New drugs selectively changing the microbiome without disrupting its function - is it possible?
Dr Eggimann collaborated to several industry-sponsored clinical trials since 1990.

Anything I say can be highly biased

No offshore Account!
All goes to the Hospital to pay:
research nurse
data manager

DISCLOSURE

Dr Eggimann served on an advisory board for and/or sponsored lectures: 3M, Abionic, Aridis, Astellas Bayer, Janssen Lilly, Medex, MSD, Nabriva, Pfizer, Weyth-Lederle, Roche
Please Evelina, could you provide us some recent data about antibiotic guidelines for decolonization.

But, Philippe, don’t touch Antibiotic!

Please Jean-François, could you provide us some recent data about antibiotic guidelines for VAP.
Over the last 15 years

- 45 randomized trials
- 12 editorials
- 5 meta-analyses
- 17 letters
- 20 reviews

LOW EVIDENCE
HIGH CLINICAL USE
Prone to save normal flora

INTESTINAL MICROFLORA

10^4 micro-organisms, >500 different species

- Stomach: 10^2 to 10^3
- Duodenum: <10^5
- Jejunum: 10^5
- Ileum: 10^3 to 10^7
- Colon with appendix: 10^9 to 10^12

Enterobacteria
Enterococcus
Faecalis
Bacteroides
Bifidobacteria
Peptococcus
Peptostreptococcus
Ruminococcus
Clostridia
Lactobacilli

LOW EVIDENCE HIGH CLINICAL USE

Decolonization University

Lacornell
Prone to save normal flora

**HIGH EVIDENCE**

**LOW CLINICAL USE**
Very strong evidence for SDD
Very strong evidence for SDD

Selective digestive and oropharyngeal decontamination in medical and surgical ICU patients: individual patient data meta-analysis

N.L. Plantinga ¹, ², *, A.M.G.A. de Smet ⁴, E.A.N. Oostdijk ², ³, E. de Jonge ⁵, C. Camus ⁷, W.A. Krueger ⁸, D. Bergmans ⁶, J.B. Reitsma ¹, M.J.M. Bonten ¹, ²

Clinical Microbiology and Infection (2017), https://doi.org/10.1016/j.cmi.2017.08.019
Associations Between Enteral Colonization With Gram-Negative Bacteria and Intensive Care Unit–Acquired Infections and Colonization of the Respiratory Tract

Jos F. Frencken,1,2,a Bastiaan H. J. Wittekamp,1,a Nienke L. Plantinga,1 Cristian Spitoni,3 Kirsten van de Groep,1,2 Olaf L. Cremer,2 and Marc J. M. Bonten1,4

Results of Marginal Structural Model Analyses for Objective 1: The Association Between Rectum Colonization With Gram-Negative Bacteria and Intensive Care Unit–Acquired Infections (n = 2066)

<table>
<thead>
<tr>
<th>Model</th>
<th>ICU-Acquired GNB Infection</th>
<th>ICU Death</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSHR (95% CI)</td>
<td>P Value</td>
</tr>
<tr>
<td>Crude</td>
<td>4.38 (2.92–6.57)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>MSM</td>
<td>3.04 (1.99–4.66)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Clinical Infectious Diseases® 2018;66(4):497–503
SDD how it works

Associations Between Enteral Colonization With Gram-Negative Bacteria and Intensive Care Unit–Acquired Infections and Colonization of the Respiratory Tract

Jos F. Frencken,1,2,a Bastiaan H. J. Wittekamp,1,a Nienke L. Plantinga,1 Cristian Spitoni,3 Kirsten van de Groep,1,2 Olaf L. Cremer,2 and Marc J. M. Bonten1,4

<table>
<thead>
<tr>
<th>Association Between Rectum or Respiratory Tract Colonization With Gram-Negative Bacteria and Intensive Care Unit–Acquired Bacteremia (n = 2066)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Rectum colonization</td>
</tr>
<tr>
<td>Crudea</td>
</tr>
<tr>
<td>MSMa</td>
</tr>
<tr>
<td>Respiratory tract colonization</td>
</tr>
<tr>
<td>Crudea</td>
</tr>
<tr>
<td>MSMa</td>
</tr>
<tr>
<td>Rectum and respiratory tract colonization</td>
</tr>
<tr>
<td>Crudea</td>
</tr>
<tr>
<td>MSMa</td>
</tr>
</tbody>
</table>
SDD how it works

Associations Between Enteral Colonization With Gram-Negative Bacteria and Intensive Care Unit–Acquired Infections and Colonization of the Respiratory Tract

Jos F. Frencken,1,2,a Bastiaan H. J. Wittekamp,1,a Nienke L. Plantinga,1 Cristian Spitoni,3 Kirsten van de Groep,1,2 Olaf L. Cremer,2 and Marc J. M. Bonten1,4
SDD: no antimicrobial resistance

Effect of selective decontamination on antimicrobial resistance in intensive care units: a systematic review and meta-analysis

Nick Daneman, Syed Sarwar, Robert A Fowler, Brian H Cuthbertson, on behalf of the SuDDICU Canadian Study Group

Lancet Infect Dis 2013; 13: 328-41
SDD: decreases antimicrobial resistance

Colistin and tobramycin resistance during long-term use of selective decontamination strategies in the intensive care unit: a post hoc analysis

Bastiaan HJ Wittekamp¹*, Evelien AN Oostdijk², Anne Marie GA de Smet³ and Marc JM Bonten¹,²

Figure 2 Colistin resistance in rectal samples. Prevalence of gram-negative bacteria with intermediate susceptibility (I) or resistant (R) to colistin in rectal samples obtained during study period 1 and 2 respectively.

Figure 3 Colistin resistance in respiratory samples. Prevalence of gram-negative bacteria with intermediate susceptibility (I) or resistant (R) to colistin in respiratory samples obtained during study period 1 and 2 respectively.

Figure 4 Tobramycin resistance in rectal samples. Prevalence of gram-negative bacteria with intermediate susceptibility (I) or resistant (R) to tobramycin in rectal samples obtained during study period 1 and 2 respectively.

Figure 5 Tobramycin resistance in respiratory samples. Prevalence of gram-negative bacteria with intermediate susceptibility (I) or resistant (R) to tobramycin in respiratory samples obtained during study period 1 and 2 respectively.
Prone to save normal flora

INTESTINAL MICROFLORA

- Lactobacilli
- Streptococci
- Lactobacilli
- Enterobacteria
- Enterococcus
- Faecales
- Bacteroides
- Bifidobacteria
- Peptococcus
- Peptostreptococcus
- Ruminococcus
- Clostridia
- Lactobacilli

Stomach: $10^2$ to $10^3$
Duodenum: $<10^{-5}$
Jejunum: $10^3$ to $10^4$
Ileum: $10^5$ to $10^6$
Colon with appendix: $10^9$ to $10^{12}$

HIGH EVIDENCE
LOW CLINICAL USE

SDD University
Ecological effects of SDD
Ecological effects of SDD

Resistant rectal samples
- Ceftazidime
- Tobramycin
- Ciprofloxacin

Resistant respiratory samples
- Ceftazidime
- Tobramycin
- Ciprofloxacin

Pre-intervention
Intervention SDD/SOD
Post-intervention
Ecological effects of SDD

Emergence of colistin resistance in Enterobacteriaceae after the introduction of selective digestive tract decontamination in an intensive care unit.

Ecological effects of SDD

Comparative gut microbiota and resistome profiling of intensive care patients receiving selective digestive tract decontamination and healthy subjects

Elena Buelow,1,2, Teresita d. j. Bello González,1, Susana Fuentes,1,4, Wouter A. A. de Steenhuijzen Pits,1,5, Leo Lahti,1,6, Juramurat R. Bayjanov,1, Eline A. M. Majoors,1, Johanna C. Braat,1, Maaike S. M. van Mourik,1, Evelien A. N. Oostdijk,1, Rob J. L. Willems,1, Marc J. M. Bonten,1, Mark W. J. van Passen1,9, Hauke Smidt9 and Willem van Schaik3,10

Buelow et al. Microbiome (2017) 5:88
Ecological effects of SDD

Comparative gut microbiota and resistome profiling of intensive care patients receiving selective digestive tract decontamination and healthy subjects


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Ecological effects of SDD

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Elena Buelow1,2,*, Teresita del Bello González1,*, Susana Fuentes1,4, Wouter A. A. de Steenwijk Piter1,5, Leo Lahtila6, Jurnamurat R. Bayjans1, Eline A. M. Major1, Johanna C. Braat1, Maaike S. M. van Mourik1, Evelien A. N. Oostdijk1, Rob J. L. Willems1, Marc J. M. Bonten1, Mark W. J. van Passel1, Hauke Smidt1 and Willem van Schaik1,6*

---

No \( \text{bla}_{\text{NDM}} \)
No \( \text{bla}_{\text{OXA}} \)
No \( mcr-1 \)

Fig. 3 Antimicrobial resistance genes present at significantly higher or lower levels in the microbiot.

Ecological effects of SDD

https://www.intentio.com/gut-microbiota-poor-energy-levels/
Ecological effects of SDD

Plasmid-mediated colistin resistance mechanisms: is it time to revise our approach to selective digestive decontamination?

In November, 2015, Yi-Yun Liu and colleagues published their observations of the emergence of a plasmid-mediated mechanism for polymyxin E (colistin) resistance, MCR-1. They reported its identification in both human and animal

*Timothy Miles Rawson, Luke Stephen Prockter Moore, James Christopher Hatcher, Hugo Donaldson, Alison Helen Holmes

timothy.rawson07@ic.ac.uk

National Institute for Health Research, Health Protection Research Unit in Healthcare Associated Infections and Antimicrobial Resistance, Imperial College London, Hammersmith Campus, London W12 0NN, UK (TMR, LSPM, AHH); and Imperial College Healthcare NHS Trust, London, UK (JCH, HD, AHH)

https://www.intentio.com/gut-microbiota-poor-energy-levels/
Contextual effects of SDD

Unusually High Incidences of *Staphylococcus aureus* Infection within Studies of Ventilator Associated Pneumonia Prevention Using Topical Antibiotics: Benchmarking the Evidence Base

James C. Hurley

Microorganisms 2018, 6, 2; doi:10.3390
Stop the killing of beneficial bacteria

Concerns about antibiotics focus on bacterial resistance — but permanent changes to our protective flora could have more serious consequences, says Martin Blaser.

The average child in the United States and other developed countries has received 10–20 courses of antibiotics by the time he or she is 18 years old\(^1\). In

“Each generation could be beginning life with a smaller endowment of ancient microbes than the last.”
Back to the bench

Life on the Earth is comprised of three domains:

**Bacteria**
- Green nonsulfur bacteria
- Mitochondrion
- Proteobacteria
- Cyanobacteria
- Thermotoga
- Thermodesulfobacterium
- Aquifex

**Archaea**
- Crenarchaeota
- Thermoproteus
- Methanobacterium
- Methanococcus
- Thermococcus
- Methanopyrus

**Eukarya**
- Euryarchaeota
- Methanosarcina
- Entamoeba
- slime molds
- Animals
- Fungi
- Plants
- Ciliates
- Flagellates
- Trichomonads
- Diplomonads (Giardia)
- Microsporidia

**Prokaryote**
- 4-6 $10^{31}$ cells

1% identified by culture
The human microbiome

Worlds within worlds: evolution of the vertebrate gut microbiota

Ruth E. Ley*1, Catherine A. Lozupone*5, Mical Hamady1, Rob Knight* and Jeffrey I. Gordon*

Sequence copies of 16S rRNA

Percentage of 16S rRNA Sequences in Sample

- Mixed water
- Non-cultured Insects or earthworms
- Soils of freshwater sediments
- Other human
- Salt-water surfactant, anoxic, or sediment
- Salt-water surface
- Terrestrial gut
- Vertebrate Gut

Firmicutes: (8606)
Bacteroidetes: (2461)
Actinobacteria: (1062)
Gammaproteobacteria: (1912)
Alphaproteobacteria: (1214)
Verrucomicrobia: (509)

Nature Reviews Microbiology 6, 776-788 (October 2008)
The human microbiome

We are composed of several species:
- Eucaryotic
- Bacterial
- Archaea

As adults our microbial census exceeds the total number of our own human cells
- By about 10 fold

The largest collection of microbes resides within the intestine
- With $10^{13-14}$ cells!!!!
- Several hundreds of species
- «The GUT MICROBIOTA»

90% microbes

100% Human?

10% human cells
The human microbiome

SnapShot: The Human Microbiome
Antonio Gonzalez, Yoshiaki Umezawa, and Rob Knight
BioFrontiers Institute, Department of Computer Science, Howard Hughes Medical Institute, University of Colorado, Boulder, CO 80309-0596, USA

Healthy human microbiome map

Cosmopolitan view of the microbiome

United States of America

Venezuela

Spanish

Japanese

All body sites base map of healthy individuals

The microbial pregnancy roadmap

PC1 (16%) PC2 (6%) PC3 (5%)

PC1 (60%) PC2 (45%) PC3 (4%)

690.e1 Cell 158, July 31, 2014
Human gut microbiome viewed across age and geography

Tanya Yatsunenko¹, Federico E. Rey¹, Mark J. Manary²,³, Indi Trehan²,⁴, Maria Gloria Domínguez-Bello⁵, Monica Contreras⁶, Magda Magris⁷, Gilda Hidalgo⁷, Robert N. Baldassano⁸, Andrey P. Anokhin⁹, Andrew C. Heath⁹, Barbara Warner⁹, Jens Reeder¹⁰, Justin Kuczynski¹⁰, J. Gregory Caporaso¹¹, Catherine A. Lozupone¹⁰, Christian Lauber¹⁰, José Carlos Clemente¹⁰, Dan Knights¹⁰, Rob Knight¹⁰,¹² & Jeffrey I. Gordon¹

Figure 2 | Bacterial diversity increases with age in each population. The number of observed OTUs sharing ≥97% nucleotide sequence identity plotted against age for all subjects.
Gut microbiota composition correlates with diet and health in the elderly

Community subjects

Long-term residential care

Figure 4 | Transition in microbiota composition across residence location is mirrored by changes in health indices. The PCoA plots show 8 groups of

The individual microbiota of people in long-stay care was significantly less diverse than that of community dwellers. Loss of community-associated microbiota correlated with increased frailty.
Gut microbiome and antibiotics

Incomplete recovery and individualized responses of the human distal gut microbiota to repeated antibiotic perturbation

Les Dethlefsen and David A. Relman

Amoxy-clav 5 days

Amoxy-clav 5 days
Gut microbiome and antibiotics

Disruption of the Gut Ecosystem by Antibiotics

Mi Young Yoon\textsuperscript{1,2} and Sang Sun Yoon\textsuperscript{1,2}

\textsuperscript{A} Lumen
\textsuperscript{B} Outer mucus layer
\textsuperscript{C} Inner mucus layer
\textsuperscript{D} Intestinal epithelium

Yonsei Med J 2018 Jan;59(1):4-12
Gut microbiome and antibiotics

Stop the killing of beneficial bacteria

Concerns about antibiotics focus on bacterial resistance — but permanent changes to our protective flora could have more serious consequences, says Martin Blaser.

The average child in the United States and other developed countries has received 10–20 courses of antibiotics by the time he or she is 18 years old\(^1\). In

“Each generation could be beginning life with a smaller endowment of ancient microbes than the last.”
Prone to restore normal flora

LOW EVIDENCE
Already clinically used
The gut microbiome as therapeutic target

Patrice D. Cani*, Nathalie M. Delzenne

Prebiotics

Dysbiosis
Gut microbiota
Nutritional and genetic obesity

GLP-2
ZO-1/Occludin

Gut barrier alterations
Metabolic endotoxemia
Low-grade inflammation, insulin resistance, type 2 diabetes

Pharmacology & Therapeutics 130 (2011) 202–212
Effects of probiotics on gut microbiota: mechanisms of intestinal immunomodulation and neuromodulation

Peera Hemarajata and James Versalovic

*Ther Adv Gastroenterol*

(2013) 6(1) 39–51
Lactobacillus acidophilus LA 1 binds to cultured human intestinal cell lines and inhibits cell attachment and cell invasion by enterovirulent bacteria

Gut 1994; 35: 483–

acillus acidophilus Strain LA1 Secretes a antibacterial Substance(s) Active In Vitro and In Vivo

ST-CAMARD,1 VANESSA LÉVIN,1 DOMINIQUE BRASSART,2 ESER,3 ALAIN L. SERVIN1,2 and SYLVIE HUDAULT1

1armacie, Université Paris XI, F-92296 Châtenay-Malabry, France, 1 and 2, Versuch-les-Bains, CH-1000 Lausanne 28, Switzerland

Figure 2: Adhesion of Lactobacillus acidophilus strain 1 to mucus secreting HT29-MTX monolayer seen by low and

APPLIED AND ENVIRONMENTAL MICROBIOLOGY, July 1997, p. 2747–2753
Efficacy of probiotics in prevention of acute diarrhoea: a meta-analysis of masked, randomised, placebo-controlled trials

Sunil Sazawal, Girish Hiremath, Usha Dhingra, Pooja Malik, Saikat Deb, Robert E Black

Table 2: Results of the overall and subgroup analyses
Probiotic prophylaxis in predicted severe acute pancreatitis: a randomised, double-blind, placebo-controlled trial


Wrong target
Gut microbiota and host defense in critical illness

Max C. Jacobs\textsuperscript{a}, Bastiaan W. Haak\textsuperscript{a}, Floor Hugenholtz\textsuperscript{a}, and W. Joost Wiersinga\textsuperscript{a,b}

A randomized synbiotic trial to prevent sepsis among infants in rural India

Pinaki Panigrahi1,2, Sailajanandan Parida3, Nimai C. Nanda4, Radhanath Satpathy5, Lingaraj Pradhan6, Dinesh S. Chandel7, Lorena Baccaglini1, Arjit Mohapatra5, Subhranshu S. Mohapatra5, Pravas R. Misra5, Rama Chaudhry8, Hegang H. Chen9, Judith A. Johnson10, J. Glenn Morris Jr10, Nigel Paneth11 & Ira H. Gewolb12

(Lactobacillus plantarum plus fructooligosaccharide)

Table 2 | Effect of synbiotic treatment on sepsis and other morbidities in the first 60 days of life

<table>
<thead>
<tr>
<th>Outcome variables</th>
<th>Control n = 2,278 (%)</th>
<th>Synbiotic n = 2,278 (%)</th>
<th>RR (95% CI)</th>
<th>NNT (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death and sepsis (primary outcome)</td>
<td>206 (9.0)</td>
<td>123 (5.4)</td>
<td>0.60</td>
<td>27</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Deaths</td>
<td>4 (0.2)</td>
<td>6 (0.3)</td>
<td>1.50</td>
<td>NA*</td>
<td>0.526†</td>
</tr>
<tr>
<td>Sepsis (A + B + C)</td>
<td>202 (8.9)</td>
<td>117 (6.1)</td>
<td>0.58</td>
<td>27</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>A. Sepsis/pSBI—culture-positive septicemia</td>
<td>27 (1.2)</td>
<td>6 (0.3)</td>
<td>0.22</td>
<td>108</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Gram-negative sepsis</td>
<td>16 (0.7)</td>
<td>4 (0.2)</td>
<td>0.25</td>
<td>190</td>
<td>0.007</td>
</tr>
<tr>
<td>Gram-positive sepsis</td>
<td>11 (0.5)</td>
<td>2 (0.1)</td>
<td>0.18</td>
<td>253</td>
<td>0.012</td>
</tr>
<tr>
<td>B. Sepsis/pSBI—culture-negative sepsis (Culture-negative clinical sepsis warranting hospitalization and IV antibiotics)</td>
<td>36 (1.6)</td>
<td>19 (0.8)</td>
<td>0.53</td>
<td>134</td>
<td>0.021</td>
</tr>
<tr>
<td>C. Sepsis/pSBI—LRTI (LRTIs requiring antibiotic therapy)</td>
<td>139 (6.1)</td>
<td>92 (4.0)</td>
<td>0.66</td>
<td>48</td>
<td>0.002</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>59 (2.6)</td>
<td>12 (0.5)</td>
<td>0.20</td>
<td>48</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Local infections (including &gt;10 pustules, oral thrush, conjunctivitis)</td>
<td>33 (1.5)</td>
<td>16 (0.7)</td>
<td>0.48</td>
<td>134</td>
<td>0.015</td>
</tr>
<tr>
<td>Abscess/otitis media</td>
<td>11 (0.5)</td>
<td>5 (0.2)</td>
<td>0.45</td>
<td>NA*</td>
<td>0.133*</td>
</tr>
<tr>
<td>Omphalitis</td>
<td>13 (0.6)</td>
<td>3 (0.1)</td>
<td>0.23</td>
<td>228</td>
<td>0.014</td>
</tr>
</tbody>
</table>
Dysbiosis of upper respiratory tract microbiota in elderly pneumonia patients

Wouter AA de Steenhuijsen Piters¹, Elisabeth GW Huijskens²,³, Anne L Wyllie¹, Giske Biesbroek¹, Menno R van den Bergh¹,⁴, Reinier H Veenhoven⁴,⁸, Xinhui Wang¹, Krzysztof Trzciński¹, Marc J Bonten⁵, John WA Rossen²,⁶, Elisabeth AM Sanders¹ and Debby Bogaert¹

Figure 1 Two-dimensional nonmetric multidimensional scaling (nMDS) plot of the oropharyngeal microbiome composition in adult and elderly pneumonia patients and healthy controls based...
Probiotic Prophylaxis of Ventilator-associated Pneumonia: A Blinded, Randomized, Controlled Trial

Lee E. Morrow¹, Marin H. Kollef², and Thomas B. Casale³

Days of Mechanical Ventilation

Probability of Remaining VAP-Free

Log Rank Statistic 10.861, df=1, P=0.001

Am J Respir Crit Care Med Vol 182. pp 1058–1064, 2010
Probiotics for Preventing Ventilator-Associated Pneumonia in Mechanically Ventilated Patients: A Meta-Analysis with Trial Sequential Analysis

Hong Weng 1,2, Jian-Guo Li 3, Zhi Mao 4, Ying Feng 3, Chao-Yang Wang 1, Xue-Qun Ren 6 and Xian-Tao Zeng 1,2

![Forest plot of incidence of VAP](image1)

**FIGURE 1** | Forest plot of incidence of VAP.

![Forest plot of incidence of overall mortality](image2)

**FIGURE 6** | Forest plot of incidence of overall mortality.
Over the next XX years

xx randomized trials
xx editorials
xx meta-analyses
xx letters
xx reviews

HIGHLY CONTROVERSIAL!!!
Prone to save normal flora

LOW EVIDENCE
HIGH CLINICAL USE

Decolonization University
Decolonization: new strategies and opportunities?

Clearance of Carbapenem-resistant *Enterobacteriaceae* versus Vancomycin-resistant enterococci carriage after fecal microbiota transplant: a prospective comparative study

Aurélien Dinh, Hafedh Fessi, Clara Duran, Rui Batista, Hugues Michelon, Frédérique Bouchand, Raphaël Lepeule, Daniel Vittecoq, Lelia Estaunt, Iraj Sobhani, Christine Lawrence, François Chast, Pierre Ronco, Benjamin Davido
Decolonization: new strategies and opportunities?

Fecal microbiota transplantation against intestinal colonization by extended spectrum beta-lactamase producing *Enterobacteriaceae*: a proof of principle study

Ramandeep Singh1,3†, Pieter F. de Groot2†, Suzanne E. Geerlings2, Caspar J. Hodiamont4, Clara Belzer5, Ineke J. M. ten Berge1, Willem M. de Vos5, Frederike J. Bemelman1 and Max Nieuwdorp2,6,7,8

Table 1 Patient characteristics

<table>
<thead>
<tr>
<th>#</th>
<th>Age</th>
<th>Sex</th>
<th>BMI (kg/m²)</th>
<th>Comorbidity</th>
<th>ESBL-Producer</th>
<th>ESBL-neg. after 1st FMT</th>
<th>ESBL-neg. after 2nd FMT</th>
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<tbody>
<tr>
<td>1</td>
<td>58</td>
<td>M</td>
<td>27</td>
<td>E. coli</td>
<td>E. coli</td>
<td>Y</td>
<td>–</td>
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<td>47</td>
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<td>27</td>
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<td>M</td>
<td>25</td>
<td>E. coli</td>
<td>K. p</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4</td>
<td>61</td>
<td>M</td>
<td>24</td>
<td>E. coli</td>
<td>E. coli</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>56</td>
<td>F</td>
<td>28</td>
<td>E. coli</td>
<td>E. coli</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>6</td>
<td>70</td>
<td>F</td>
<td>28</td>
<td>E. coli</td>
<td>K. p</td>
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<td>N</td>
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<td>7</td>
<td>59</td>
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<td>26</td>
<td>E. coli</td>
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<td>Y</td>
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<td>10</td>
<td>76</td>
<td>M</td>
<td>23</td>
<td>E. coli</td>
<td>E. coli</td>
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<td>–</td>
</tr>
<tr>
<td>11</td>
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To summarize
**Ecological effects of SDD**

Plasmid-mediated colistin resistance mechanisms: is it time to revise our approach to selective digestive decontamination?

In November, Yi-Yun Liu and colleagues published their observations of the emergence of a plasmid-mediated mechanism for colistin resistance in Enterobacteriaceae. This finding highlights the need for a reassessment of current strategies targeting the gut microbiota.

**Prone to save normal flora**

*HIGH EVIDENCE*  *LOW CLINICAL USE*

**Intestinal Microflora**

- Lactobacillus
- Streptococcus
- Escherichia coli
- Bifidobacterium
- Enterococcus

**Probiotic University**

**Prone to restore normal flora**

*LOW EVIDENCE*  *Already clinically used*

**Intestinal Microflora**

- Lactobacillus
- Streptococcus
- Escherichia coli
- Bifidobacterium
- Enterococcus

**Decolonization University**

**Low EVIDENCE**  **HIGH CLINICAL USE**
Thank you for Your attention and for the invitation