

# Optimal preparation for **cancer** treatment

Dr Jann Arends • Tumor Biology Center • Freiburg • Germany



Improving disease management and clinical outcomes through Advanced Medical Nutrition

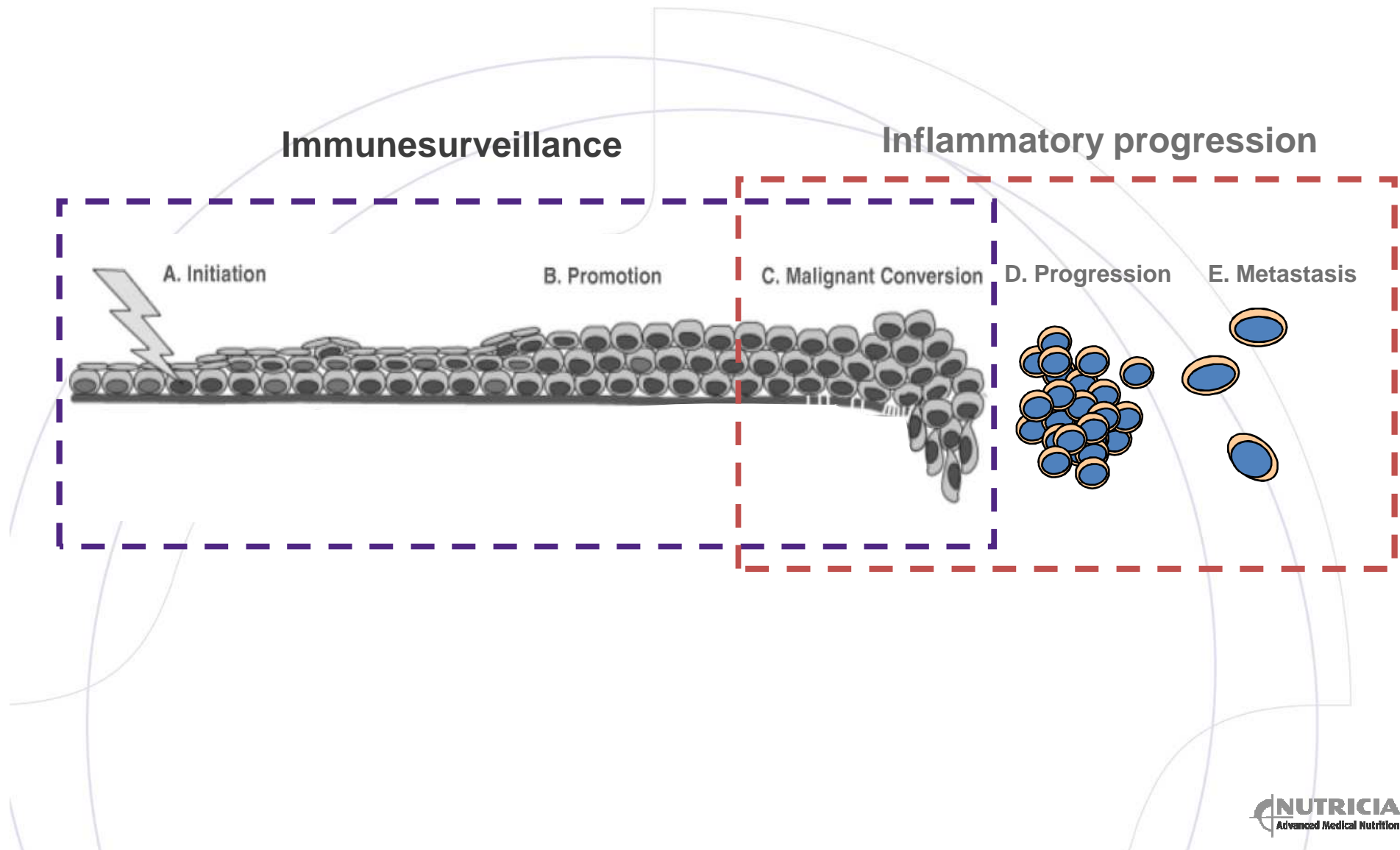
# Introduction

Nutritional problems follow the cancer patient  
.. everywhere ..

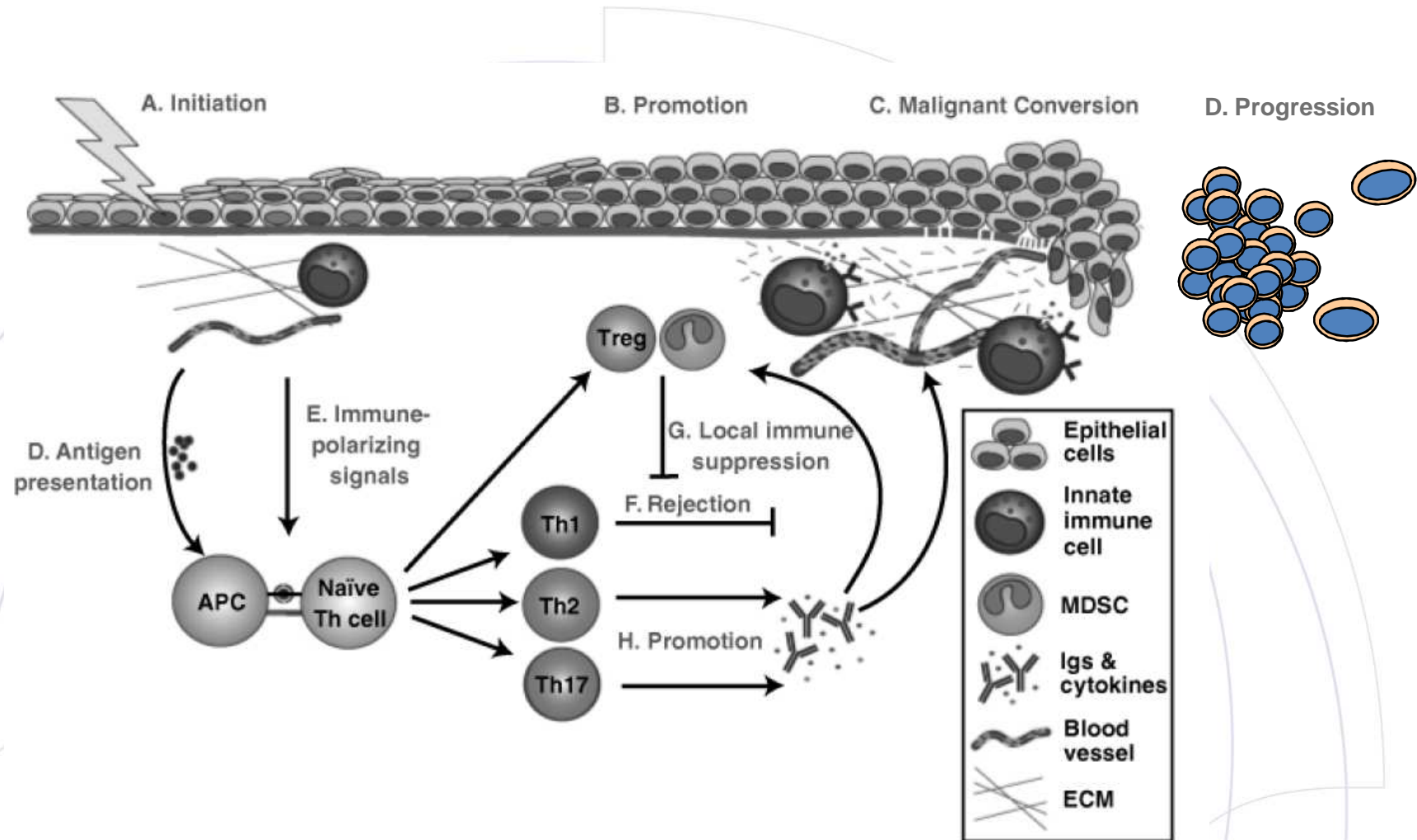
## **2 major elements:**

- Metabolism
- Immunology

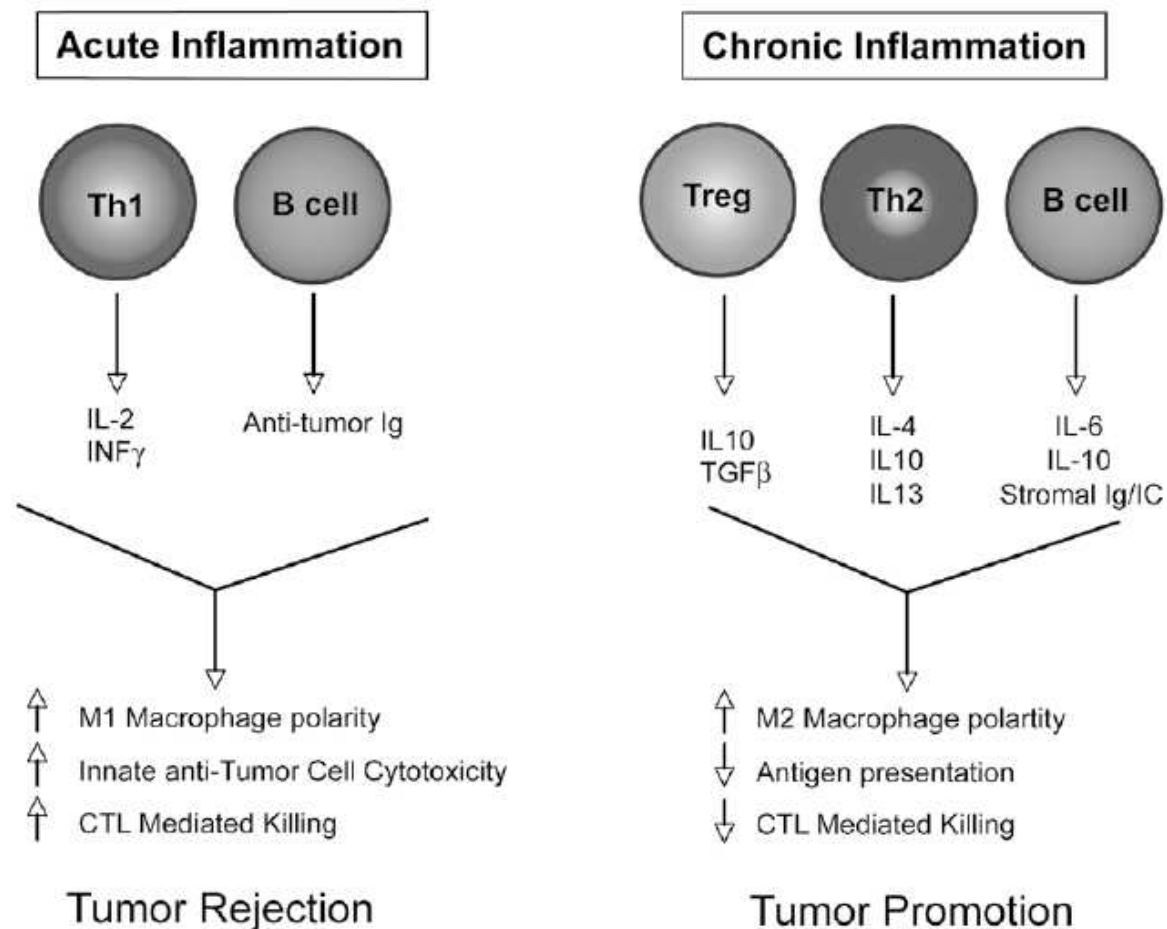
# Development of cancer



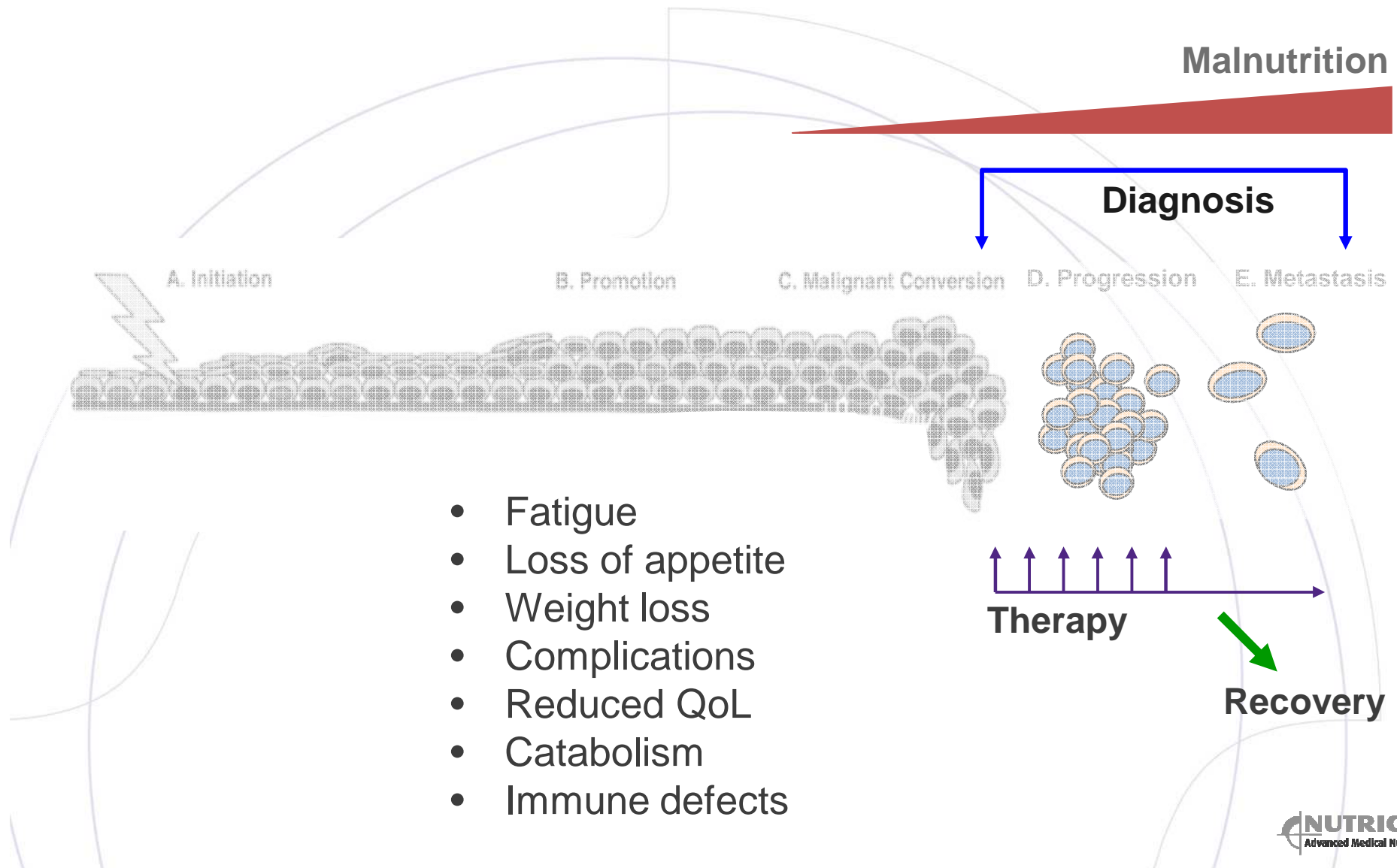
# Immune activity and cancer



# Immune surveillance - inflammatory progression



# Patient journey



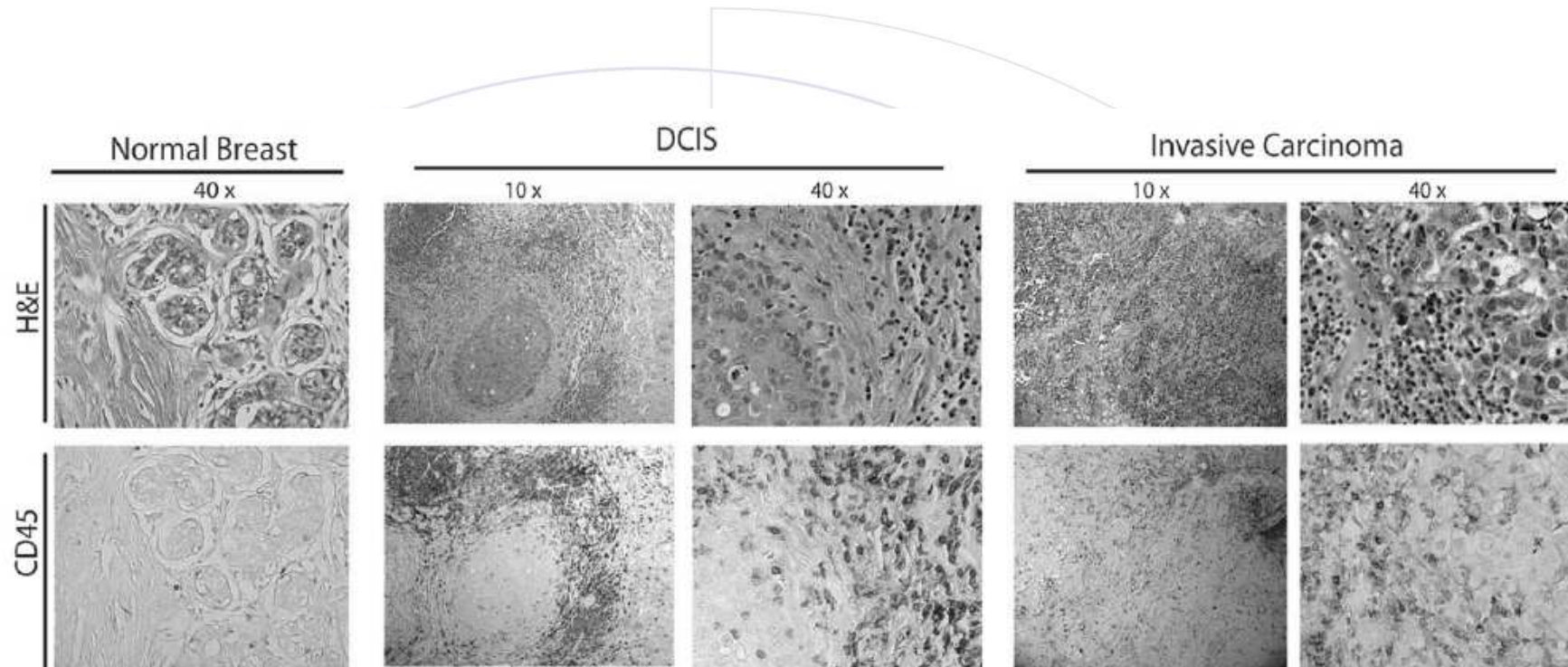


# Patient – Clinical problems

- Catabolism
- Chronic inflammation
- Immune defects



# Immune cells in tumours



Development of human breast carcinoma is characterized by abundant infiltration of immune cells. Representative sections of normal, premalignant, and malignant human breast tissue stained with hematoxylin and eosin (H&E) (upper panels), and following immunodetection of CD45 (leukocyte common antigen, brown staining). DCIS, ductal carcinoma *in situ*.

DeNardo & Coussens, 2007

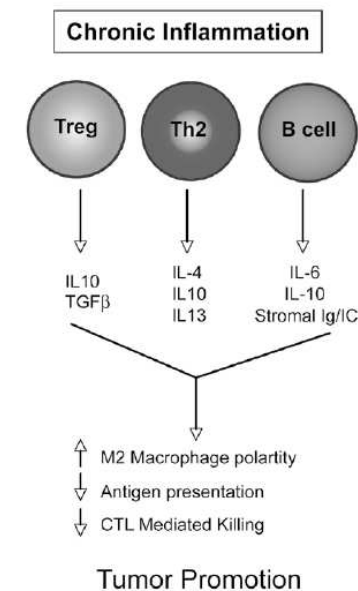


# Chronic inflammation in cancer

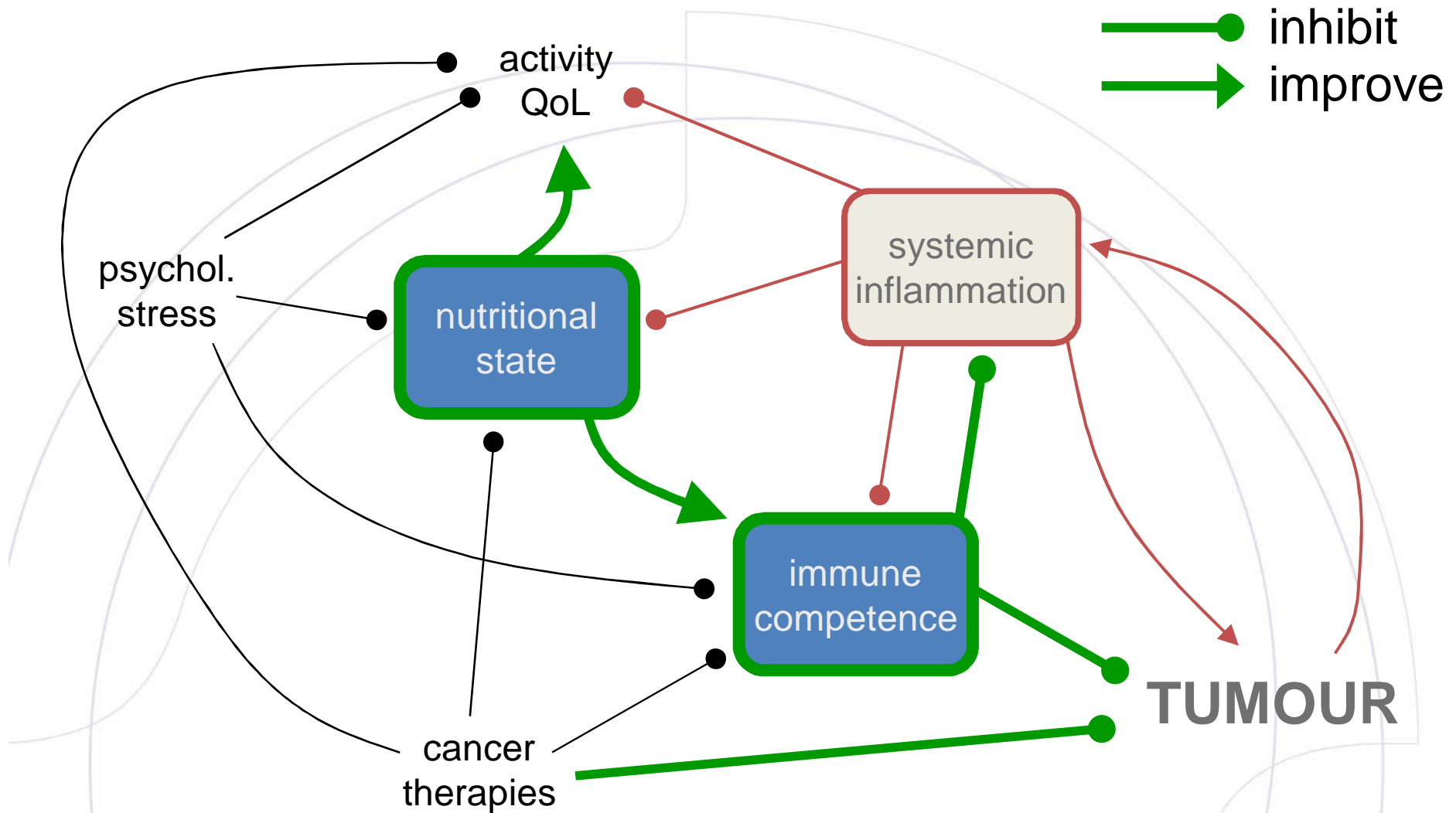
- CRP increased at diagnosis in 50% (pancreatic cancer)
- CRP correlated with
  - weight loss Deans 2004, Barber 1999, Falconer 1995
  - increased energy expenditure Falconer 1994
  - decreased caloric intake Wigmore 1997
  - decreased survival Deans 2004

# Immune defects

- Susceptibility to infections
- Post-operative complications
- Death by infection



# Prognostic factors in cancer



# Goals for oncology-specific nutrition

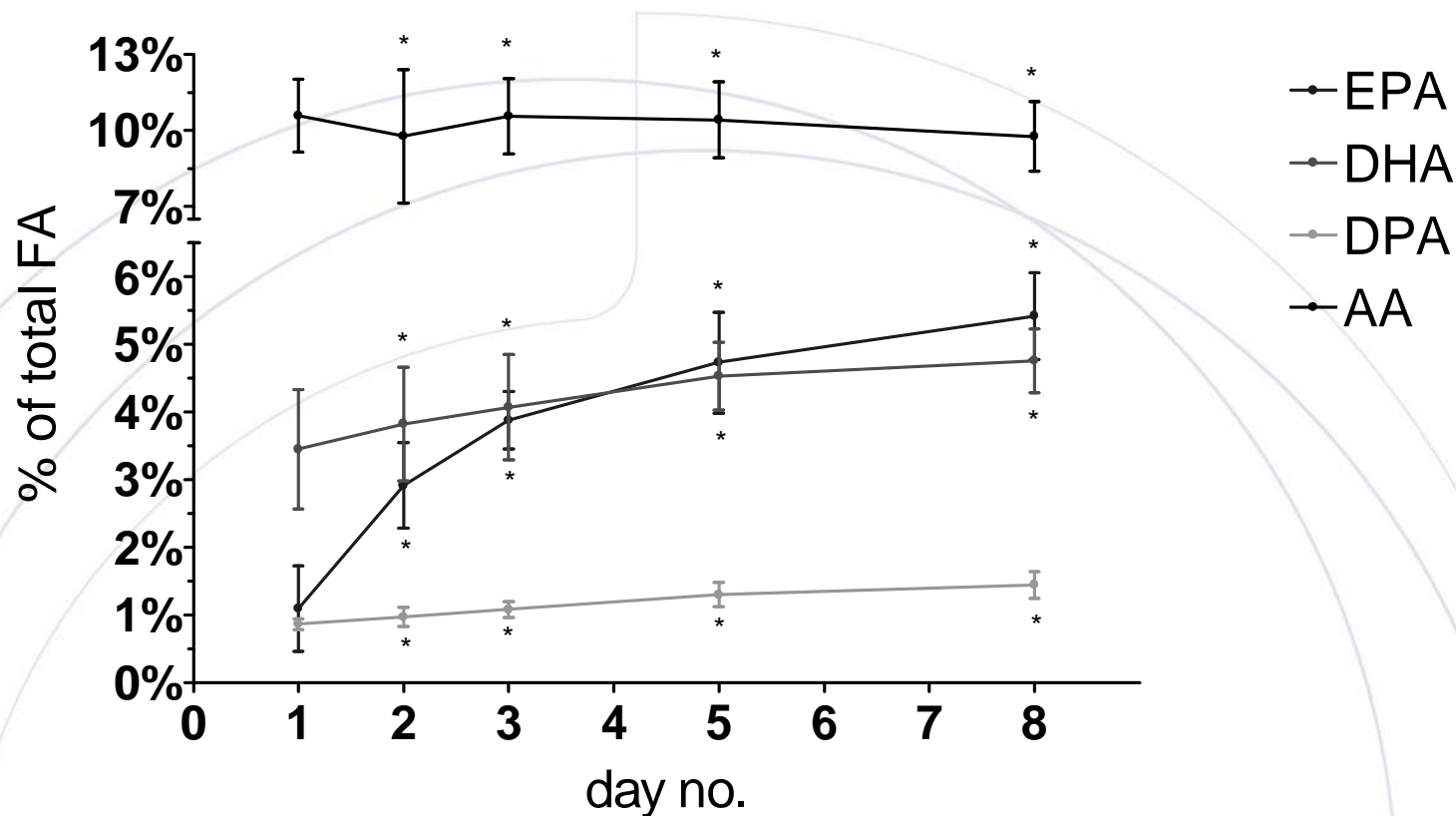
- Reduce inflammation
- Improve muscle function (strength and endurance)
- Improve immunity

# New nutritional supplement

- Reduce inflammation **Eicosapentaenoic acid - EPA**
- Improve muscle function **High protein/Leucine content**
- Improve immunity **Oligosaccharides - FOS/GOS**



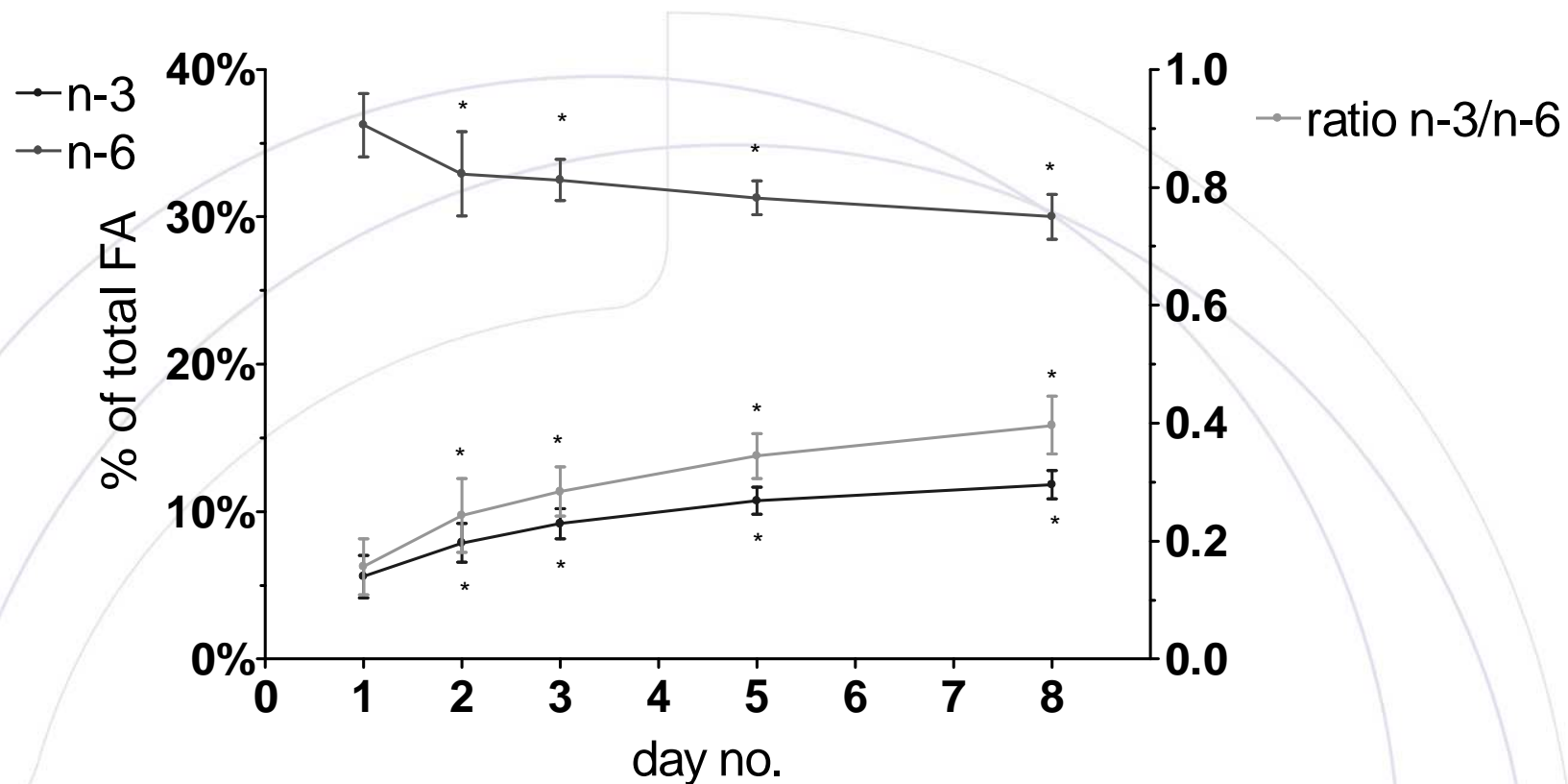
# Plasma fatty acids with supplement



\*Significantly different from baseline  $p < 0.001$ .  
Data presented as mean  $\pm$  standard deviation.

All FAs increase/decrease significantly at all time points.

# Plasma fatty acids with supplement



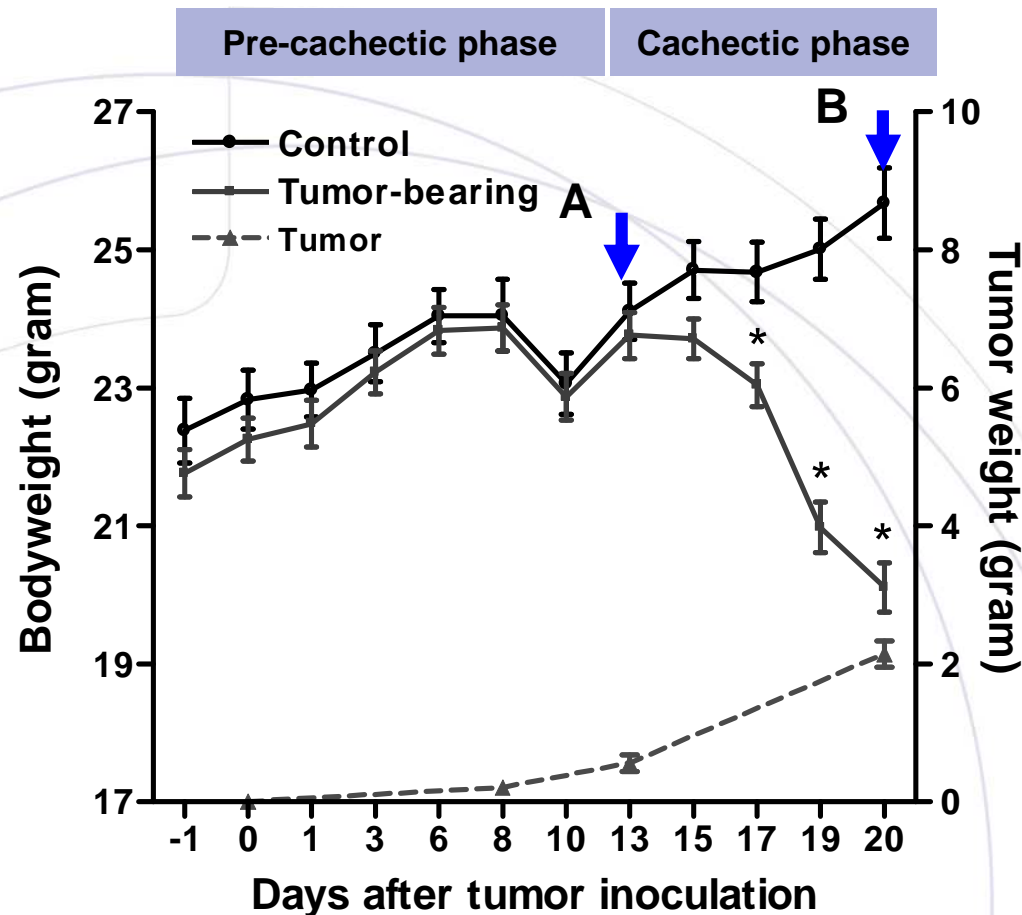
All FAs increase/decrease significantly at all time points.

# Tumour-induced cachexia: *In vivo* model

Syngenic CD2F1 mice

Day 0: s.c.-inoculation  
of  $5 \times 10^5$  colon  
adenocarcinoma cells

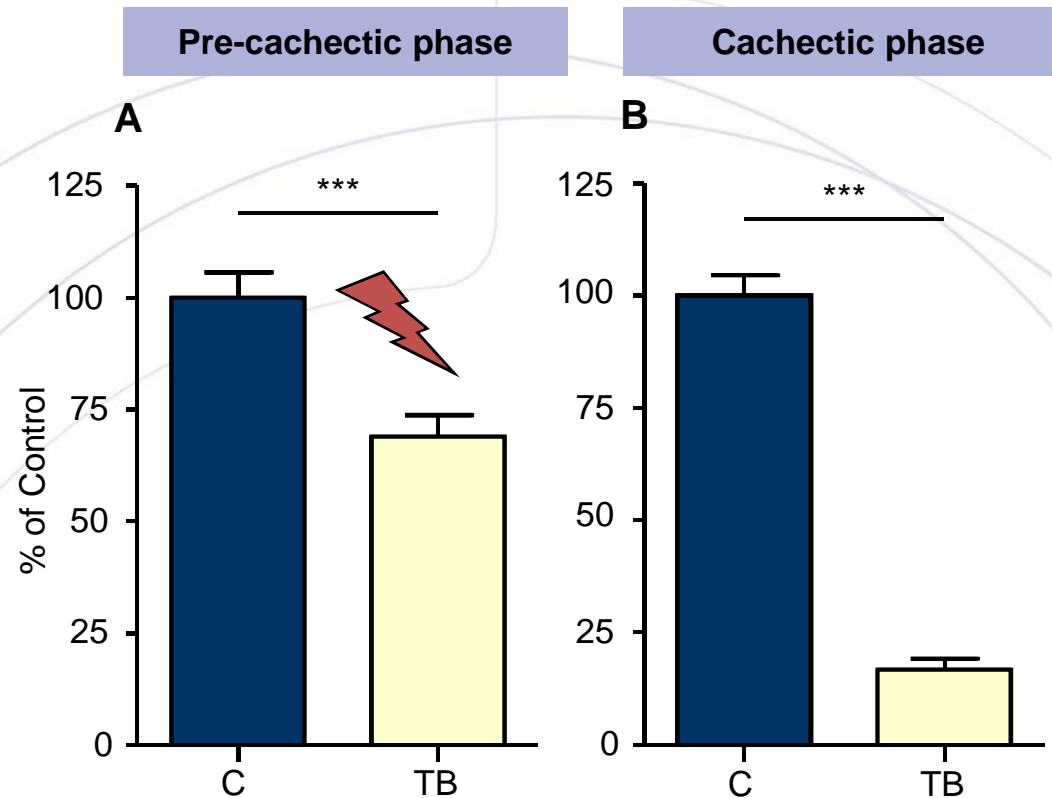
A and B: test for contact  
hypersensitivity to  
oxazolone  
(Th1-response)



Growth of the tumor and effect of tumor inoculation  
on body weight.

\*  $p < 0.01$  vs Control group.

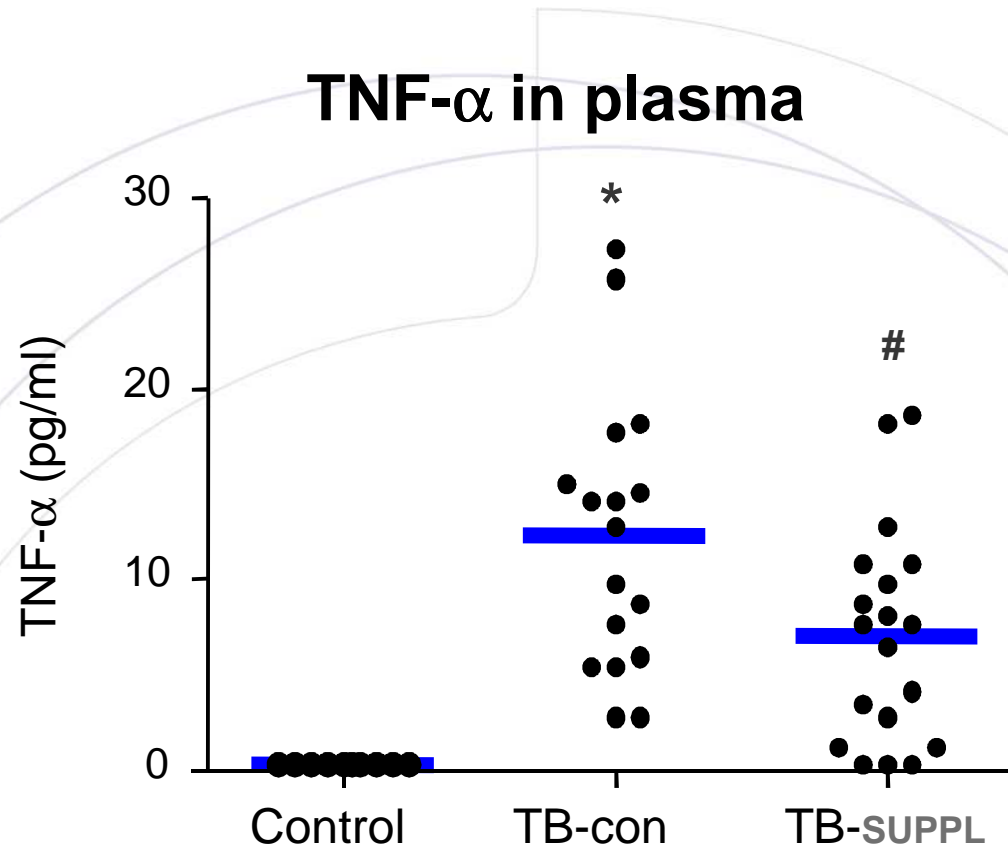
# Significant reduction in Th1-immune function prior to weight loss



*Effect of tumour inoculation on in vivo Contact Hypersensitivity measured by ear swelling in a pre-cachectic state on day 14 (A) and in mice already suffering from cachexia on day 22 (B).*

\*\*\*  $p < 0.001$  between groups.

New supplement:  
Effects on inflammatory mediators

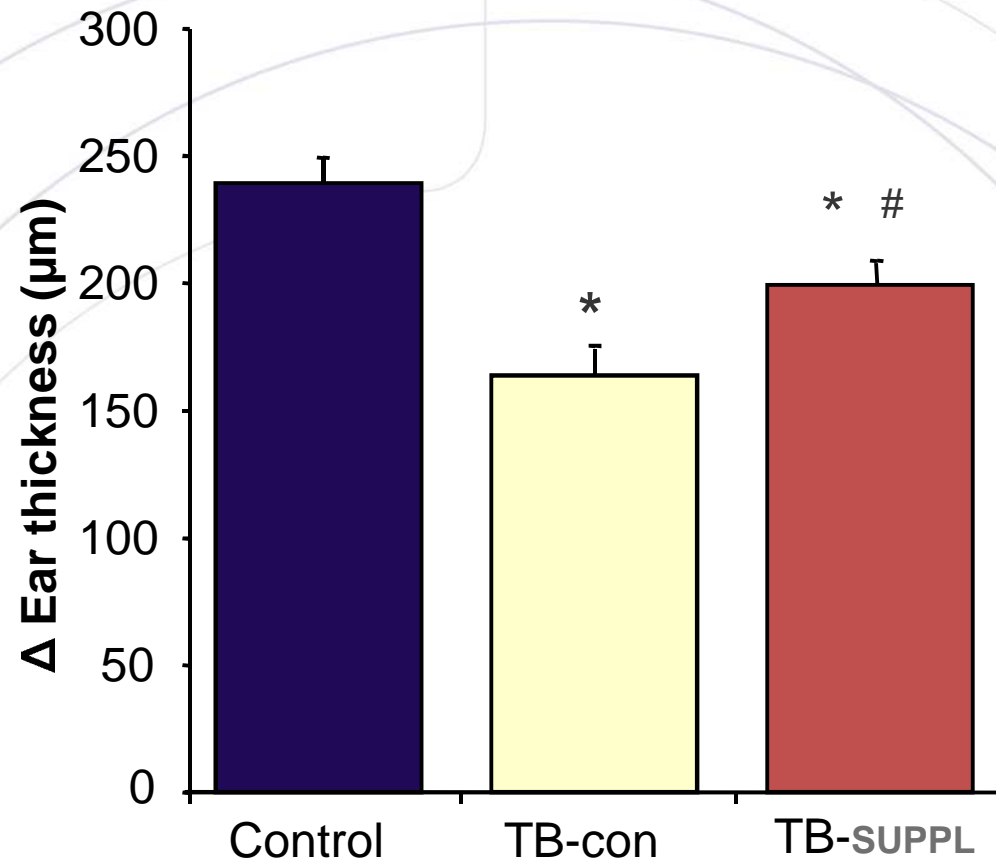


**\*  $p < 0.001$  vs Control,  
^  $0.001 < p < 0.01$  vs Control,  
#  $0.01 < p < 0.05$  vs Control and TB-con**



# New supplement: Effects on Th1-immune function

## Oxazolone contact hypersensitivity

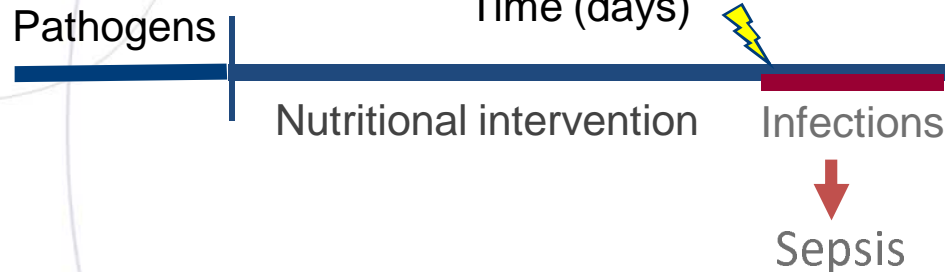
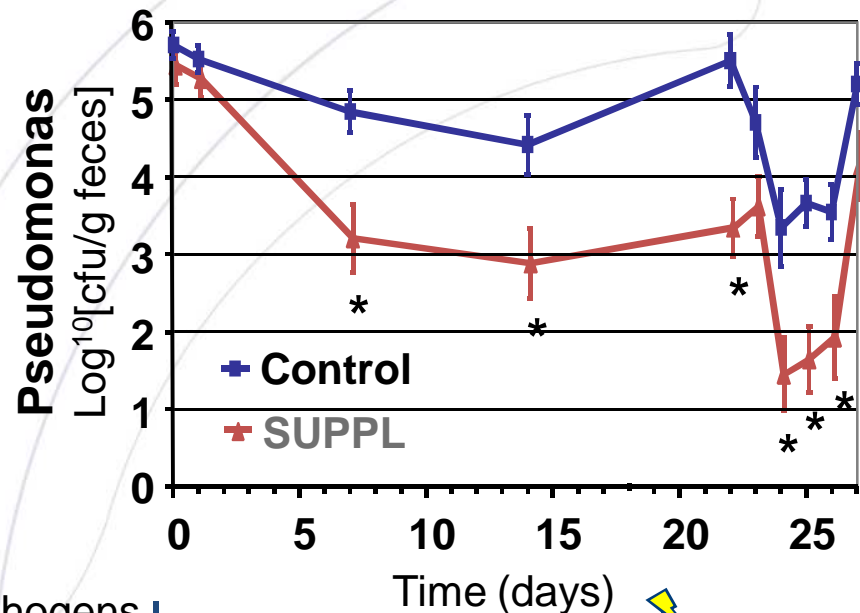


\*  $p < 0.017$  vs Control, #  $p < 0.017$  vs TB-con

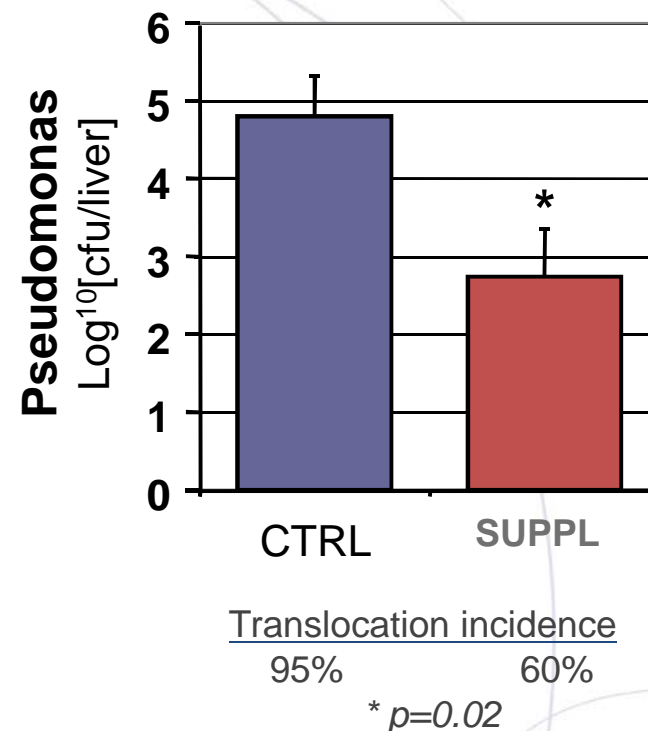
# New supplement: Effects on opportunistic infections post Ctx

## Pseudomonas infection model

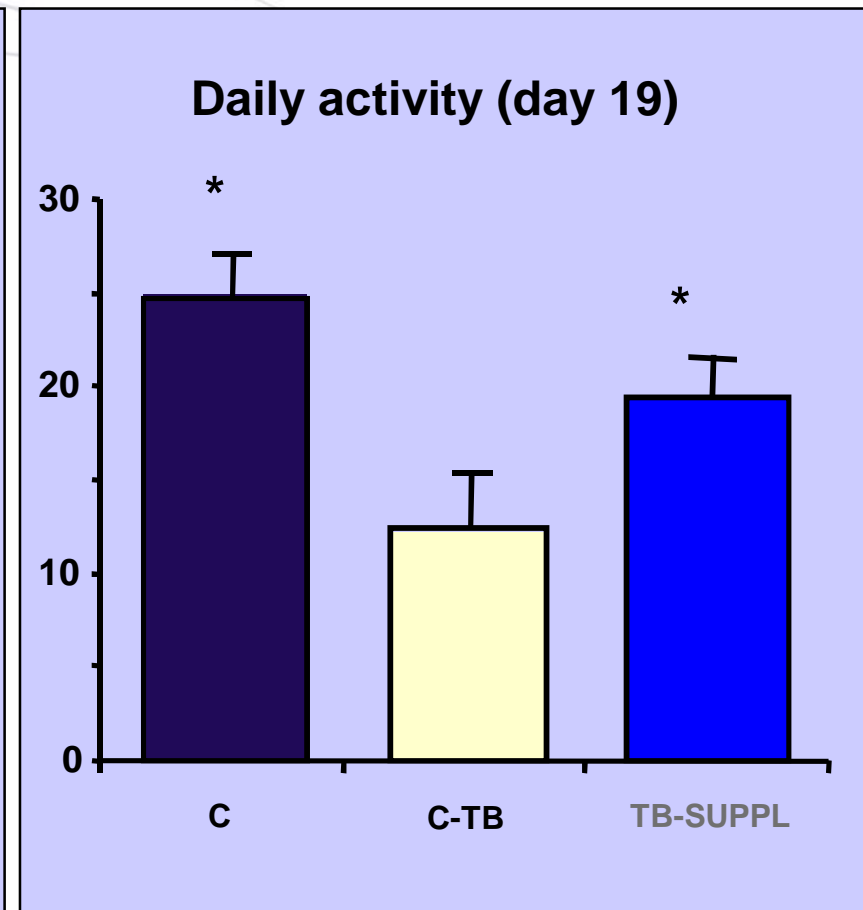
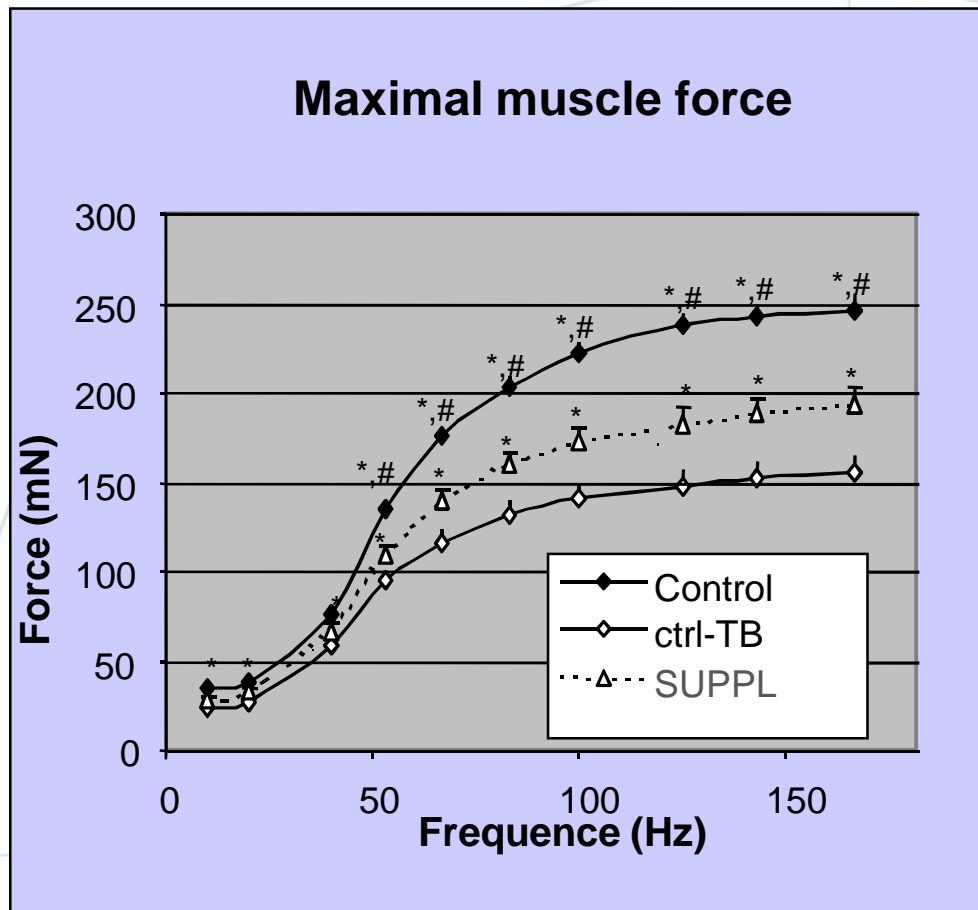
### Faecal colonization



### Liver translocation

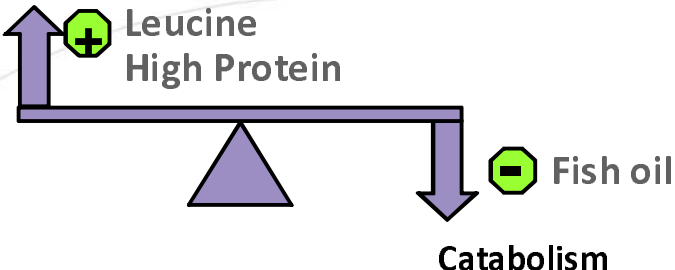







# New supplement: Improvement muscle function



# Dual mode of action

## Anticatabolic and immune-preserving

Actives	Mechanism of action	Dual mode of action
<b>Leucine High Protein</b>  <b>Fish oil</b>		 Muscle function Daily activity Quality of Life 
<b>FOS GOS</b>		 Immune function 

# “Dawn of a new era of cancer therapies”

Tlsty & Coussens, 2006



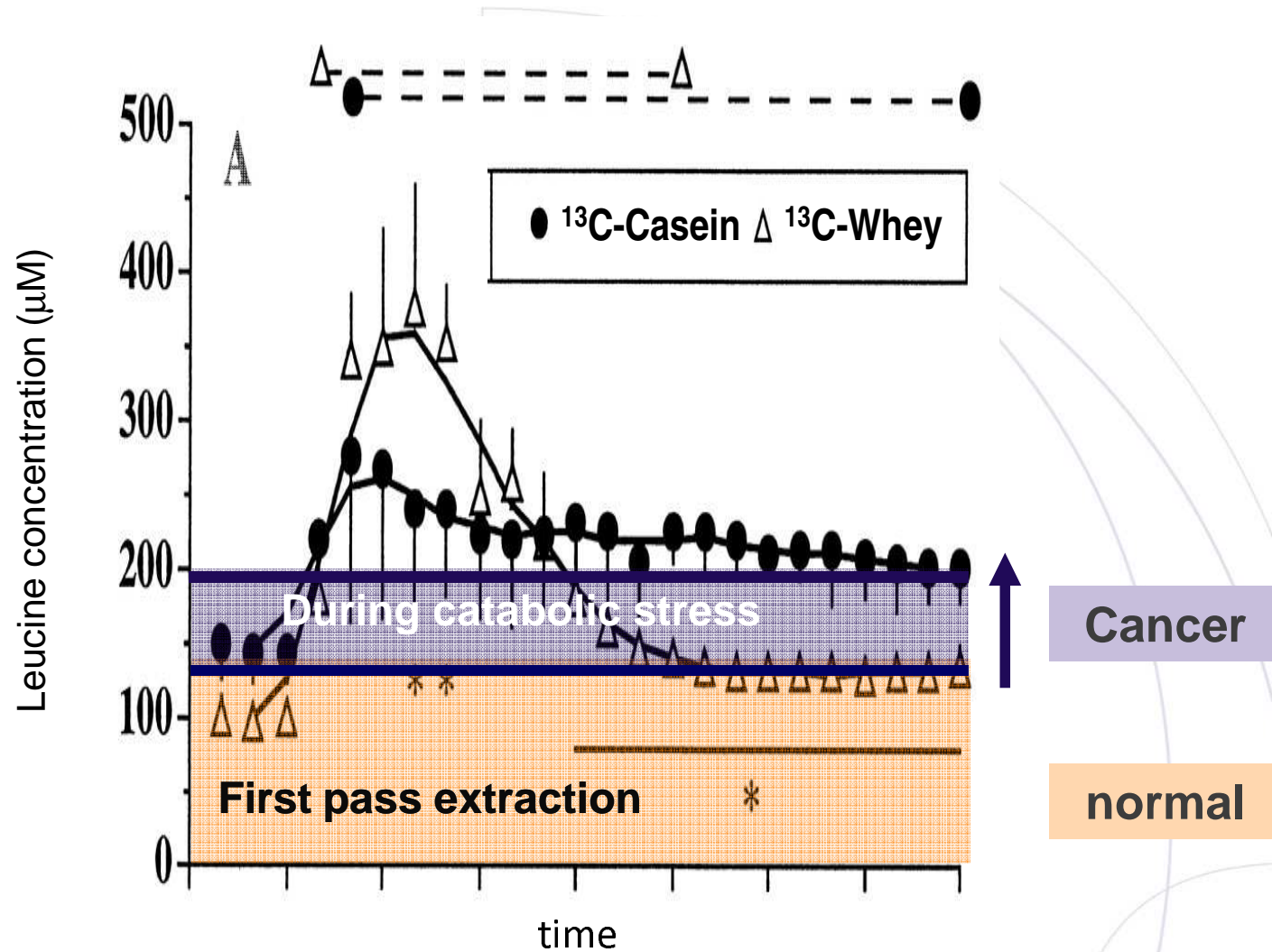
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# Conclusions

- Cancer is associated with nutritional, metabolic and immunological deterioration. This makes the patients susceptible to complications or delay of treatment.
- The New Supplement (EPA, Oligosaccharides, Protein, Leucine mixture) clearly demonstrated in pre-clinical studies:
  - improvement in immune activity
  - reduction in inflammation
  - improvement in muscle function
- The improvement of the immune function, already in an early phase, will help to reduce the risk for infectious complications. This will increase the chances of an optimal execution of cancer therapies.

# Imbalance of anabolism vs catabolism



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