

Fecal microbiota transplantation for decolonization from multidrug-resistant bacteria in pediatric allogeneic hematopoietic stem cell transplantation recipients: a retrospective real-world data study

Authors

Riccardo Masetti,^{1,2} Giovanni Barbara,^{2,3} Edoardo Muratore,¹ Giovanni Marasco,^{2,3} Cesare Cremon,^{2,3} Antonella Marangoni,⁴ Patrizia Brigidi,⁵ Lorenza Putignani,⁶ Giulia Angelino,⁷ Francesco Quagliarella,⁸ Federica Galaverna,⁸ Davide Leardini,¹ Tiziana Lazzarotto,⁴ Maria Gabelli,⁹ Edoardo Savarino,¹⁰ Marco Zecca,¹¹ Maura Faraci,¹² Arcangelo Prete,¹ Alessandra Biffi,⁹ Franco Locatelli^{8,13} and Pietro Merli^{8,14}

¹Pediatric Hematology and Oncology, IRCCS Azienda Ospedaliero-Universitaria di Bologna, Bologna; ²Department of Medical and Surgical Sciences (DIMEC), University of Bologna, Bologna; ³IRCCS Azienda Ospedaliero-Universitaria di Bologna, Bologna; ⁴Section of Microbiology, Department of Medical and Surgical Sciences, University of Bologna, Bologna; ⁵Microbiomics Unit, Department of Medical and Surgical Sciences, University of Bologna, Bologna; ⁶Unit of Microbiomics and Unit of Human Microbiome, Bambino Gesù Children's Hospital, IRCCS, Rome; ⁷Unit of Gastroenterology and Nutrition, Bambino Gesù Children's Hospital, IRCCS, Rome; ⁸Department of Pediatric Hematology/Oncology, Cell and Gene Therapy, Bambino Gesù Children's Hospital, IRCCS, Rome;

⁹Department for Women's and Children's Health-Pediatric Hematology, Oncology and Stem Cell Transplant, Padua University Hospital, Padua; ¹⁰Gastroenterology Unit, Azienda Ospedaliera di Padova, Padova; ¹¹Department of Pediatric Hematology/Oncology, Fondazione IRCCS Policlinico San Matteo, Pavia; ¹²Hematopoietic Stem Cell Transplantation Unit, Department of Hemato-Oncology, Istituto di Ricovero e Cura a Carattere Scientifico Istituto G. Gaslini, Genoa; ¹³Catholic University of the Sacred Heart, Rome and ¹⁴Department of Medicine and Surgery, Saint Camillus International University of Health Sciences, Rome, Italy

Correspondence:
P. MERLI - pietro.merli@opbg.net
<https://doi.org/10.3324/haematol.2025.288067>

Received: April 16, 2025.
Accepted: June 18, 2025.
Early view: June 26, 2025.

©2025 Ferrata Storti Foundation
Published under a CC BY-NC license 

Supplementary Table 1. List of colonizing MDR strains

Patient ID	MDR strains	Sampling
FMT01	Enterobacter hormaechei VIM +	Rectal Swab
FMT02	Klebsiella oxytoca VIM+	Rectal Swab
FMT03	Klebsiella oxytoca VIM +	Rectal Swab
FMT04	Klebsiella oxytoca VIM+	Rectal Swab
FMT05	Serratia marscenses VIM +	Rectal Swab
FMT06	Klebsiella pneumoniae NDM+, Klebsiella oxytoca NDM+	Rectal Swab
FMT07	Pseudomonas aeruginosa XDR	Rectal Swab
FMT08	Carbapenem resistant E. Coli, Morganella morganii ESBL and Klebsiella pneumoniae ESBL	Rectal Swab
FMT09	P. aeruginosa VIM+	Stool Cultures
FMT10	Klebsiella pneumoniae MDR; Enterobacter cloacae MDR	Stool Cultures
FMT11	P. aeruginosa VIM+	Stool Cultures
FMT12	E. coli OXA-48	Stool Cultures
FMT13	E. coli, Klebsiella oxytoca NDM+	Stool Cultures
FMT14	Klebsiella pneumoniae MDR	Stool Cultures
FMT15	KPC, E.coli VIM+	Stool Cultures
FMT16	P. aeruginosa VIM+	Stool Cultures
FMT17	Citrobacter freundii, Klebsiella ornithinolytica VIM+	Stool Cultures
FMT18	Klebsiella oxytoca VIM+	Stool Cultures
FMT19	P. aeruginosa VIM+	Stool Cultures
FMT20	Klebsiella pneumoniae MDR	Stool Cultures
FMT21	P. aeruginosa VIM+	Stool Cultures
FMT22	P. aeruginosa VIM+	Rectal Swab

Supplementary Table 2. Hematological parameters dynamic

ID	WBC at FMT (/mcl)	N at FMT (/mcl)	L at FMT (/mcl)	WBC +1 week from FMT(/mcl)	N + 1 week from FMT (/mcl)	L + 1 week from FMT (/mcl)	WBC +6 weeks from FMT (/mcl)	N +6 weeks from FMT (/mcl)	L +6 weeks from FMT (/mcl)
B01	650	190	560	3390	2240	450	4780	3890	360
B02	3480	2210	220	1160	710	300	1260	550	390
B03	1560	1180	270	130	20	70	/	/	/
B04	1400	1120	70	3690	3410	190	600	370	120
B05	9600	8050	620	6570	5420	520	7650	6320	700
B06	11910	11220	210	7640	6490	660	5460	4670	600
PD1	4330	2930	/	1820	1080	/	660	230	/
PD2	3910	920	/	700	530	/	6480	2400	/
RO1	1700	1000	840	770	40	670	6300	5200	350
RO2	2000	1400	200	1700	940	470	2500	1600	340
RO3	7500	2300	950	2700	1000	1500	2600	2500	50
RO4	1200	400	330	4800	3500	320	2670	1800	330
RO5	880	10	1700	3000	600	1600	5000	4000	240
RO6	4000	2800	2100	5000	2200	2000	4000	2500	600
RO7	1900	1300	560	3000	1600	860	3700	2300	440
RO8	2500	1260	600	3400	3300	30	3200	2800	120
RO9	8500	6600	330	2740	2600	10	3000	2200	180
RO10	4800	2200	3700	80	50	20	3000	2200	310
RO11	4400	1500	500	1100	1000	40	4000	1700	1400
RO12	7000	6000	550	140	120	10	7300	5600	740
RO13	2700	1900	180	2400	1700	250	5800	5000	270
RO14	1500	500	280	2200	1000	550	2600	1000	1160

L= Lymphocytes; N = Neutrophils; WBC= White blood cells

Supplementary Table 3. Other factors associated with decolonization efficacy

	Patients decolonized at 6 weeks (n=11)	Patients not decolonized at 6 weeks (n=10)	P Values
Center (Rome, Bologna, Padua)	6/4/1	8/1/1	NS
Age, years (median)	8.4	3.8	NS
Antibiotic preparation (%yes)	27%	60%	NS
FMT prior to HCT (%yes)	64%	90%	NS
Colonizing pathogens VIM producer (% yes)	82%	40%	NS (p=0.08)
Antibiotic within 30 days post FMT (% yes)	64%	90%	NS

NS = not significant