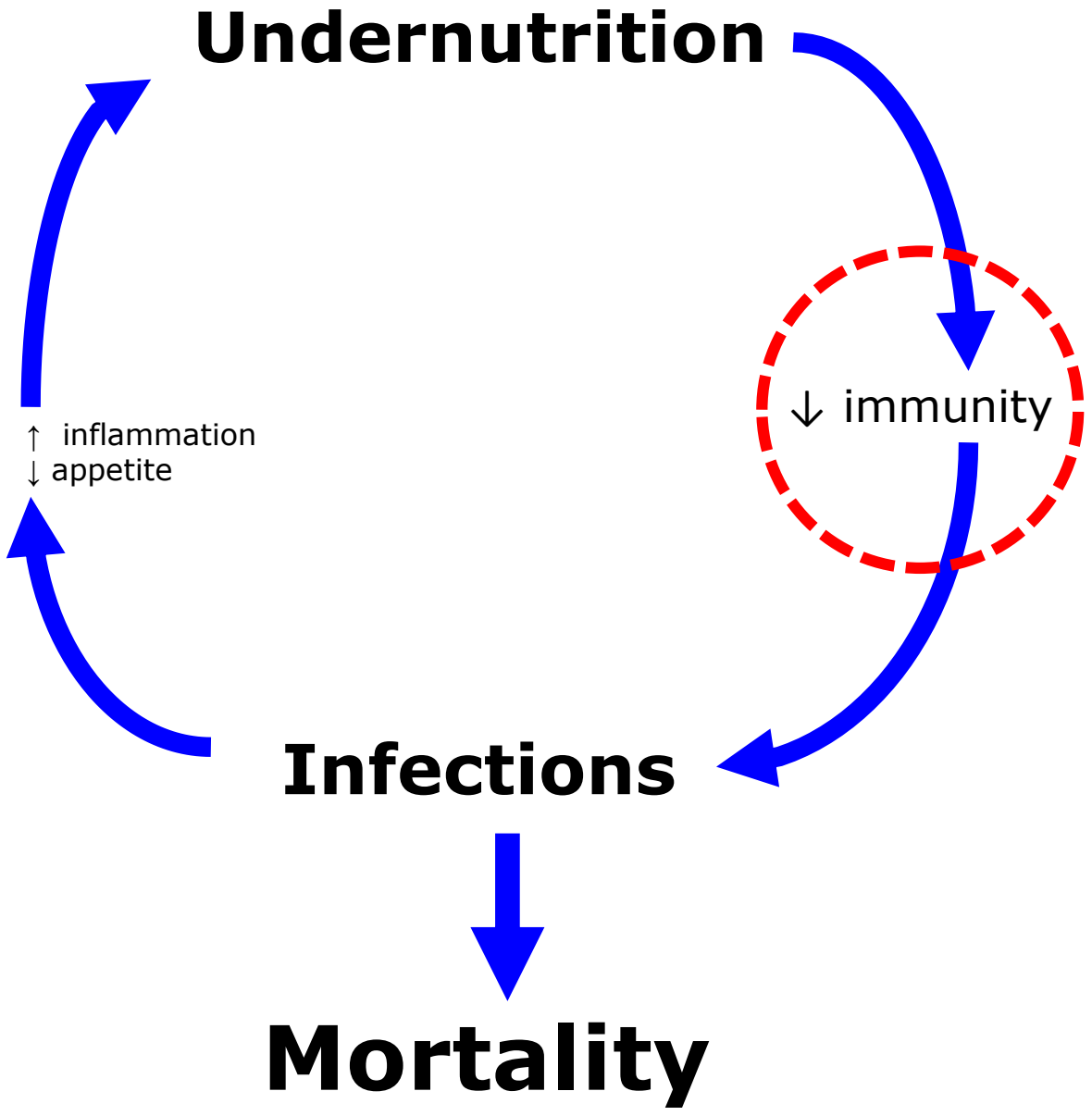
- ~ 19 million children

- High infectious disease mortality



Fra: Pelletier et al, J Nutr 1994

Mwanamugimu Nutrition Unit - Kampala - Uganda


Undernutrition
↓ immunity
Infections
Mortality
↑ inflammation
↓ appetite

The thymus gland

- Production and maturation of T-lymphocytes
- Orchestrates immune responses
- Shrinks in malnutrition
- Size predicts subseqent mortality
- → marker of ”immunodeficiency of malnutrition”?

Objectives

To identify correlates of thymus size in children with severe acute malnutrition, and predictors of growth in thymus size with nutritional rehabilitation.

Design

Cross-sectional and prospective study

Participants

Children admitted for in-patient treatment of severe acute malnutrition

FeedSAM study

Collaboration:
University of Copenhagen and Mwanamugimu Nutrition Unit

- October 2012 to February 2013

Inclusion criteria

- Admitted to Mwanamugimu with SAM
- Age 6- 60 months
- Informed consent

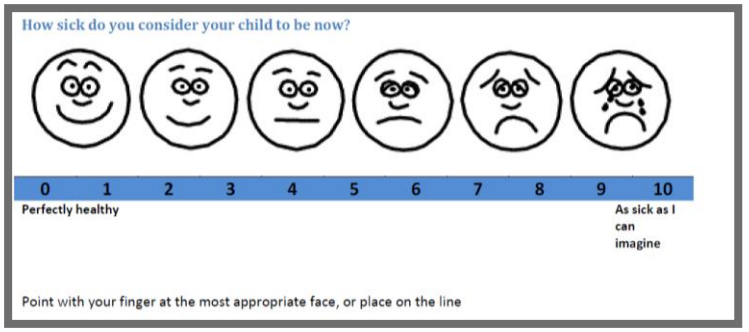
Exclusion criteria

- Shock/severe respiratory distress
- Disability
- Haemoglobin < 4 g/dl
- Weight < 4.5 kg

Control group:

- 20 apparently healthy children
- WHZ > -1

Overview of assesments



Physical examination Questionnaire

Anthropometry

Thymus area measured

IN-HOSPITAL TREATMENT

OUT-PATIENT FOLLOW-UP

Day 0 Day 2 Discharge Week 8

Blood samples

Admission: Sodium, Potassium, Phosphate, Hemoglobin, C-Reactive Protein (CRP), A1 acid glycoprotein (AGP)

Day 2: Sodium, Potassium, Phosphate

Discharge: Sodium, Potassium, Phosphate, Hemoglobin, C-Reactive Protein (CRP), A1 acid glycoprotein (AGP)

Thymus size

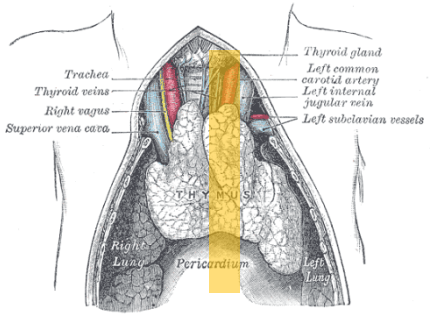
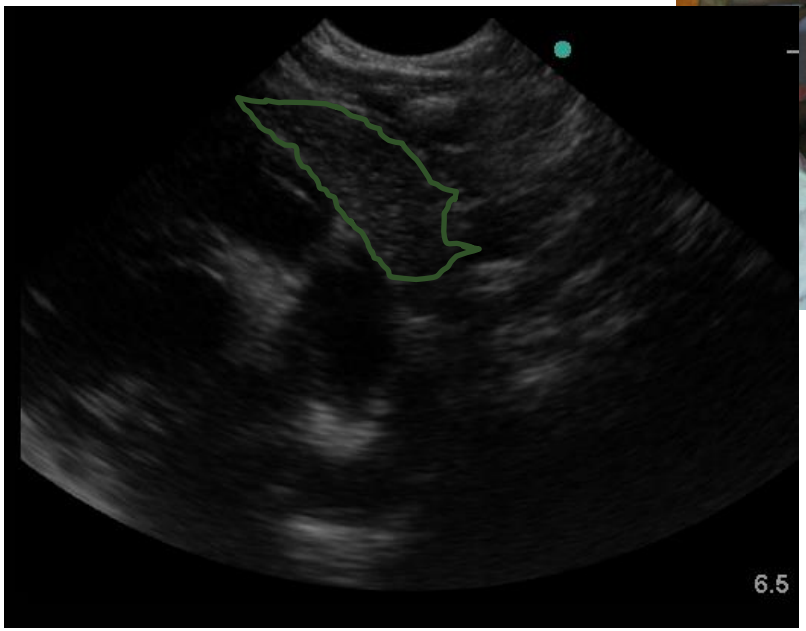


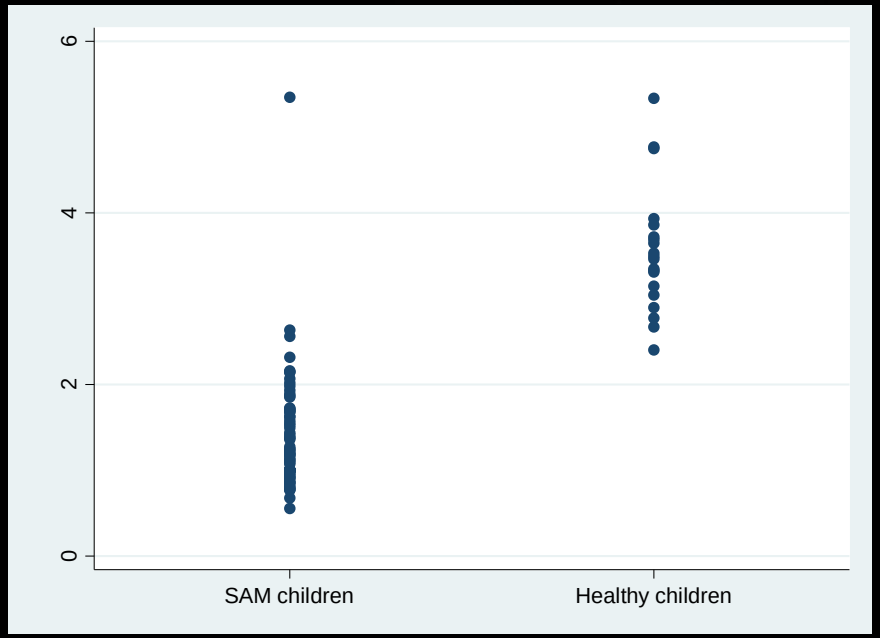
Photo: Sofine Heilskov



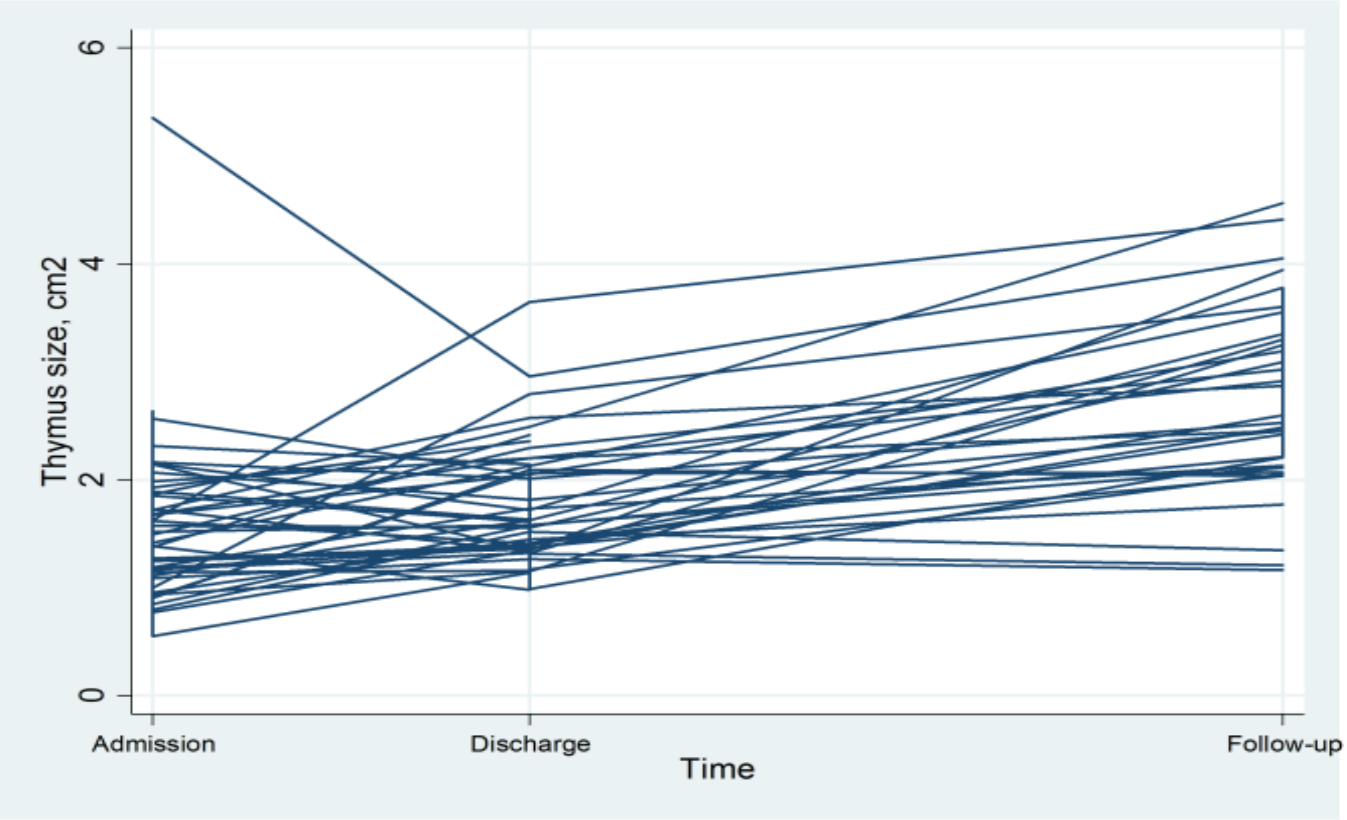
Characteristics of 85 included children

Female sex
Age, months
Oedema
HIV infected
Died in hospital

Thymus area in malnourished and well-norished children



Change in thymus size



- Increase over time
- Correlated with simultaneous change in MUAC
- Few other correlates identified

Conclusion:

The thymus in children with severe malnutrition is:

- Frequently invisibly small
- Thumus atrophy most severe with
    - Poorer nutritional status
    - Severity of illness
    - Infection
    - Low haemoglobin
    - Hypo-phosphatemia
- Increasing in size with refeeding in a similar pattern to arm circumference

Thank you!

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