

Convegno Educazionale GITMO

LE TERAPIE CELLULARI IN EMATOLOGIA TRA PASSATO, PRESENTE E FUTURO

Brescia, 28-29 novembre 2025

Centro Paolo VI

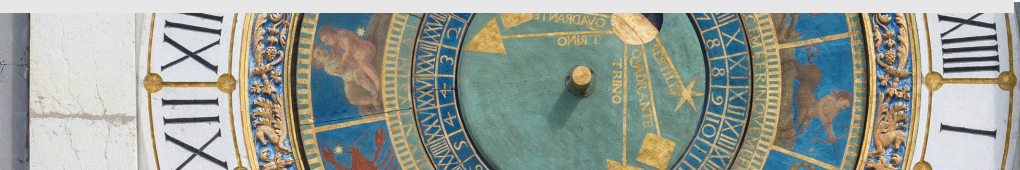
La nutrizione nel paziente trapiantato:
un'arma per ridurre infezioni e GVHD?

Enrico Morello

ASST Spedali Civili di Brescia
SSD Trapianto Midollo Osseo Adulti

Disclosures of Enrico Morello

Company name	Research support	Employee	Consultant	Stockholder	Speakers bureau	Advisory board	Other
Sanofi							(3000 Eur) EBMT2025 Travel grant
Nestlè	80000 Eur @ASST SCB (study support)						



Outline

One-Health

Eubiosi e Disbiosi

Diete e impatto sulla salute

Malnutrizione Disbiosi e Trapianto

Come valutare la malnutrizione

Disbiosi al trapianto

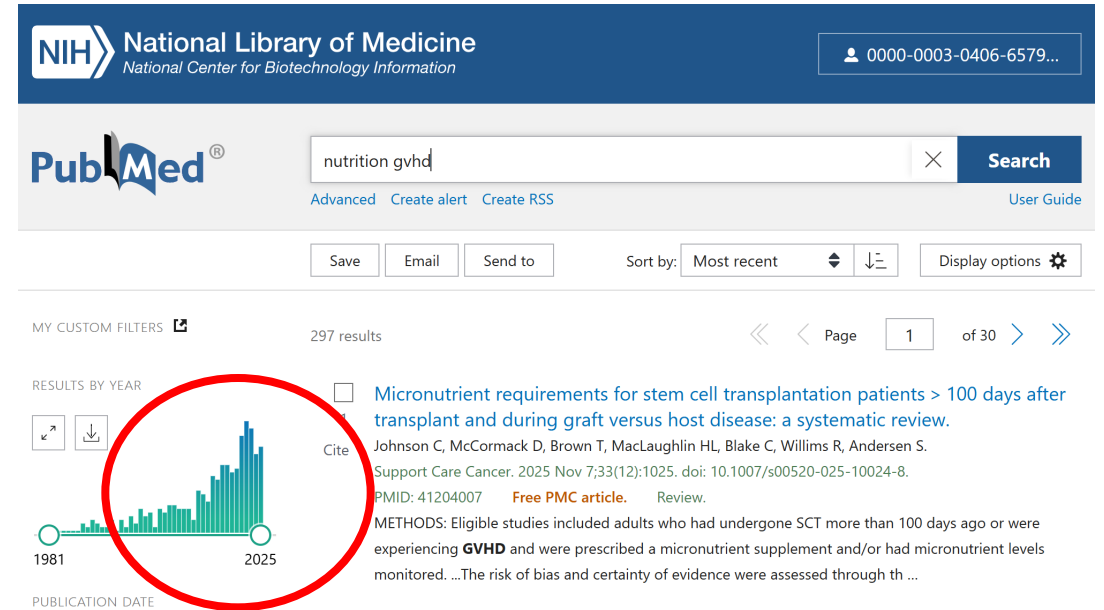
Impatto sulle infezioni

Impatto sulla GVHD

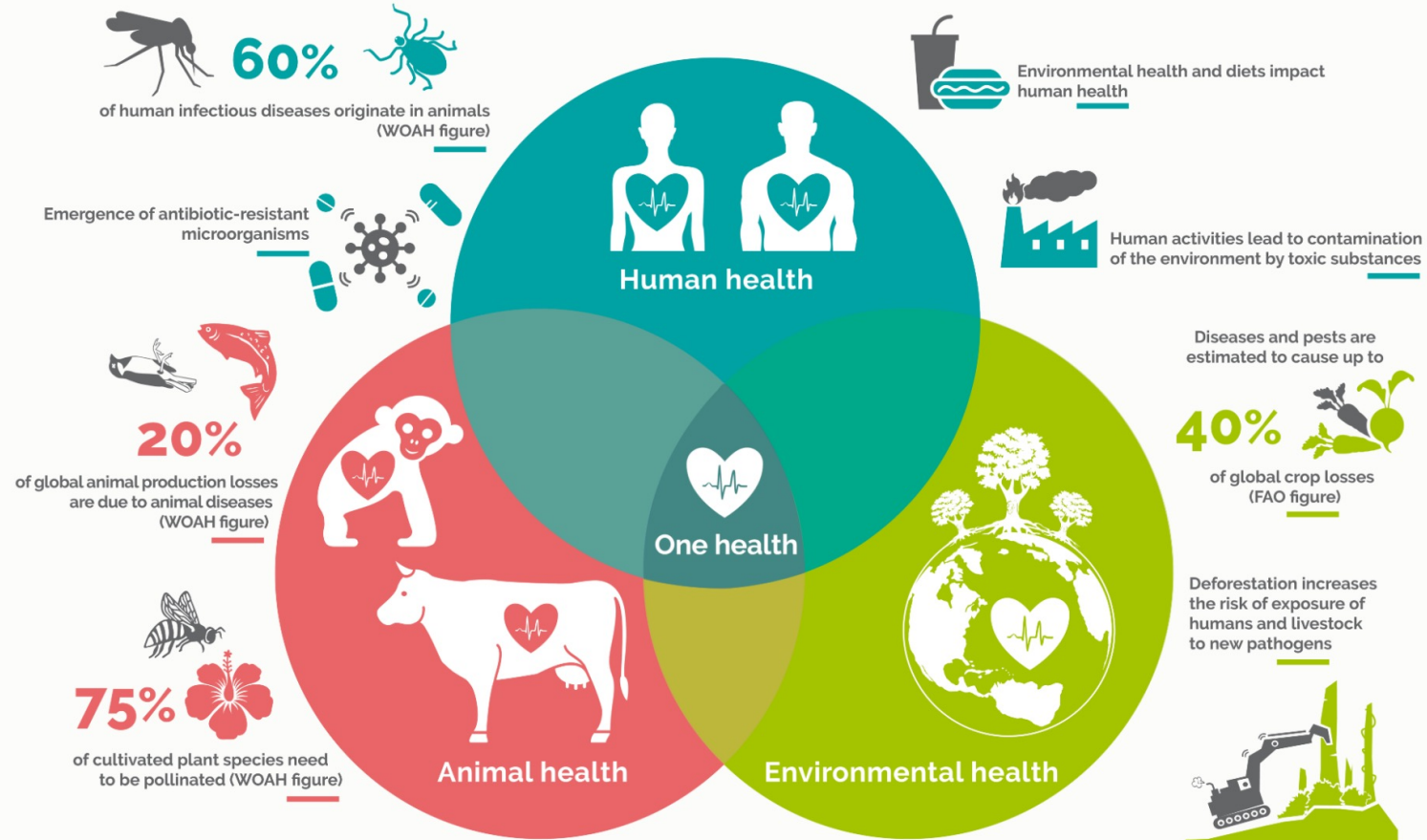
Lattosio ed enterococchi

Il ruolo del TGF-beta

Proposte per il futuro



One-Health



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<https://www.inrae.fr/en/europe-and-world/one-health-people-animals-and-environment>



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Eubiosi e Disbiosi = Salute e Malattia

Microbiota composition in different regions

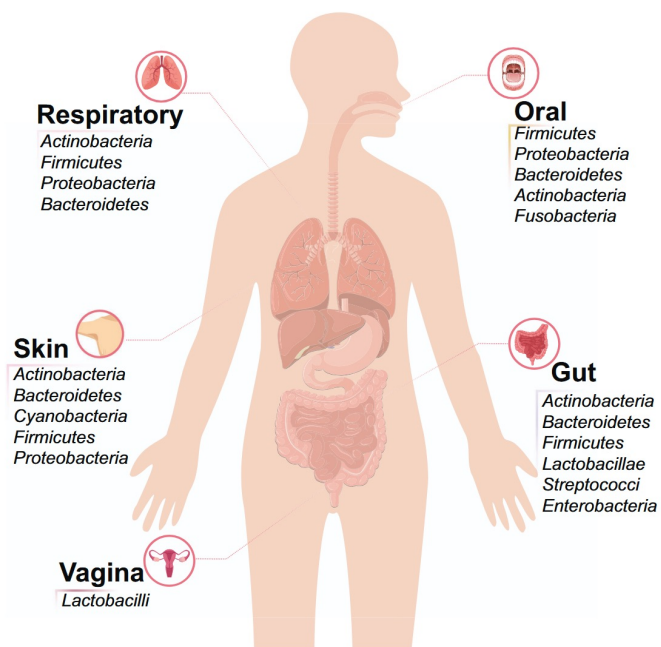


Fig. 1 Human microbiota composition in different locations. Predominant bacterial genera in the oral cavity, respiratory tract, skin, gut, and vagina are highlighted

Microbiota in health and diseases
Hou et al.

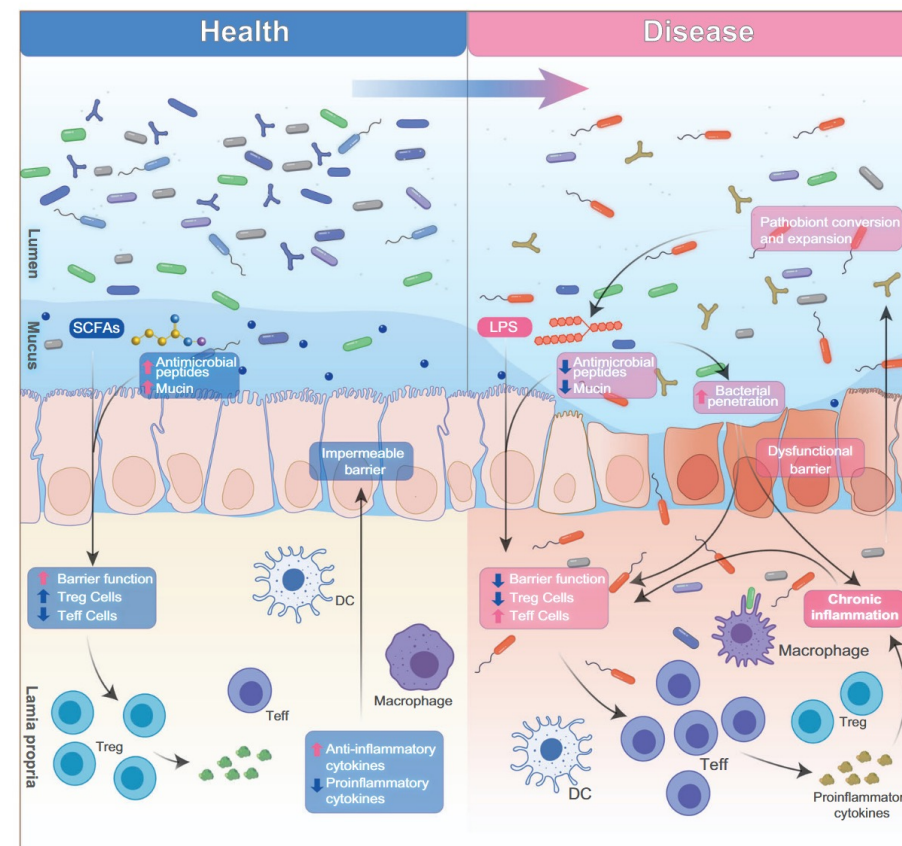


Fig. 3 Factors affecting microbiota-associated chronic inflammation in healthy and disease state

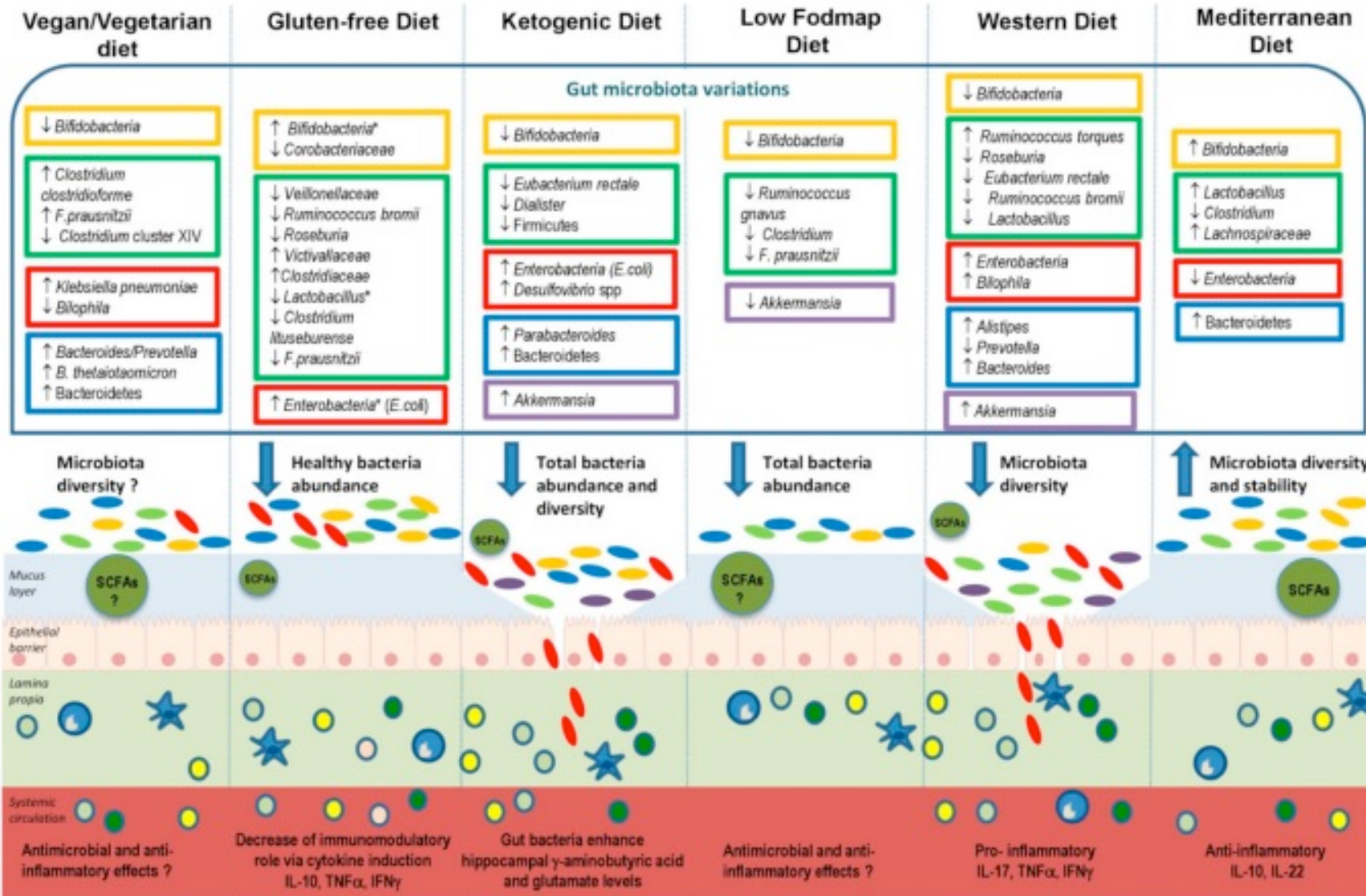
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Dieta e microbiota: l'effetto delle scelte alimentari sulla nostra salute



Microbiota

strato mucoso

epitelio

lamina propria

vasi

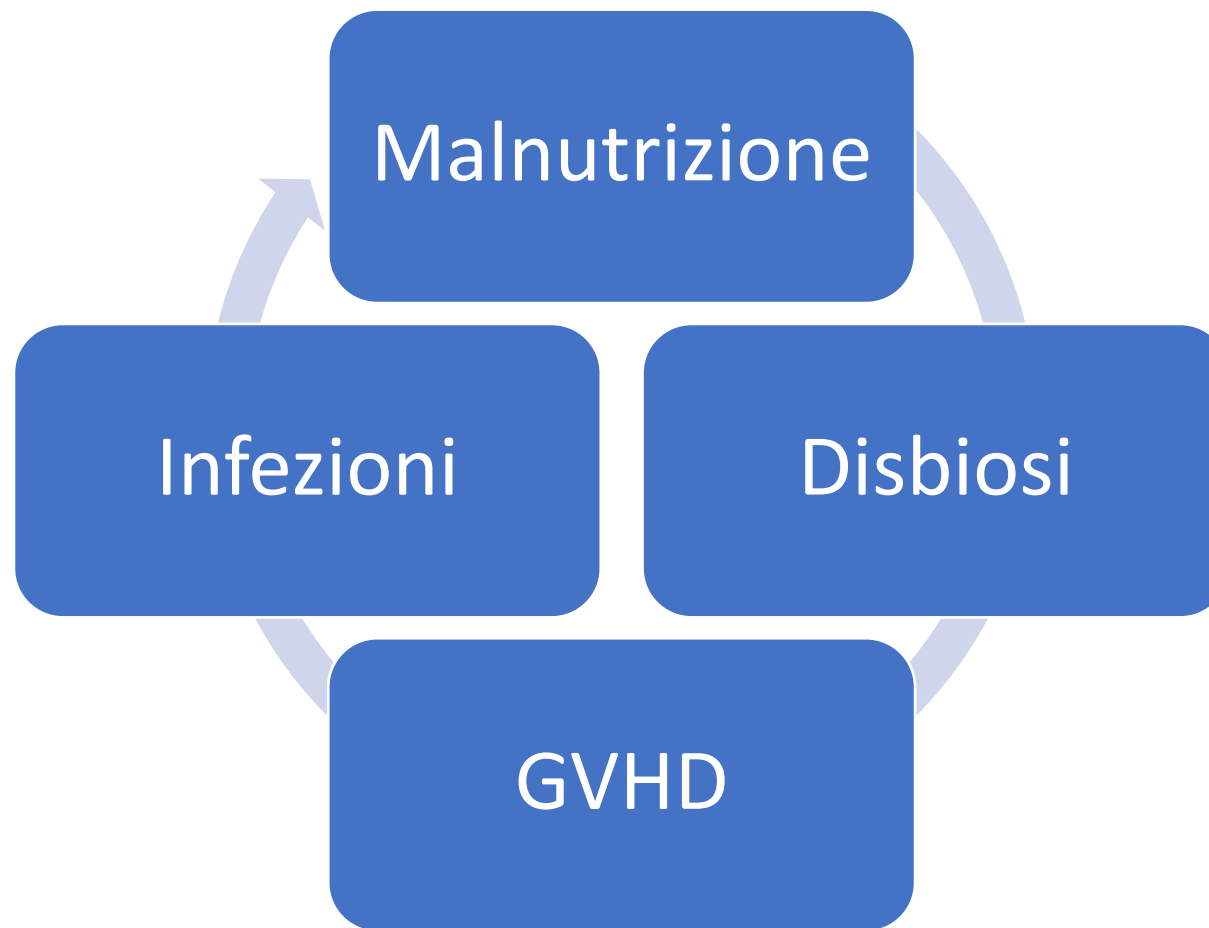
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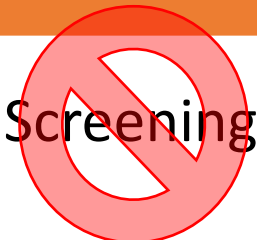
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Renata Alleva, Terra Madre 2022

Un circolo, vizioso o virtuoso?



Malnutrizione, come valutarla (GLIM)

 Screening → Assessment e Diagnosi nutrizionale

GLIM CRITERIA

Phenotypic criteria:

- **Unintentional weight loss** by time frame
- **Low body mass index (BMI; kg/m²)** according to age and ethnicity
- **Reduced muscle mass** based on valid body composition assessment methods
 - Examples: physical exam, dual-energy absorptiometry, bioelectrical impedance analysis, ultrasound, computed tomography, magnetic resonance imaging, mid upper arm circumference, or calf circumference

Etiologic criteria:

- **Reduced food intake or assimilation** based on quantitative or qualitative report
 - Examples: 3-day food record, food frequency questionnaire, or patient self-report
 - Considerations:
 - Gastrointestinal symptoms that impact food intake or absorption (e.g., dysphagia, nausea, vomiting, diarrhea, constipation, abdominal pain, etc.)
 - Presence of malabsorptive disorders (e.g., intestinal failure, pancreatic insufficiency, post-operative bariatric surgery, etc.)
 - Other relevant clinical situations affecting food intake (e.g., esophageal strictures, gastroparesis, intestinal pseudo-obstruction, etc.)
- **Inflammation and Disease Burden** from acute or chronic injury or disease
 - Acute: major infection, burns, trauma, or closed head injury
 - Chronic: malignant disease, chronic obstructive pulmonary disease, congestive heart failure, or chronic kidney disease
 - Supportive laboratory tests: C-reactive protein, albumin, or pre-albumin

HOW TO USE THE GLIM FRAMEWORK

	Phenotypic criteria	Check if present
Unintentional Weight loss (%)	> 5% within past 6 months > 10% beyond 6 months	
BMI (kg/m²)	< 20 if < 70 years (Asia: < 18.5) < 22 if ≥ 70 years (Asia: < 20)	
Muscle mass	Reduced	
	Etiologic criteria	Check if present
Reduced food intake	Ingestion ≤ 50% of needs from 1 to 2 weeks Any reduction for > 2 weeks	
or	Any chronic GI condition that adversely impacts food assimilation or absorption	
Assimilation		
Disease burden/Inflammation	Presence of acute disease/injury or chronic disease related	

Malnutrition: if at least one criterion was checked in each section

Determine Malnutrition Severity			
Severity Grade	Phenotypic Criteria		
	Unintentional Weight Loss (%)	Low BMI (kg/m ²) ^a	Reduced Muscle Mass
Stage 1: Moderate Malnutrition Patient requires 1 phenotypic criterion that meets this grade.	• 5-10% in 6 months; or • 10-20% in more than 6 months	• <20 if <70 years; or • <22 if ≥70 years	• Mild-to-moderate deficit (per validated assessment methods on previous page)
Stage 2: Severe Malnutrition Patient requires 1 phenotypic criterion that meets this grade.	• >10% in 6 months; or • >20% in more than 6 months	• 18.5 if <70 years; or • <20 if ≥70 years	• Severe deficit (per validated assessment methods on previous page)

Definitions and Footnotes:
ER= energy requirement; GI= gastrointestinal
Further research is needed for consensus on reference body mass index data for Asian populations in clinical settings.

References:
Jensen, G.L., et al. (2018). *Journal of Parenteral and Enteral Nutrition*, 43(1), 32-40.
Keller, H.H., et al. (2020). *Journal of Parenteral and Enteral Nutrition*, 44(8), 992-1003.



Valutazione soggettiva globale riportata dal paziente
tramite punteggio
Scored Patient-Generated Subjective Global assessment
(PG-SGA)

Anamnesi: Le sezioni da 1 a 4 sono strutturate per essere completate dal
paziente. [Le sezioni da 1 a 4 vengono definite "PG-SGA Short Form (SF)"]

Malnutrizione – PG-SGA, come si fa?



Storia del peso (a un mese e a sei mesi
dal trapianto)

L'apporto di cibo

I sintomi (nausea, mucosite, disgeusia,
vomito, diarrea....)

L'attività fisica

Le comorbidità

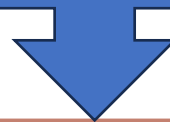
La presenza e l'entità di episodi
febrili (catabolismo)

La somministrazione di corticosteroidi
(catabolismo)

L'esame obiettivo (stato muscolare,
depositi di grasso e idratazione)

Malnutrizione – PG-SGA

Strumento raccomandato soprattutto in oncologia per rilevare e classificare la malnutrizione.



Include dati riferiti dal paziente (PRO) e valutazione clinica; risultato categorizzato in:

A: buono stato nutrizionale

B: moderata malnutrizione

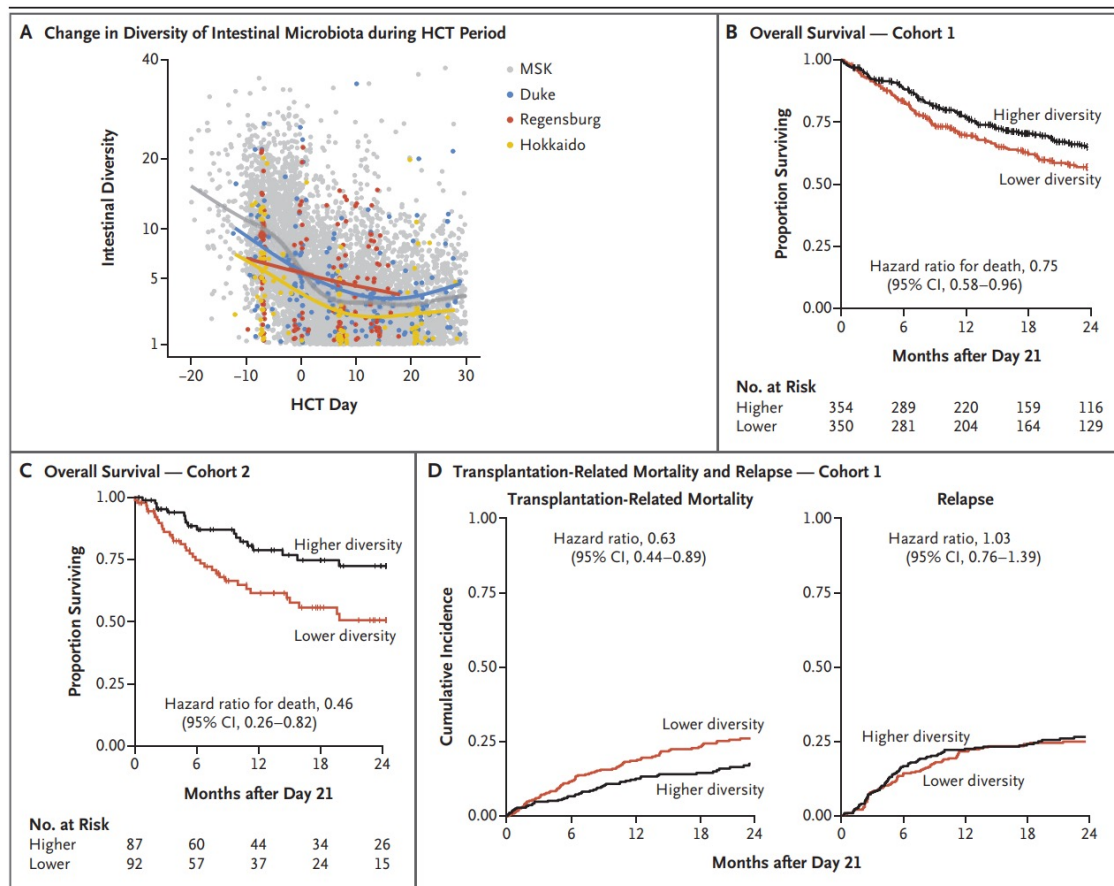
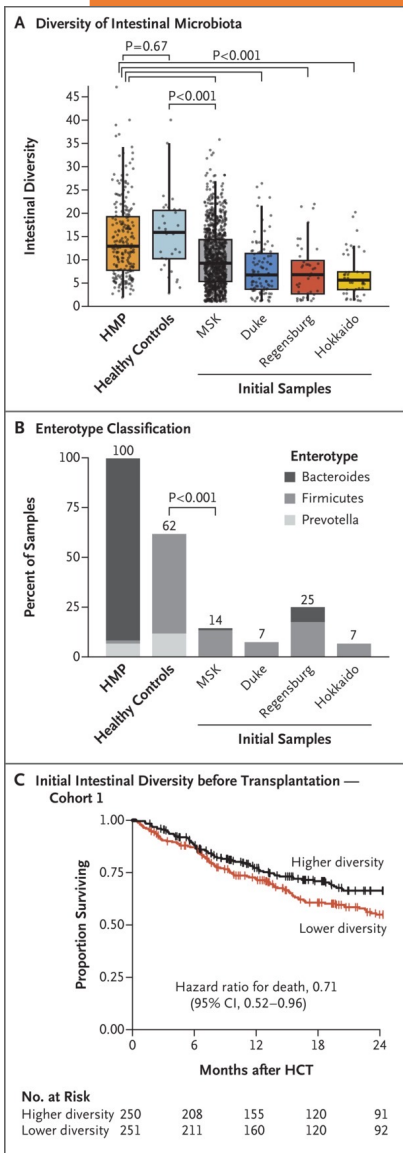
C: grave malnutrizione.



Aiuta a identificare rapidamente i bisogni di intervento nutrizionale personalizzato.



Stato del microbiota pre-trapianto



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Microbiota as Predictor of Mortality in Allogeneic Hematopoietic-Cell Transplantation

J.U. Peled, A.L.C. Gomes, S.M. Devlin, E.R. Littmann, Y. Taur, A.D. Sung, D. Weber,

Low Diversity =
dysbiosis

LD @conditioning
(Cohort1)

LD @engraftment

Reduced
OS

Reduced
OS

Increased
TRM

= Relapse

Peled JU et al. N Engl J
Med2020;382:822-834

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Nutrizione e infezioni, quali evidenze?

1542

Correspondence

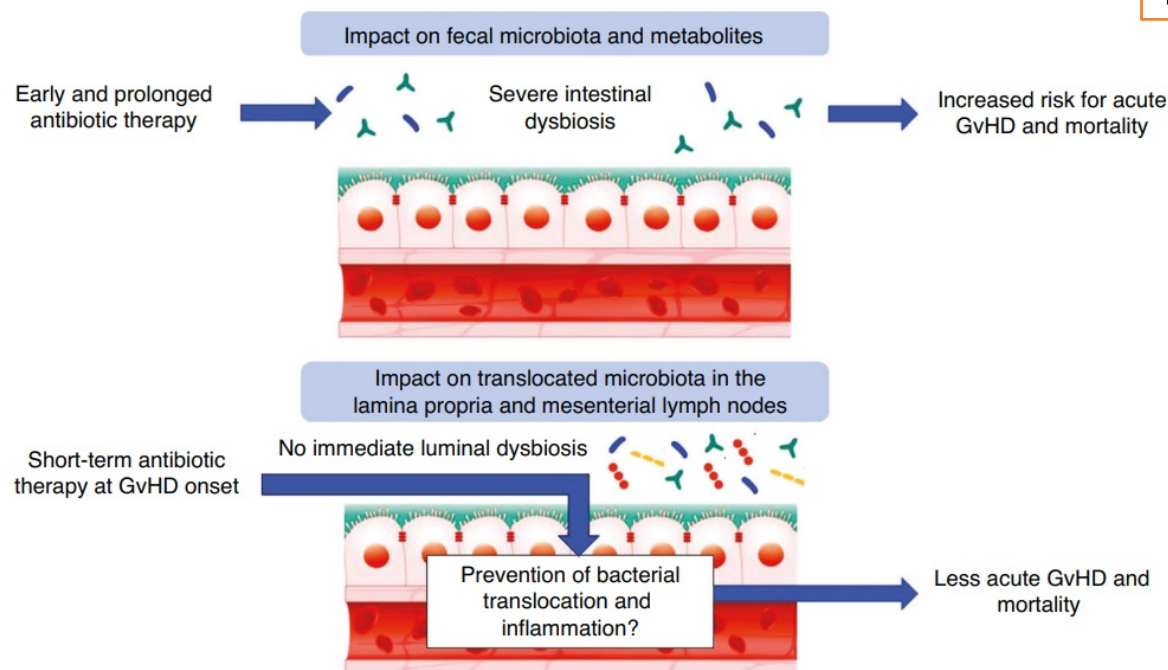
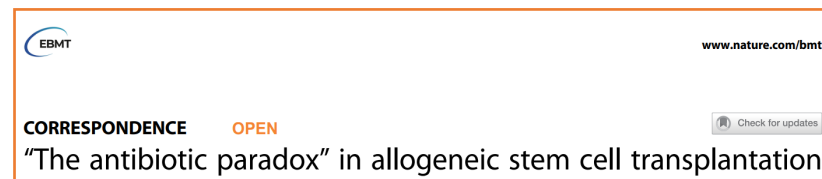


Fig. 1 The antibiotic paradox explained by differential microbial targets: Early and prolonged antibiotic therapy affects luminal microbiota composition resulting in severe intestinal dysbiosis and an increased risk for acute GI GvHD and associated mortality (evidence by Weber et al. [15] and Peled et al. [5]). Antibiotic administration at GvHD onset suppresses bacterial translocation as important co-stimulator of T cell activation and may dampen GvHD (evidence by van Bekkum et al. [10], Schwab et al. [11]).



Storia microbiologica del paziente

Storia antibiotica del paziente

Antibiosi e Disbiosi

GVHD onset

Nutrizione: diete restrittive e non

REGULAR ARTICLE

blood advances

Nonrestrictive diet does not increase infections during post-HSCT neutropenia: data from a multicenter randomized trial

Federico Stella,^{1,*} Vincenzo Marasco,^{2,*} Giorgia Virginia Levati,² Anna Guidetti,^{1,2} Annamaria De Filippo,² Martina Pennisi,² Cecilia Vismara,¹ Rosalba Miceli,³ Silva Ljevar,³ Cristina Tecchio,⁴ Nicola Mordini,⁵ Giorgia Gobbi,² Lucia Saracino,² and Paolo Corradini^{1,2}

¹Department of Pathophysiology and Transplantation, University of Milan, Milan, Italy; ²Division of Hematology and Bone Marrow Transplant and ³Biostatistics for Clinical Research Unit, Fondazione Istituto di Ricovero e Cura a Carattere Scientifico, Istituto Nazionale dei Tumori, Milan, Italy; ⁴Department of Medicine, Section of Hematology and Bone Marrow Transplant Unit, University of Verona, Verona, Italy; and ⁵Division of Hematology, Azienda Ospedaliera S. Croce e Carle, Cuneo, Italy

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Table 1. Diet details

	PD	NRD
Fish and meat	Only well cooked	Only well-cooked
Vegetables	Only cooked above 80°C	Fresh vegetables allowed*
Fruit	Cooked or thick peel fruit washed and peeled	Fresh fruit allowed*
Milk	Only pasteurized	Only pasteurized
Cheese	Only pasteurized	Pasteurized and seasoned cheese without mold
Yogurt	No	Only pasteurized
Eggs	Only freeze-dried	Only cooked
Bread	Allowed	Allowed
Dessert and ice cream	Only industrial preparation	Only industrial preparation
Honey	No	Only pasteurized
Cold cuts and sausages	No	Yes single portioned

*Manipulated according to safe food handling procedures.

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10 OCTOBER 2023 • VOLUME 7, NUMBER 19

Nutrizione: diete restrittive e non

REGULAR ARTICLE

blood advances

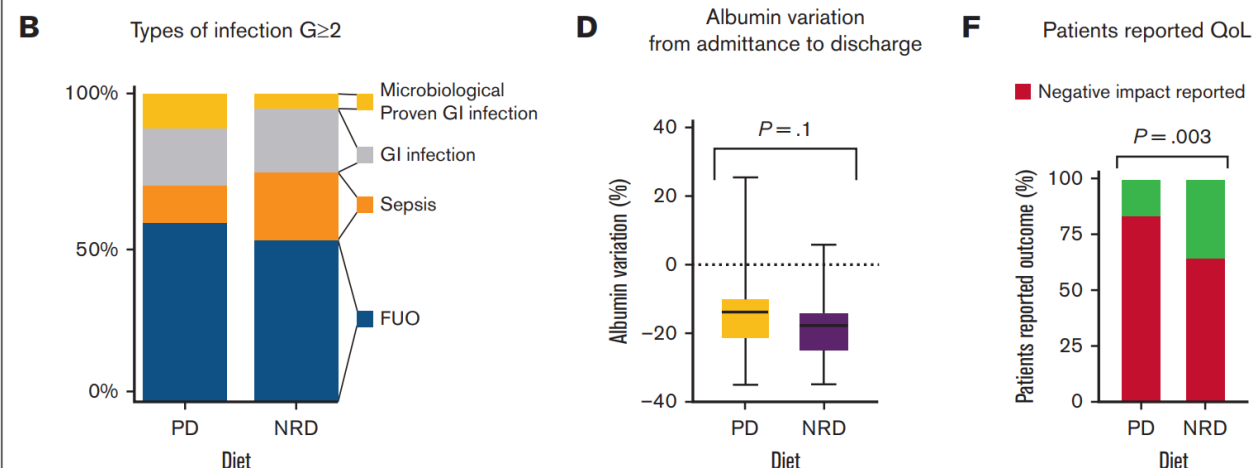
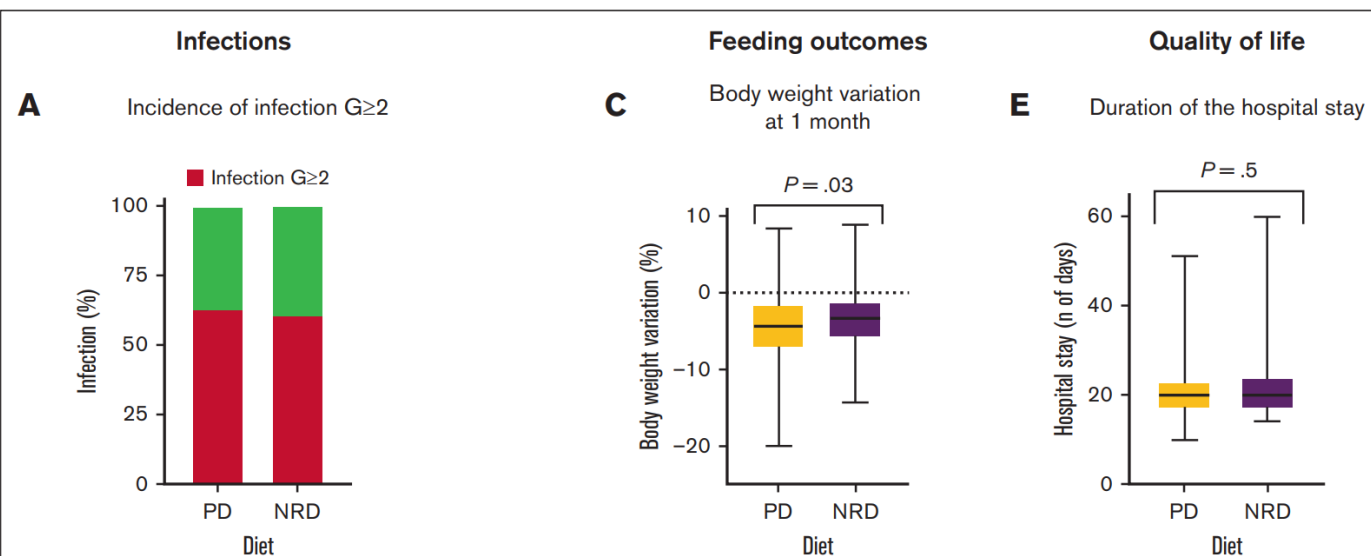
Nonrestrictive diet does not increase infections during post-HSCT neutropenia: data from a multicenter randomized trial

Federico Stella,^{1,*} Vincenzo Marasco,^{2,*} Giorgia Virginia Levati,² Anna Guidetti,^{1,2} Annamaria De Filippo,² Martina Pennisi,² Cecilia Vismara,¹ Rosalba Miceli,² Silva Ljevar,² Cristina Tecchio,⁴ Nicola Mordini,⁴ Giorgia Gobbi,² Lucia Saracino,² and Paolo Corradini^{1,2}

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10 OCTOBER 2023 • VOLUME 7, NUMBER 19



N=224

Allo HSCT: N=41 (20 PD, 21 NRD)

GVHD (>2): 20% vs 9.5% (NS)

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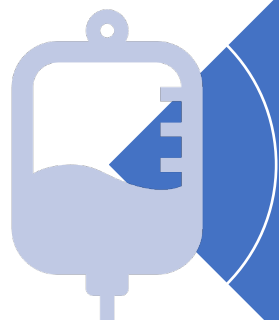
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Brescia, 28-29 novembre 2025

Nutrizione e GVHD acuta, quali evidenze?



Non esistono studi randomizzati pubblicati che promuovano un intervento nutrizionale per ridurre l'incidenza di aGVHD come endpoint principale



Esistono metanalisi riguardo al tipo di nutrizione e incidenza di aGVHD?

- SI!



Se possibile usate la via enterale! → ↓ aGVHD



Transplantation and
Cellular Therapy

journal homepage: www.tctjournal.org

ASTCT

American Society for
Transplantation and Cellular Therapy

Supportive Care

Enteral versus Parenteral Nutrition as Nutritional Support after Allogeneic Hematopoietic Stem Cell Transplantation: a Systematic Review and Meta-Analysis

Daniele Zama¹, Davide Gori², Edoardo Muratore^{1,*}, Davide Leardini¹, Flavia Rallo², Silvia Turrone³,
Arcangelo Prete¹, Patrizia Brigid⁴, Andrea Pession¹, Riccardo Masetti¹

¹ Pediatric Oncology and Hematology Unit "Lalla Seragnoli", Department of Pediatrics, University of Bologna, Sant'Orsola Malpighi Hospital, Bologna, Italy

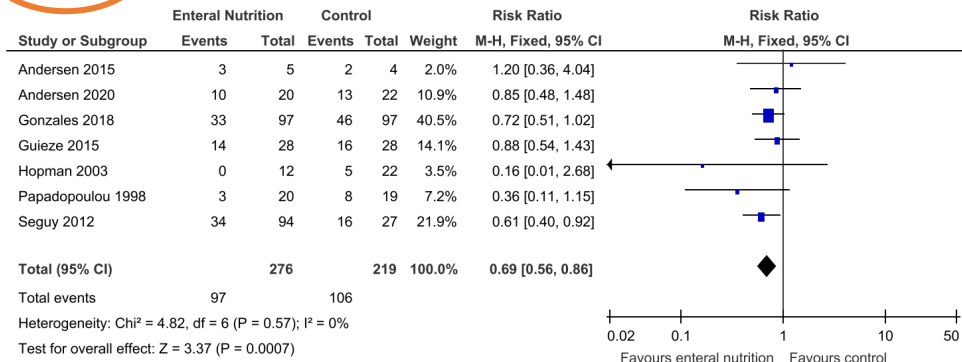
² Department of Biomedical and Neuromotor Sciences, University of Bologna, Bologna, Italy

³ Unit of Microbial Ecology of Health, Department of Pharmacy and Biotechnology, University of Bologna, Bologna, Italy

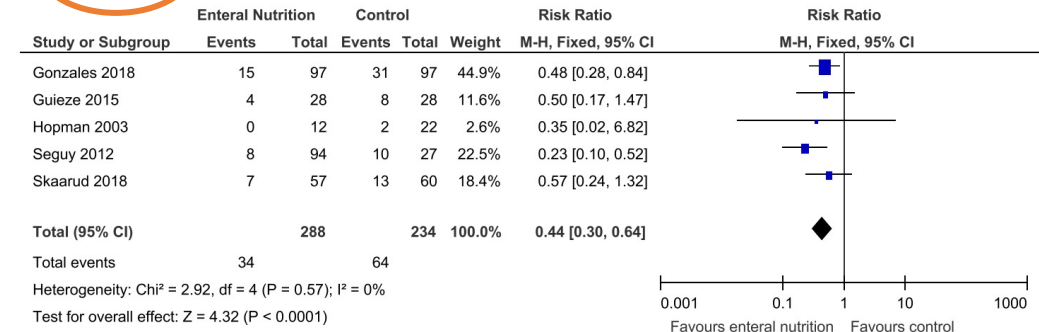
⁴ Department of Medical and Surgical Sciences, University of Bologna, Bologna, Italy



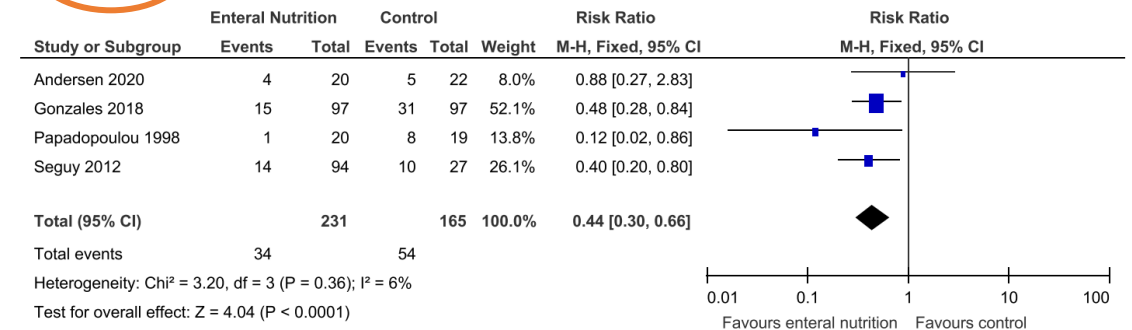
A: aGVHD



B: aGVHD III-IV



C: gut aGVHD



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Brescia, 28-29 novembre 2025



Nutrizione, lattosio, microbiota e GVHD acuta

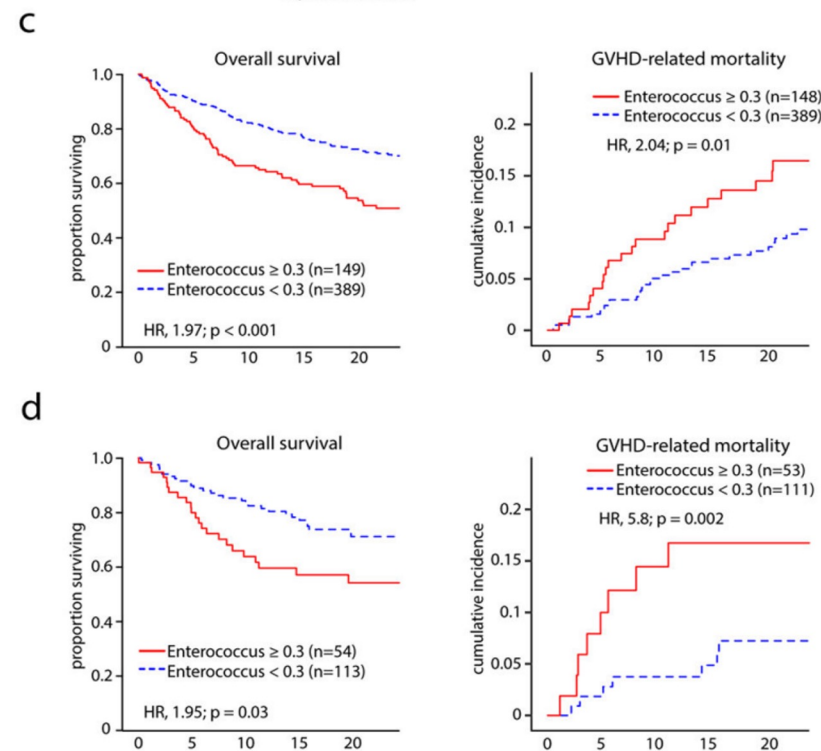


Fig. 1. *Enterococcus* domination occurs globally and increases risk of GVHD and mortality after allo-HCT.



IBD e GVHD, TGF-beta e disbiosi

Microbiota

strato mucoso

epitelio

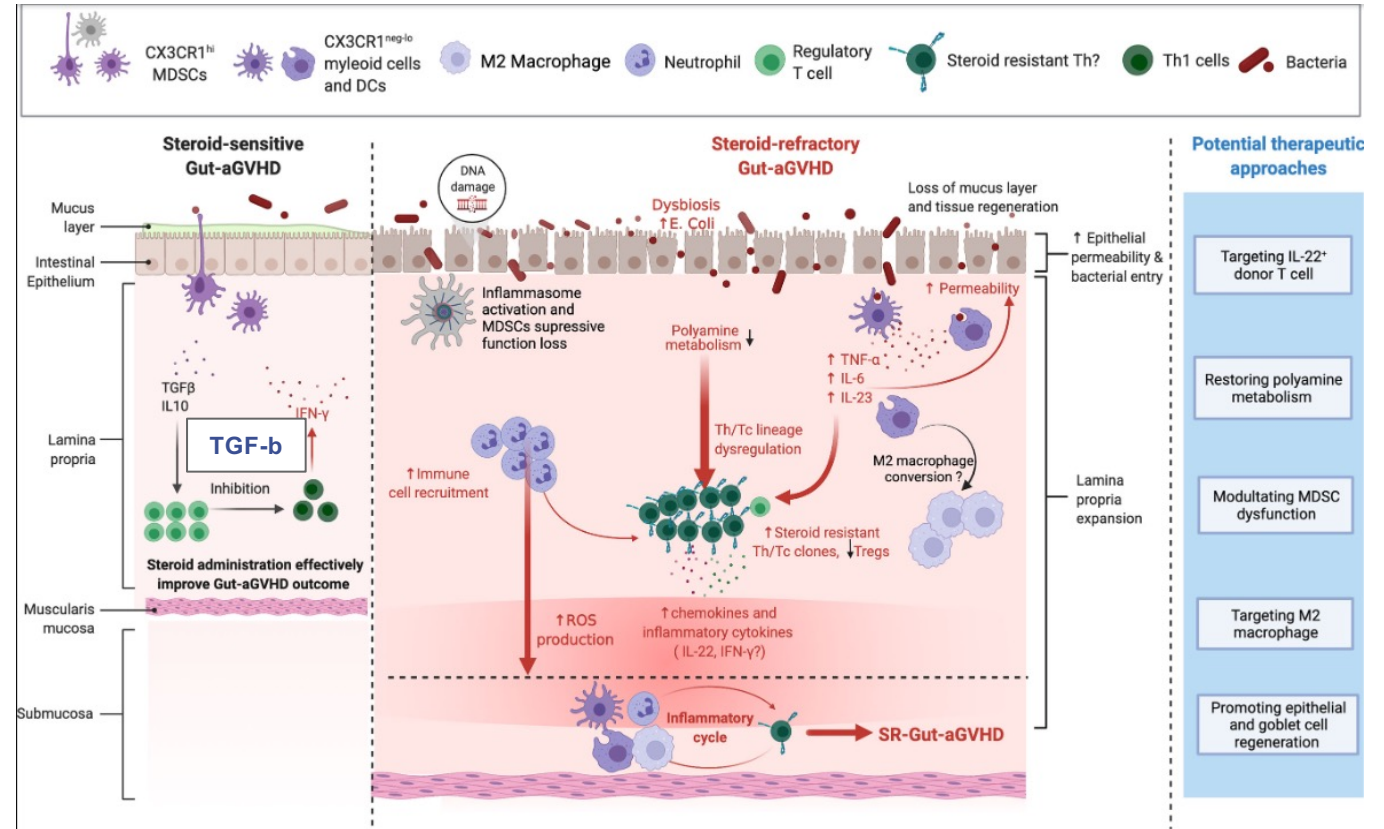
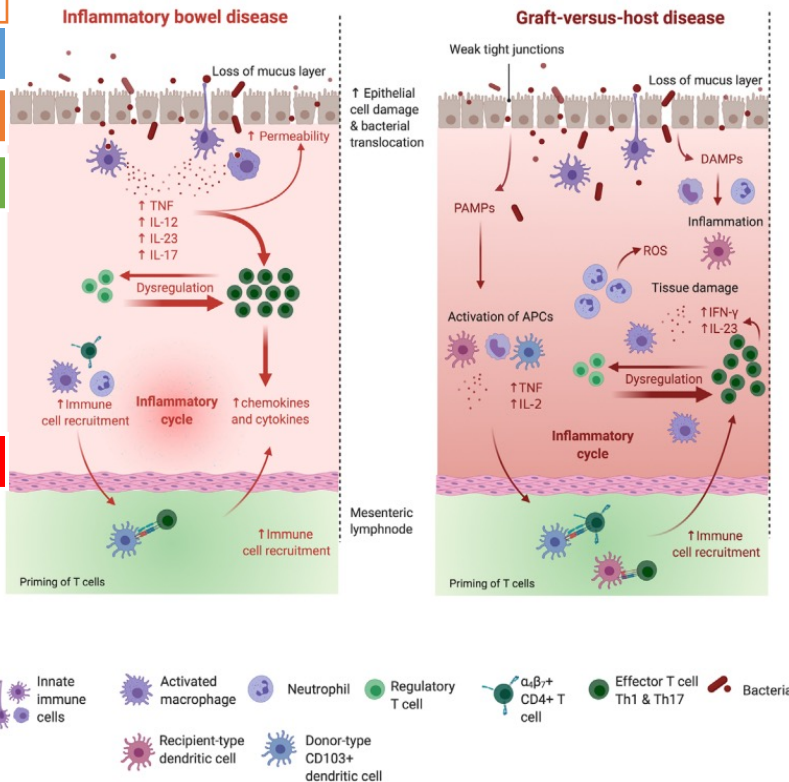
↑ translocation ↓

lamina propria

Lamina propria expansion

vasi

Mesenteric lymphnode



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Brescia, 28-29 novembre 2025

Song et al., Frontiers in Immunology 2022

TGF-beta FSMP nel trapianto allogenico

N=192

TGF-FSMP (Food for Special Medical Purposes), proposto a tutti i pazienti sottoposti ad allo-HSCT

Dose sufficiente per definire un effetto biologico: $\geq 50\%$ della dose prescritta (Gruppo A, N112), vs 80 (Gruppo B $< 50\%$)

Intervento nutrizionale: dose riportata in tabella 1

Aggiustamento della dose 2 volte in settimana

Table 1
Calories recommended by TGF- β 2 FSMP according to TDEE, BMI and PG-SGA.

	PG-SGA A	PG-SGA B	PG-SGA C	Calories by TGF- β 2 FSMP of TDEE
If BMI < 20	40 kcal/kg	42 Kcal/Kg	44 kcal/kg	20 %
If BMI 20–24.9	35 kcal/kg	39 kcal/kg	42 kcal/kg	15 %
If BMI 25–29.9	30 kcal/kg	33 kcal/kg	36 kcal/kg	12 %
If BMI > 30	25 kcal/kg	28 kcal/kg	30 kcal/kg	10 %
		TDEE		

TGF-beta FSMP nel trapianto allogenico

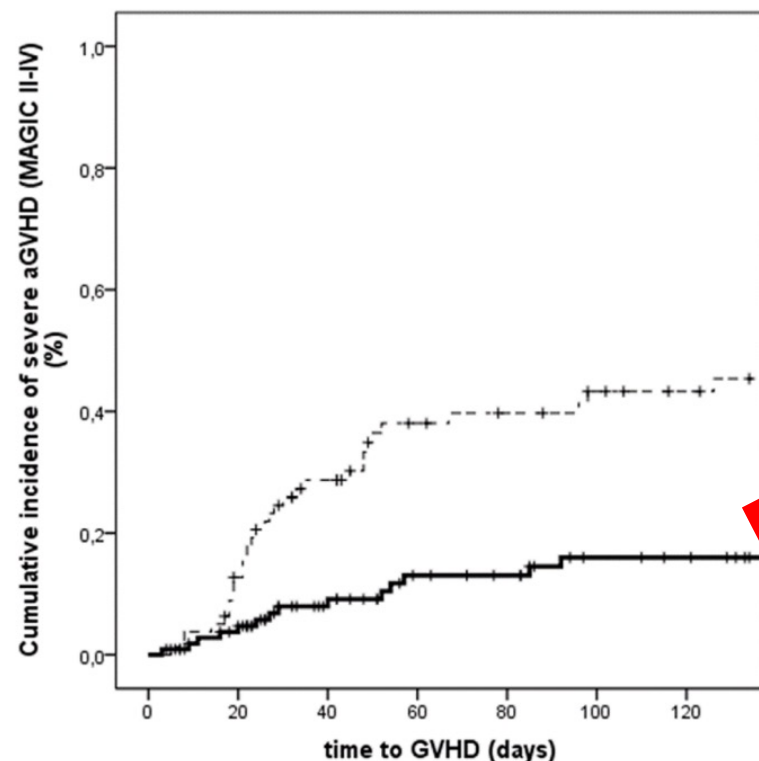


Fig. 2. CI of severe acute GVHD (MAGIC II-IV) according to TGF- β 2 FSMP treatment group: Group A continuous line, Group B dotted line.

Table 3

Comparison of mean values of lymphocyte subpopulations based on TGF- β 2 FSMP Group.

Lymphocyte subpopulations	Group A (mean values)	Group B (mean values)	p-value
Lymphocytes at +28 days (cells/ μ L)	460.4 $\pm$ 44.4	333.8 $\pm$ 43.8	0.001
T-Helper Lymphocytes CD3+CD4+ at +28 (cells/ μ L)	100.4 $\pm$ 15.1	63.1 $\pm$ 11.1	0.020
NK Lymphocytes CD56+ at +28 (cells/ μ L)	155.3 $\pm$ 16.3	116.7 $\pm$ 23.6	0.012
NK Lymphocytes CD16+ at +28 (cells/ μ L)	130.1 $\pm$ 15.6	76.9 $\pm$ 17.1	0.002

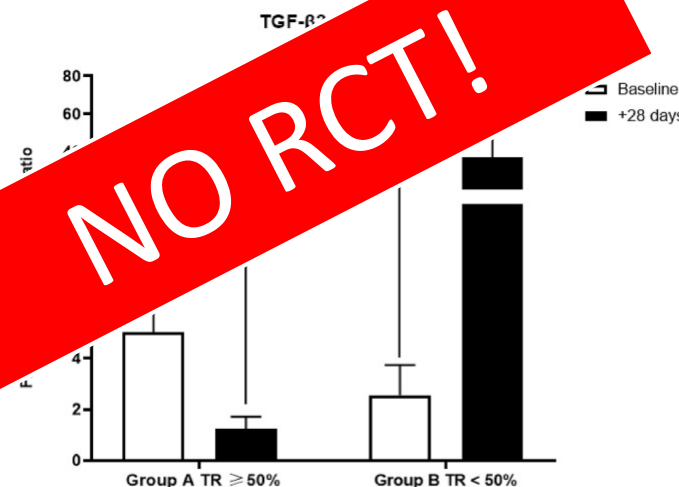


Fig. 4. Firmicutes/Bacteroidetes ratio according to TGF- β 2 FSMP Treatment Ratio at baseline and after transplantation. * p-value = 0.011, Wilcoxon matched-pairs signed rank test. Data are shown as mean $\pm$ SEM.

Gruppo A

- Ridotto rischio di grave malnutrizione (PG-SGA C)
- Ridotto rischio di TPN
- Ridotto rischio di aGVHD (II-IV)
- Ridotto rischio di GI aGVHD
- Ridotto rischio di polmoniti
- OS e NRM migliori
- Ridotta durata della degenza

TGF-Nutriallo Study

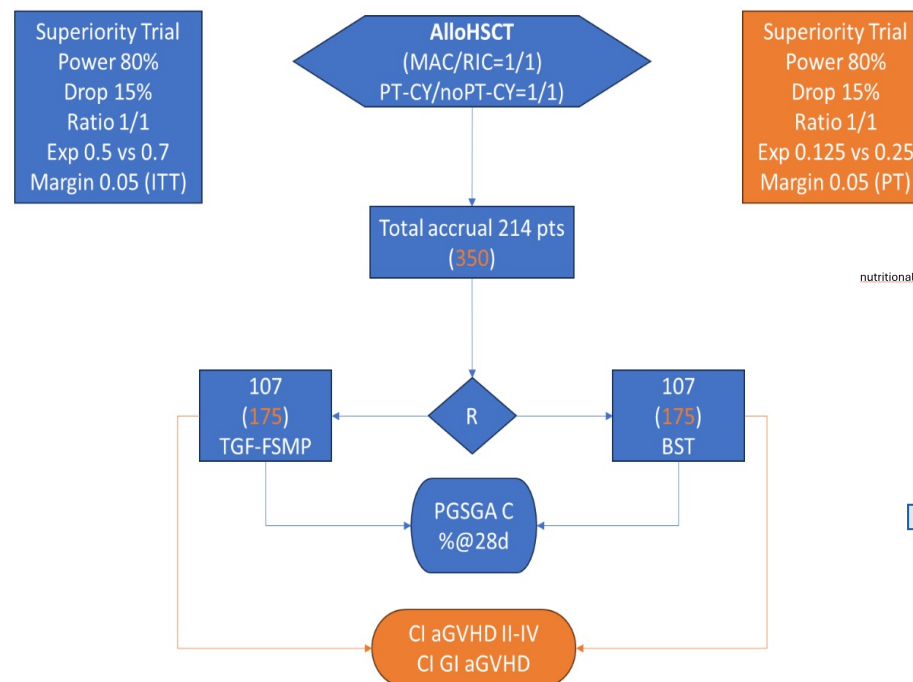
5.4.1 Inclusion Criteria

- Intact intestinal tract
- Life expectancy more than 12 weeks
- Allogeneic stem cell transplantation
- Signed informed consent

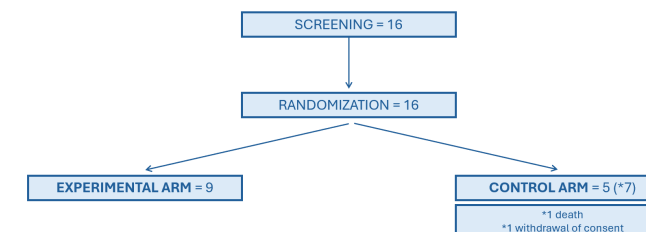
5.4.2 Exclusion Criteria

- Active hematological disease at the beginning of conditioning
- Personal history of inflammatory bowel diseases
- Personal history of bowel resection
- Personal history of gastric bypass procedures
- Enrolment in a competitive prospective study (malnutrition or GVHD as primary outcome)
- Subjects with known hypersensitivity to milk proteins or components of experimental FSMP

4.1 Study Plan



STUDIO TGF-NutriALLO
nutritional support with TGF-β2 Food for Special Medical Purposes (TGF-β2 FSMP) in adult allogeneic hematopoietic stem cell transplantation (allo-HSCT) for the prevention of malnutrition: a prospective, randomized, multicenter study



updated as of 27/11/2025

Figure 1 - Study plan: 214 patients will be enrolled and randomized 1:1 to receive TGF-β2 Food for Special Medical Purposes (FSMP) or the best supportive therapy (BST) from day -7 to day +28 post allo-SCT. The primary endpoint is the reduction from 70% to 50% of the malnutrition defined as PG-SGA C at +28. In the second phase, 68 more patients will be enrolled in each arm to assess the aGVHD cumulative incidence reduction from 25 to 12.5% at 100 days.



Nutrizione, microbiota e GVHD cronica

REVIEW · Volume 26, Issue 11, E265-E270, November 2020 · [Open Archive](#)

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Challenging and Practical Aspects of Nutrition in Chronic Graft-versus-Host Disease

[Andrea Z. Pereira](#)¹ · [Sandra Elisa Adami Gonçalves](#)^{1,2} · [Morgani Rodrigues](#)¹ · [Nelson Hamerschlag](#)¹ · [Mary E. Flowers](#)³

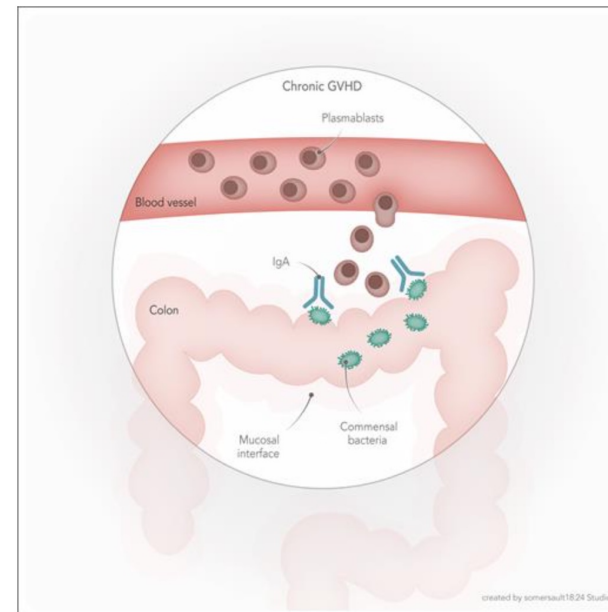
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» Highlights

Show Outline

- There are few studies on nutrition and chronic graft-versus host disease (GVHD).
- Many drugs used to treat chronic GVHD can lead to nutritional problems and metabolic syndrome.
- Monitoring and early nutritional measures of metabolic syndrome, osteoporosis, and loss of muscle mass could improve outcome and response to treatment in these patients.
- Zinc, vitamin A, vitamin D, omega 3, and probiotics could contribute to symptom reduction and nutritional improvement.



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Model for gut microbiota mediation of chronic GVHD. Early posttransplant IgA antibody response to commensal bacteria in the colon leads to clonal expansion of plasmablasts, associated with a higher risk for future cGVHD. The precise mechanism by which the process of bacterial recognition (and possibly immune-mediated clearance), IgA production, and clonal plasmablast expansion may lead to cGVHD is unknown.

TRANSPLANTATION | JUNE 26, 2025

Microbiota and chronic GVHD: a plasmablast link

Armin Rashidi

[Check for updates](#)

Blood (2025) 145 (26): 3073–3075.

<https://doi.org/10.1182/blood.2025029521>

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Brescia, 28-29 novembre 2025

Prospettive future: nutrizione e terapie cellulari

Two authors reviewed the title and abstracts of 1181 retrieved records; **however, no studies** were eligible for inclusion in this systematic review.

B. Cucchiaro and C.E. Weekes

Clinical Nutrition ESPEN 46 (2021) 60–65

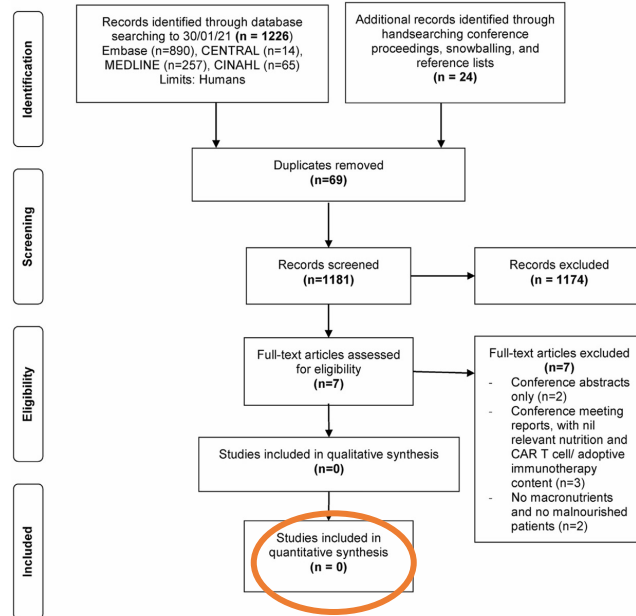


Fig. 1. PRISMA flow chart for study selection. This chart depicts the study selection process as described by the PRISMA work-group.

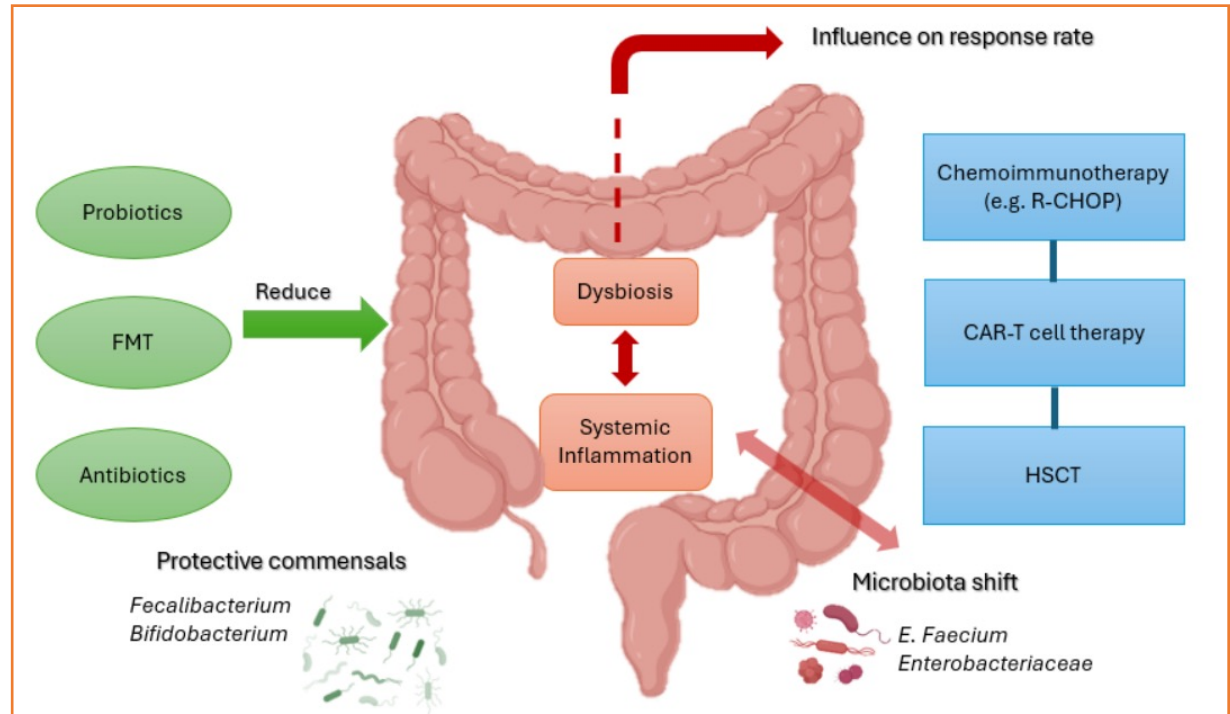


Figure 2. Schematic representation of the interplay between gut microbiota and treatment responses in B-cell NHL. Protective taxa (*Faecalibacterium*, *Bifidobacterium*) promote barrier integrity and immune regulation, while dysbiosis with *Enterococcus* and *Enterobacteriaceae* drives inflammation and toxicity. Interventions such as probiotics, FMT, and antibiotic stewardship may restore balance and improve outcomes with chemoimmunotherapy, CAR-T therapy, and HSCT. Created with BioRender. Santino Caserta. (2025) <https://app.biorender.com/illustrations/68b5c44de87b2863610e44c6>.



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I futuri centri partecipanti!

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Il documento che illustra la posizione di Slow Food
sulla relazione tra Cibo e Salute

Nella filosofia di Slow Food, che si impegna affinché tutti abbiano accesso a un cibo buono, pulito e giusto, la salute rappresenta uno dei valori chiave. Si può definire “sana” quella dieta che, oltre a risultare adeguata sul piano nutrizionale, favorisce la salute umana insieme a quella del pianeta; si deve quindi basare su una scelta ampia e diversificata di alimenti a base vegetale, integrali o per quanto possibile non processati, preferibilmente locali e ottenuti con metodi sostenibili. Oltre a ciò, è gradevole al palato.

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