

The Role of Mayr Therapy in the Prevention of Antimicrobial Resistance (AMR) via the Gut–Liver Axis – A Contribution to One Health and WHO-TCIM Goals

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Abstract

Mayr Therapy represents an interesting biologically integrative approach to the prevention of antimicrobial resistance (AMR) through strengthening of the mucosal barrier, the gut–liver axis, and the autonomic balance. A healthy intestinal microbiota, an intact intestinal mucosa, efficient liver function, and balanced vagal activity are decisive factors in infection defence and overall health. This paper explains the mechanisms, evidence, and public health relevance of the Mayr principles and positions them within the context of One Health, the WHO-TCIM Strategy 2025–2034, and AMR prevention.

1. Introduction

A healthy intestine with a stable mucosal barrier and a well-functioning liver form central biological foundations of infection defence. F. X. Mayr Medicine primarily focuses on the restoration of these systems – particularly the intestinal mucosa (barrier and microbiome), liver function (immune filter, complement, bile acids), and autonomic balance. These three axes represent decisive biological levers that can reduce susceptibility to infections and the need for antibiotics, while simultaneously promoting the organism's self-regulation (WHO, 2024; *Frontiers in Immunology*, 2023). This approach supports the aims of the One Health framework for AMR prevention by strengthening natural colonisation resistance, encouraging responsible antibiotic use, and fostering health-promoting lifestyle interventions. As such, Mayr Medicine offers a complementary and compatible method alongside guideline-based medicine and can be meaningfully integrated into TCIM (Traditional, Complementary and Integrative Medicine) programmes (WHO-TCIM Strategy 2025–2034).

2. Background: AMR Urgency and One Health Levers

Antimicrobial resistance (AMR) continues to spread globally. According to current WHO data (GLASS Report 2024), high resistance rates persist worldwide, particularly among *Escherichia coli* and *Klebsiella* strains. This intensifies the need for preventive measures that can reduce antibiotic demand (WHO GLASS, 2024). The international 'Quadripartite Alliance' (WHO, FAO, WOA, UNEP) calls for behavioural and care-based solutions that integrate nutrition, prevention, and antibiotic stewardship, addressing human, animal, and environmental health alike. Even short antibiotic therapies can significantly damage the microbiome and disrupt antiviral protective metabolites, with recovery often taking months. This pattern – more antibiotics, more dysbiosis, more infections – forms a pathophysiological vicious cycle (*Nature Reviews Microbiology*, 2023) with far-reaching implications. Mayr Medicine addresses precisely this: through digestive relief, self-regulation, nutrition, and lifestyle adjustment. These factors act upstream on infection processes and can thus indirectly reduce antibiotic prescriptions. The Mayr principles target the gut–liver axis through the reduction of steatosis, regulation of bile acid signalling pathways (FXR, TGR5), stabilisation of barrier function, and reduction of chronic inflammation (*Frontiers in Physiology*, 2024).

3. Essential Defence Mechanisms Against Pathogens

The intestinal and hepatic systems provide multilayered defence mechanisms against pathogenic microorganisms, integrating physical, chemical, microbial, and immune processes. These include the lymphatic pharyngeal ring, gastric acid barrier, and intestinal mucosal layers that maintain homeostasis and prevent infections.

3.4 Liver as an Immune Organ

Substances absorbed from the intestine reach the second line of defence – the immunologically active liver – via the portal vein. Over 90% of microbial products and toxins from the gut are eliminated by the liver. Kupffer cells, complement, and acute-phase proteins provide this frontline defence (*Frontiers in Immunology*, 2022). Liver dysfunctions and diseases such as NAFLD, MASLD, ALD, or hepatitis reduce detoxification capacity, increase intestinal permeability, and promote translocation of bacterial lipopolysaccharides (LPS) (*Nature Metabolism*, 2024). This raises systemic microbial load and worsens sepsis outcomes. From a public health perspective, these effects are relevant given the high prevalence of metabolic liver disorders and their

adverse impact on immune regulation (metabolic syndrome, diabetes, etc.).

3.5 The Gut–Liver Axis

Bile acids act as signalling molecules via FXR and TGR5 receptors, regulating intestinal tone, barrier integrity, and inflammation while influencing the immune system (Cell Reports, 2023). This axis therefore represents a therapeutic lever for TCIM-compatible nutritional and lifestyle strategies.

4. The Vagus / Gut–Brain Axis

Growing evidence shows that activation of the vagus nerve regulates sympathetic dominance and modulates immune responses (Frontiers in Neuroscience, 2023). Chronic stress weakens barrier integrity, promotes dysbiosis and inflammation, impairs repair and regeneration, and negatively influences hormonal balance. Mayr Therapy strengthens this axis through nutrition, digestive relief, movement, mindfulness-based practices, and manual abdominal treatments.

5. Mayr Principles and Evidence Blocks

The classic Mayr principles – Relief, Cleansing, Education, Manual Abdominal Treatment, and Substitution – aim to normalise intestinal motility, lymph flow, circulation, and barrier function. They link the gut–brain and gut–immune axes with autonomic regulation therapy. The individualised approach and enhanced mindfulness foster understanding of bodily connections and improve self-efficacy and compliance. Scientific evidence supports the biological plausibility and therapeutic potential of Mayr strategies for microbiome restoration, liver regeneration, and AMR reduction.

6. Policy Fit and Public Health Relevance

The WHO Strategy 2025–2034 emphasises the integration of TCIM into healthcare and the need for One Health-based preventive approaches (WHO TCIM Global Strategy, 2024). Mayr Therapy meets these criteria by strengthening biological self-regulation and reducing antibiotic demand. Given the high prevalence of NAFLD/ALD, preventive strengthening of the gut–liver axis represents a relevant public health lever (Lancet Gastroenterology, 2023) with positive impacts on multiple metabolic imbalances and the organism as a whole.

7. Conclusion

Mayr Therapy combines classical lifestyle medicine with modern One Health objectives. By strengthening the microbiome, mucosal barrier, and liver function, it can indirectly contribute to reducing antibiotic use and AMR risks. Its integrative approach aligns with WHO and EU strategies for sustainable health promotion.

8. References (Selection 2020–2025)

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