GUT-BRAIN AXIS

The complex cross talk between the **Central Nervous System** and the **Gastrointestinal (GI) System** made possible via the **Gut Microbiota** [1,2]

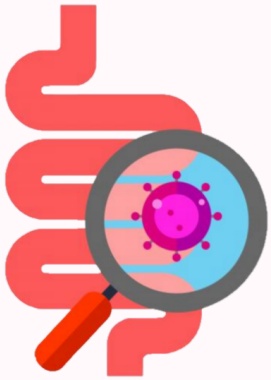
Experimental and clinical evidences

- Cognitive improvement in cirrhotic patients with rifaximin administration [3]
- Higher prevalence of GI symptoms found in autistic children as compared to their healthy siblings [4]

Gut-Brain Communication via Intestinal Microbiome [1]

From Gut to Brain

- Regulate cycling of neurotransmitters and neurotrophic factor
- Protect intestinal barrier and tight junction integrity
- Modulate enteric sensory afferents
- Achieve bacterial metabolism
- Govern mucosal immunity



From Brain to Gut

- Activate immune functions
- Regulate intestinal permeability
- Alter gut motility
- Control mucus and biofilm production

Factors Shaping the Gut Microbiota in the 1st 1000 Days of Life [5-11]

MATERNAL NUTRITION

BIRTH MODE

ANTIBIOTIC EXPOSURE

BREASTFEEDING

PEDIATRIC NUTRITION

References: 1. Carabotti M et al. Ann Gastroenterol 2015; 28(2): 203-209. 2. Clarke G et al Acta Paediatrica 2014; 103: 812-819. 3. Bajaj S et al. PLoS One 2013; 8: e60042. 4. Horvath and Perman. Current Gastroenterology Reports 2002, 4: 251-258. 5. Robertson C et al. Trends in Microbiology 2019; 27(2): 131-147. 6. Pannaraj S et al. JAMA Pediatr. 2017; 171(7):647-654. 7. Myles A et al. J Immunol 2013; 191:3200-3209. 8. Chu M et al. Genome Medicine 2016; 8: 77. 9. Modi R. et al. J Clin Invest 2014; 124(10):4212-4218. 10. Voreades N et al. Frontiers in Microbiology 2014; 5: 494. 11. Lee E et al. Allergy Asthma Immunol Res 2016; 8(5): 471-477.

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