

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

The mechanism of IBS effect in causing various neurological disorders

IBS

IRRITABLE BOWEL SYNDROME (IBS): Symptoms

- Abdominal Pain
- Bloating
- Constipation
- Diarrhea
- Flatulence
- Nausea
- Headache
- Backache
- Loss of Appetite



Mucus in the Stool

Extreme Exhaustion & A Feeling of Lethargy

Involuntary or Accidental Bowel Movement

Troubles in Micturition

Rome IV Criteria for IBS

Recurrent abdominal pain or discomfort
at least 1 day/wk (on average) in the last 3 months
associated with 2 or more of the following:



Related to defecation



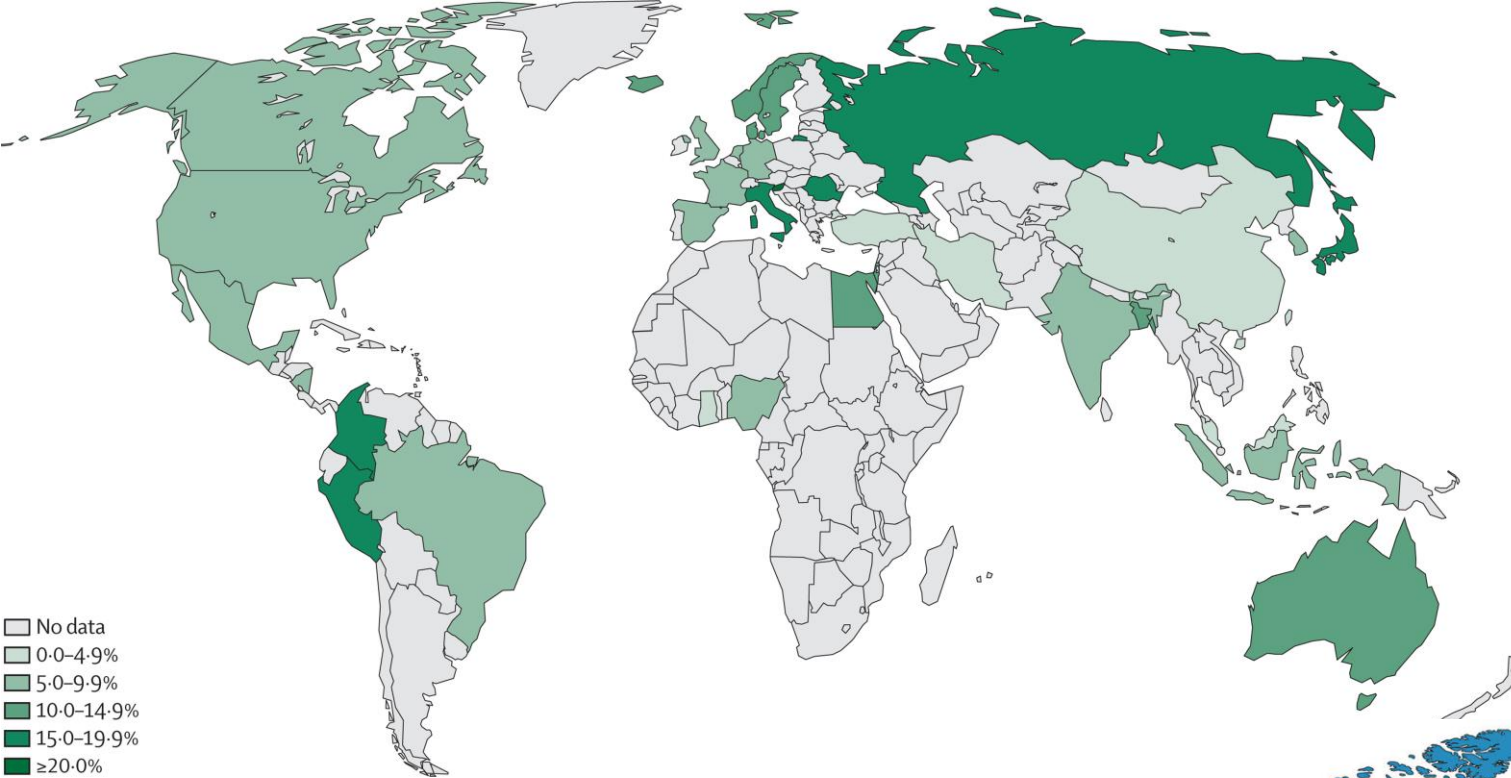
Onset associated with a
change in frequency of
stool



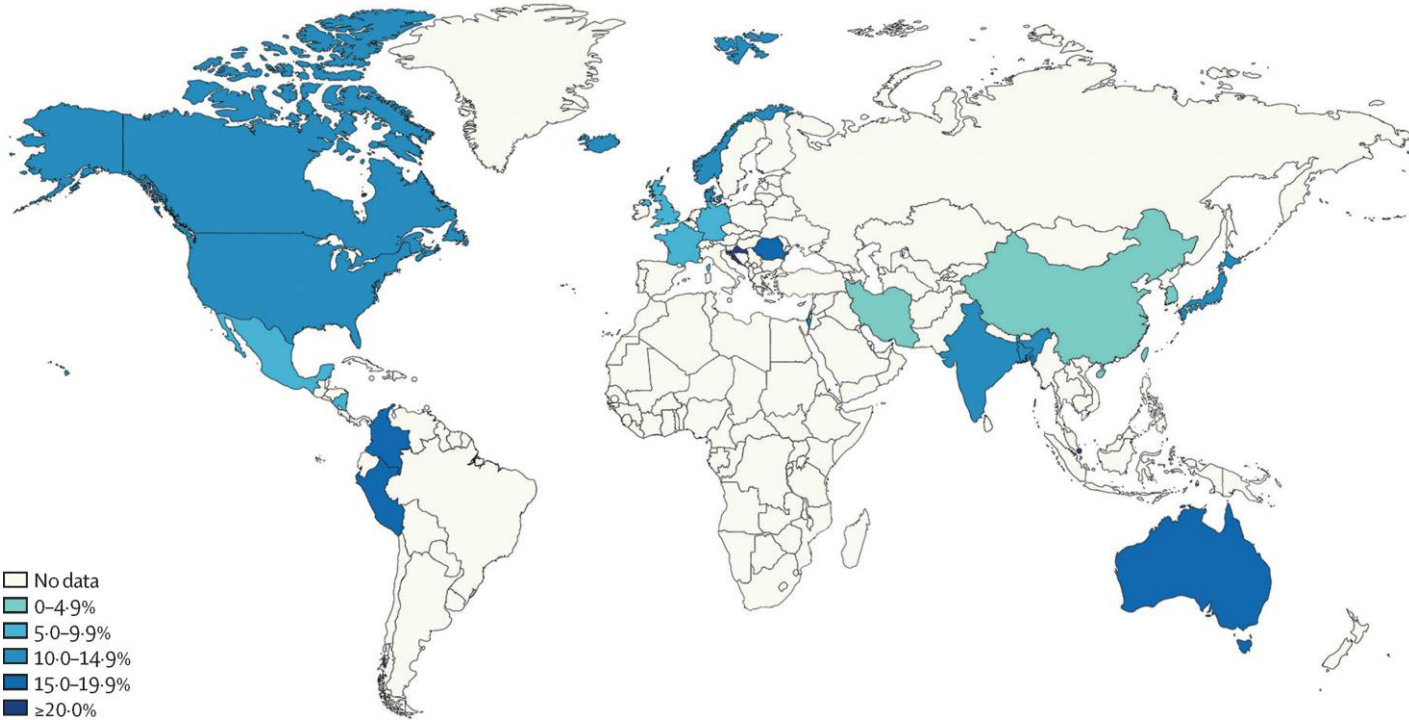
Onset associated with a
change in
form of stool

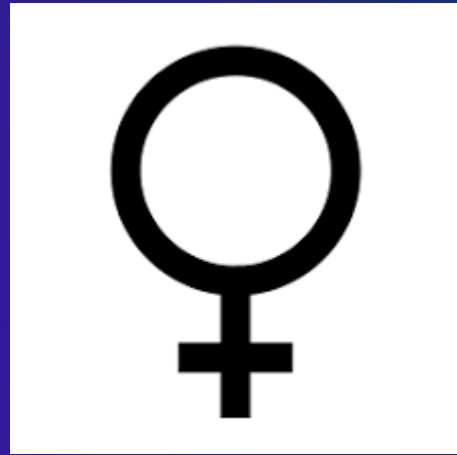
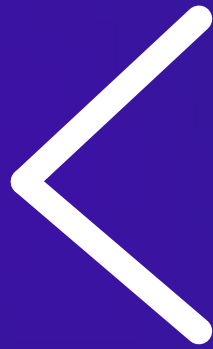
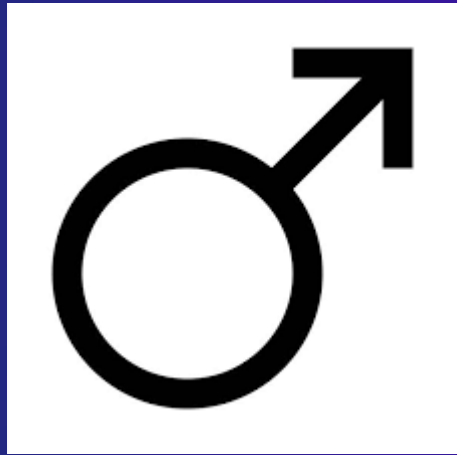


Criteria fulfilled for the last 3 months with symptom onset at least 6
months prior to diagnosis



2020





Subtypes of IBS

IBS-Constipation

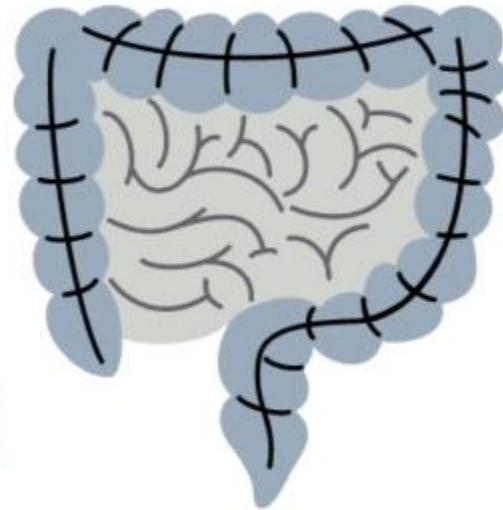
Patients with IBS-C experience predominant symptoms of constipation alongside...

ABDOMINAL DISCOMFORT

ABDOMINAL PAIN

STRAINING

BLOATING



IBS-Diarrhea

Patients with IBS-D experience predominant symptoms of diarrhea alongside...

ABDOMINAL DISCOMFORT

ABDOMINAL PAIN

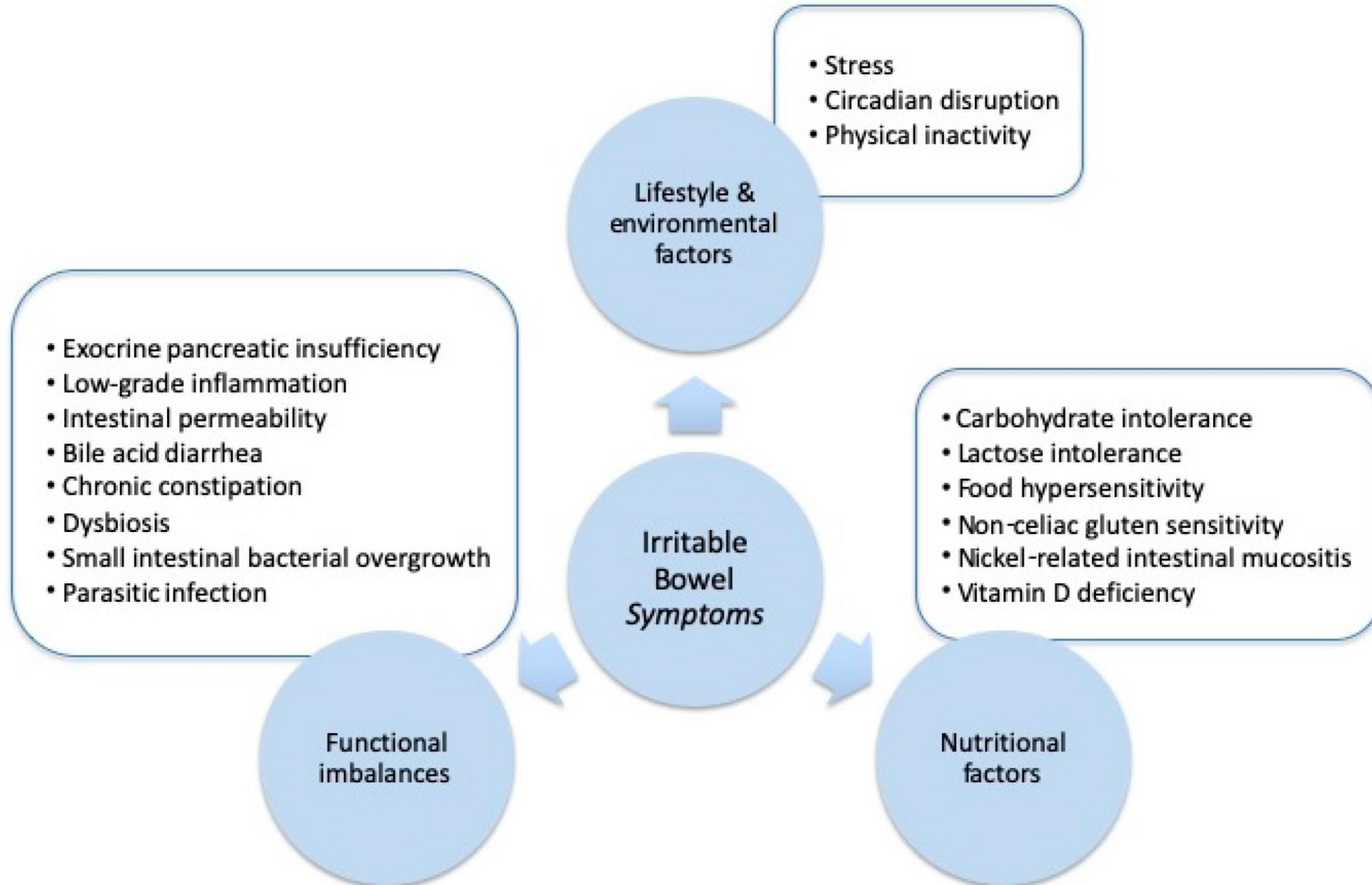
SUDDEN URGES

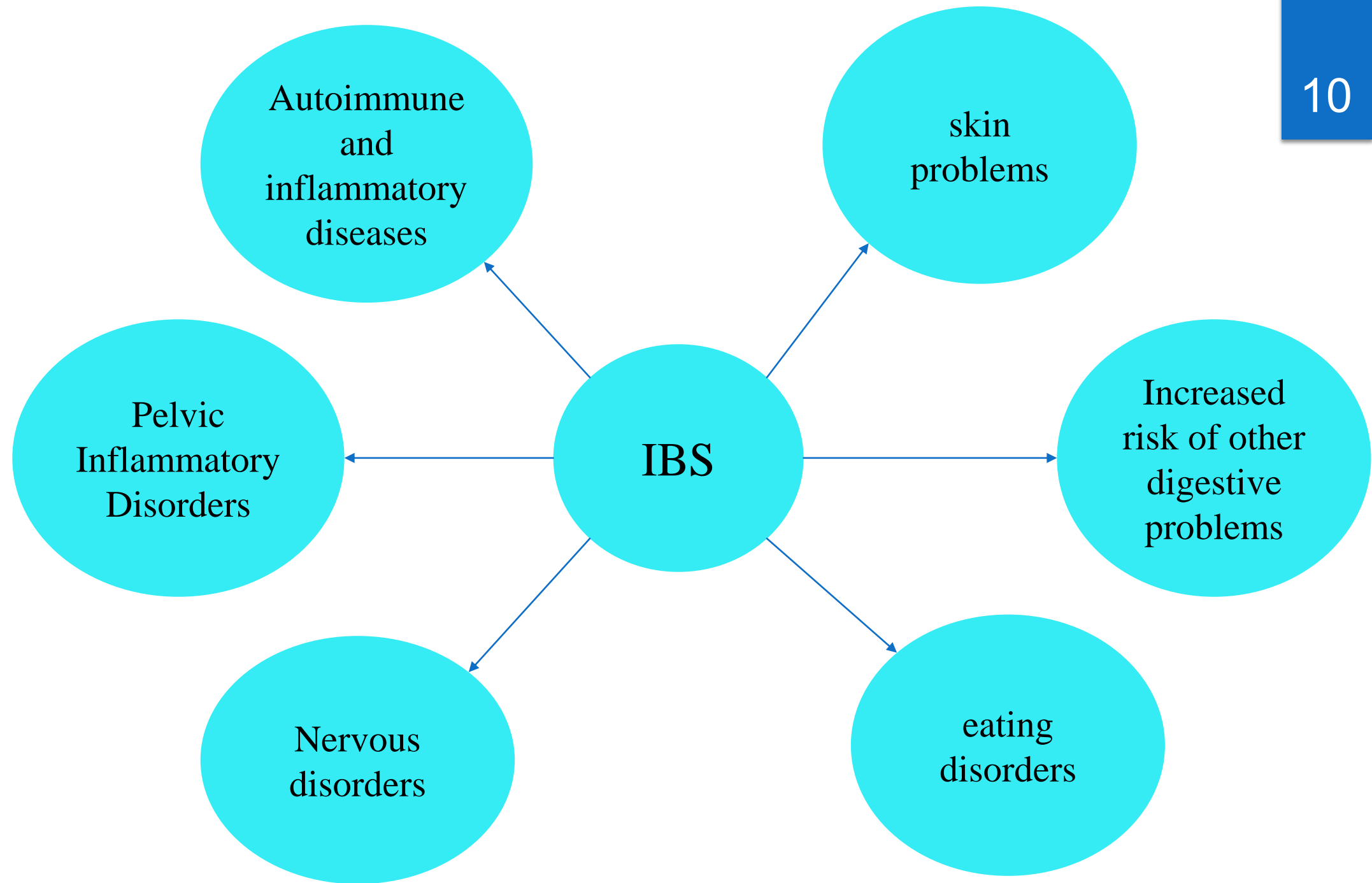
GASSINESS

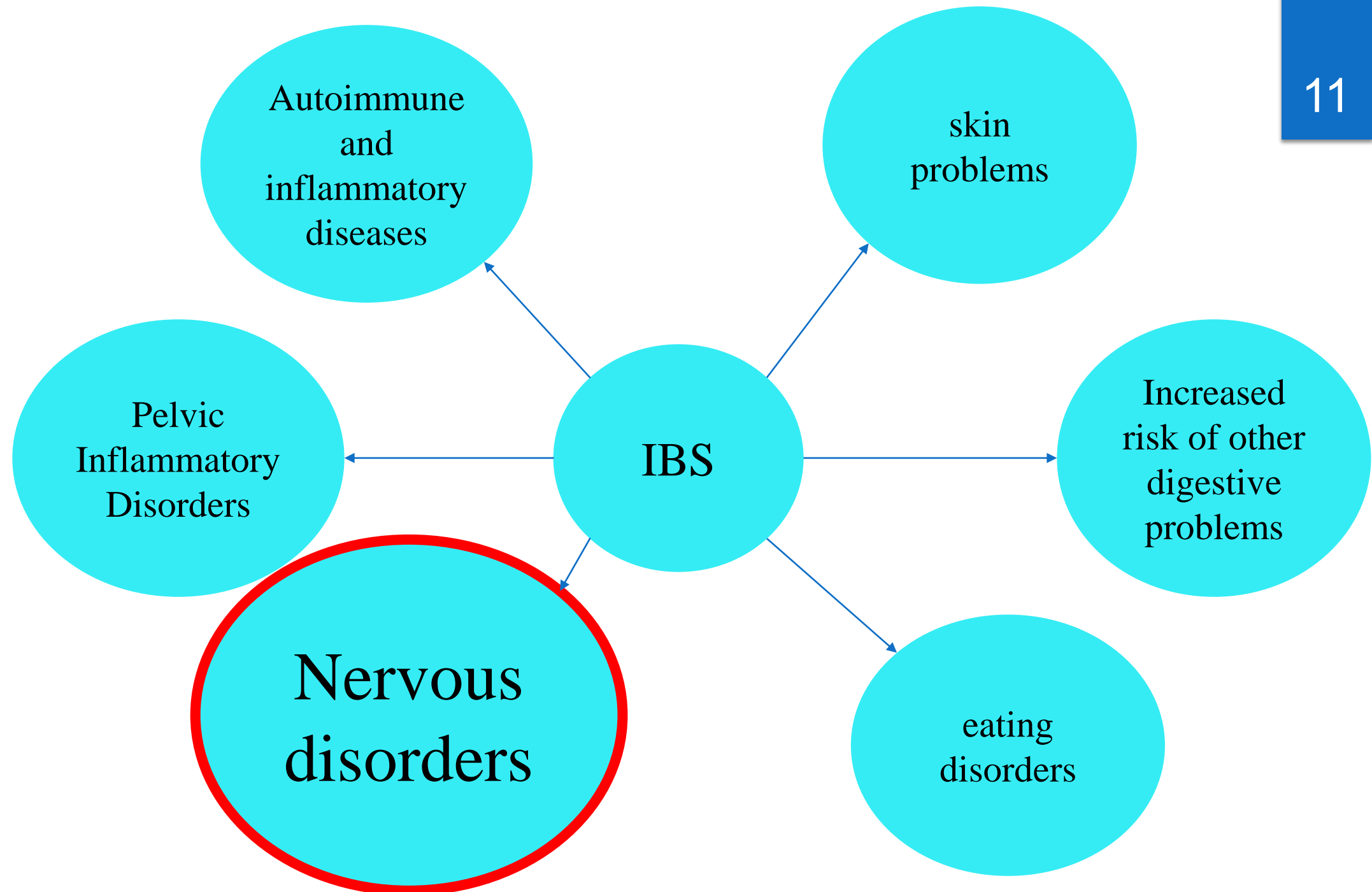
IBS-Mixed

Patients with IBS-M experience alternating symptoms of both IBS-C and IBS-D.

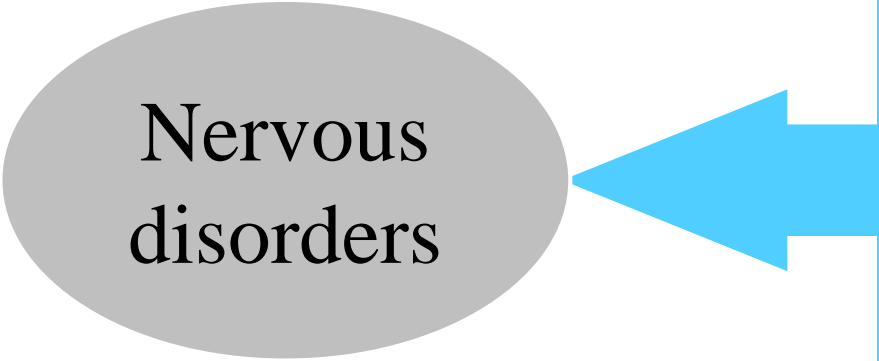
Patients may experience one or more of these subtypes over a lifetime.





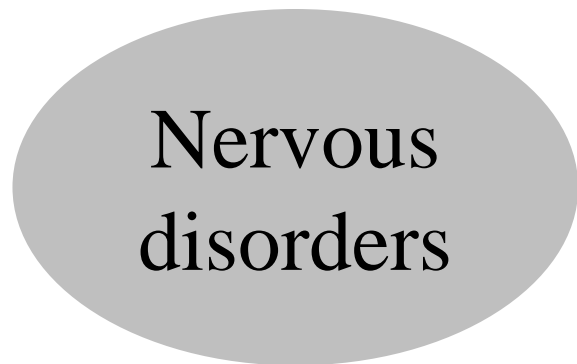


1. Inflammation and the immune system
2. Vagus nervous system and sensory neurons
3. Disorder in the HPA Axis
4. Gut microbiome and its metabolites
5. Leaky Gut & BBB
6. Chronic pain and central sensitivity
7. Imbalance of neurotransmitters
8. Psychological factors and stress



Nervous disorders

Nervous disorders



1. Inflammation and the immune system

- 2. Vagus nervous system and sensory neurons
- 3. Disorder in the HPA Axis

4. Gut microbiome and its metabolites

5. Leaky Gut & BBB

- 6. Chronic pain and central sensitivity

7. Imbalance of neurotransmitters

- 8. Psychological factors and stress

Inflammation and the immune system

↑ Macrophage activity

↑ Th17 ↓ Treg

TNF- α ,IL-1 β and IL-6



BBB

Pain Hypersensitivity

Stress, anxiety and behavioral changes

Inflammation and the immune system

IL-6



JAK-STAT

TNF- α and IL-6



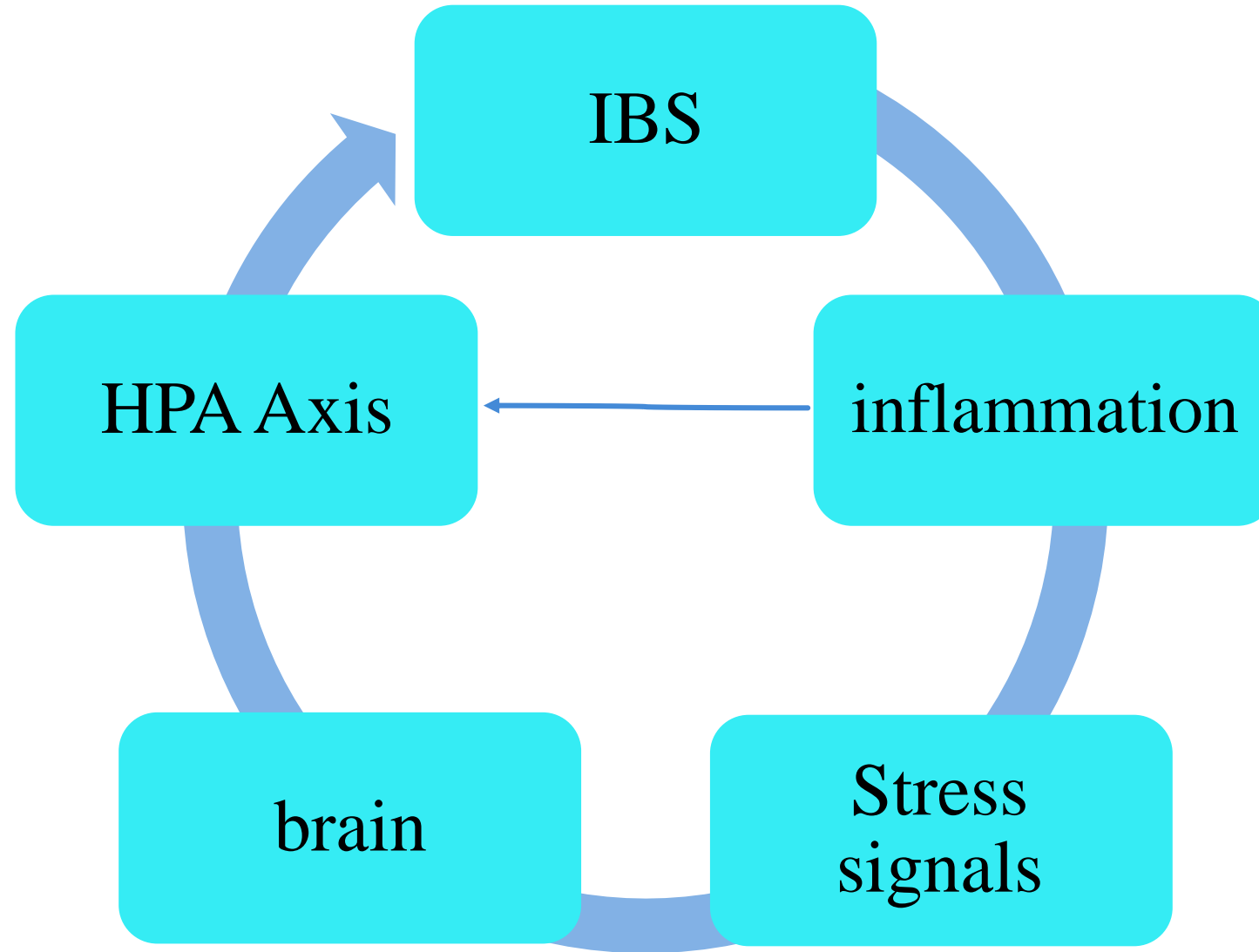
Activation of
microglia

Inflammation and the immune system

Intestinal
inflammation



Inflammation in the
nervous system



Gut microbiome and its metabolites

↓ Microbial diversity

↑ The ratio of Gram-negative bacteria to probiotics

Gut microbiome and its metabolites

Biogenic amines

↓ Serotonin

↓ GABA

↑ ↓ Dopamine

SCFAs

↓ Acetate

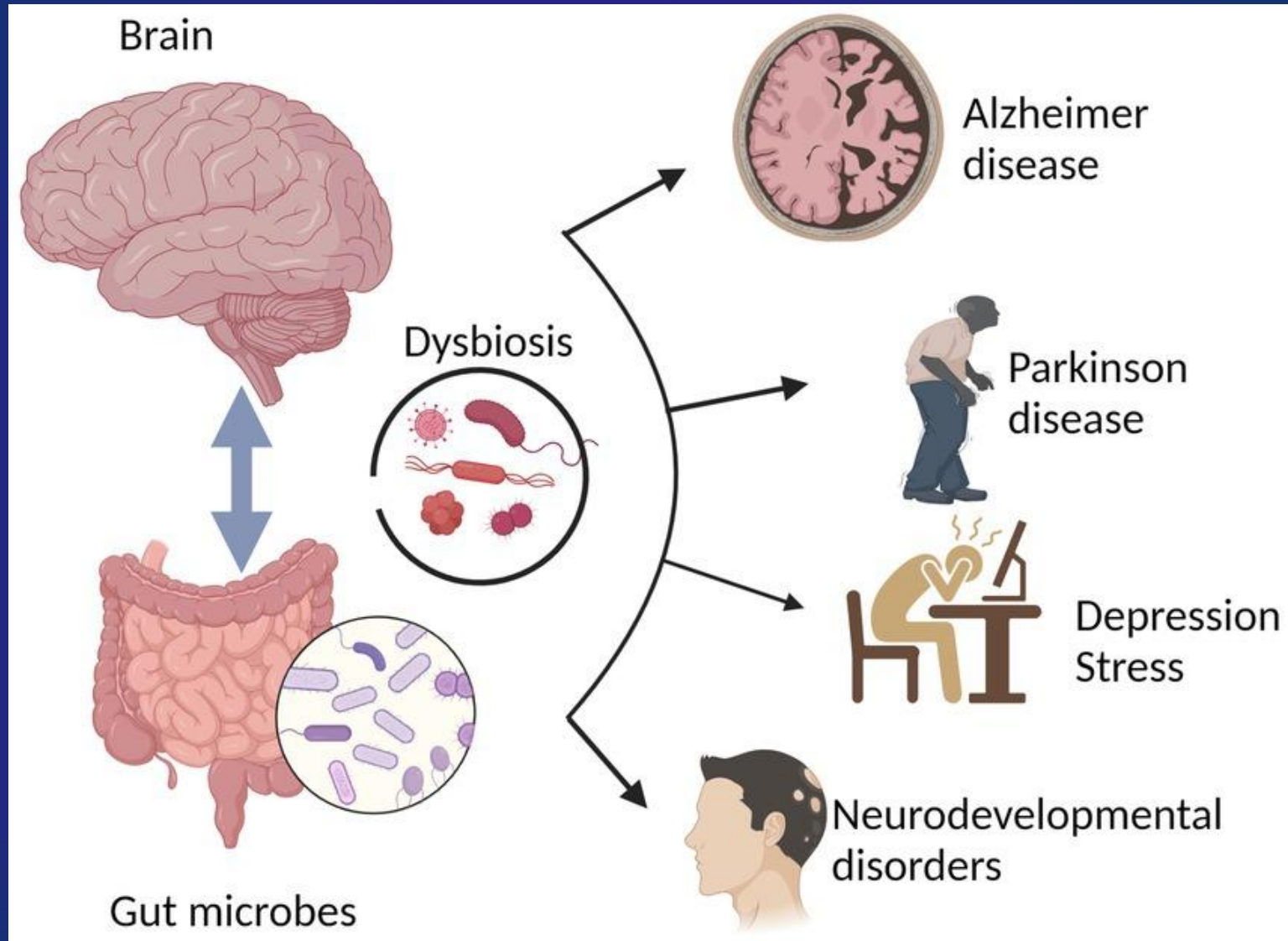
↓ Propionate

↓ Butyrate

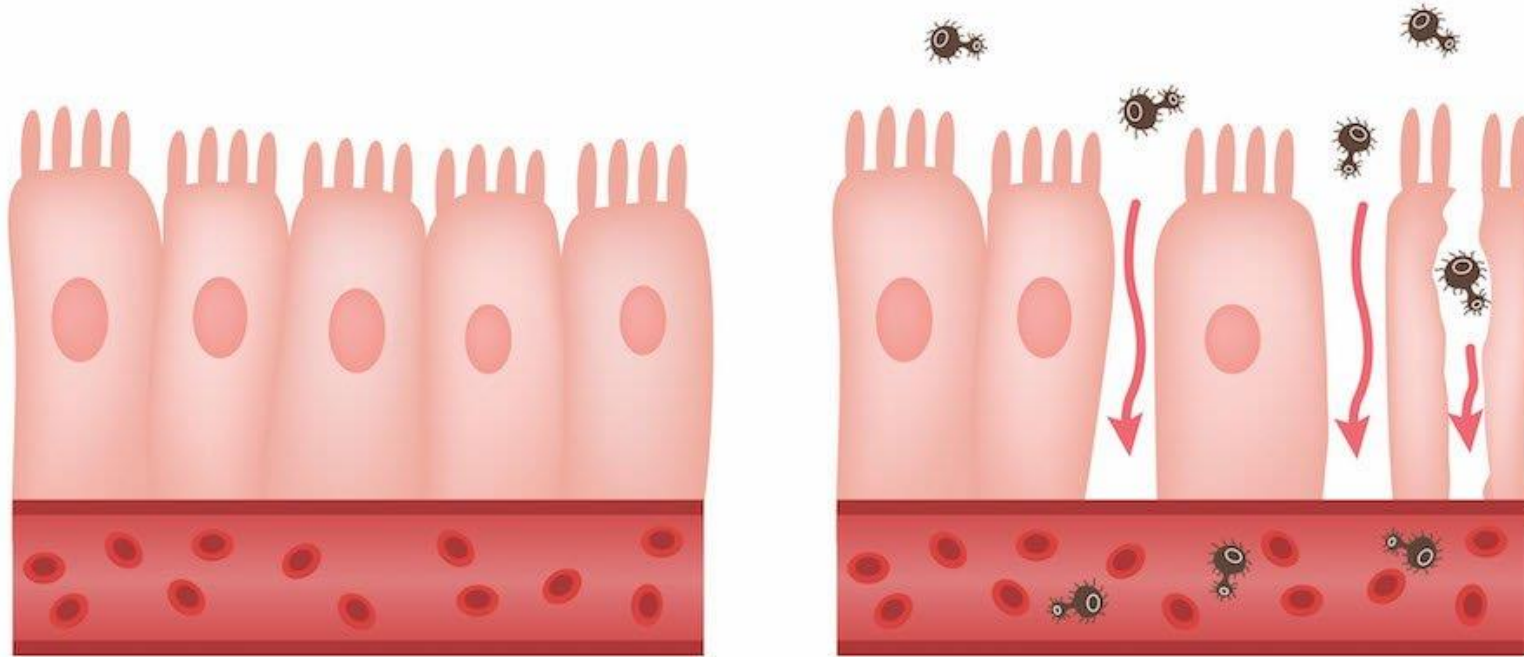
Toxic metabolites

↑ Organic amines

↑ Nitroso products



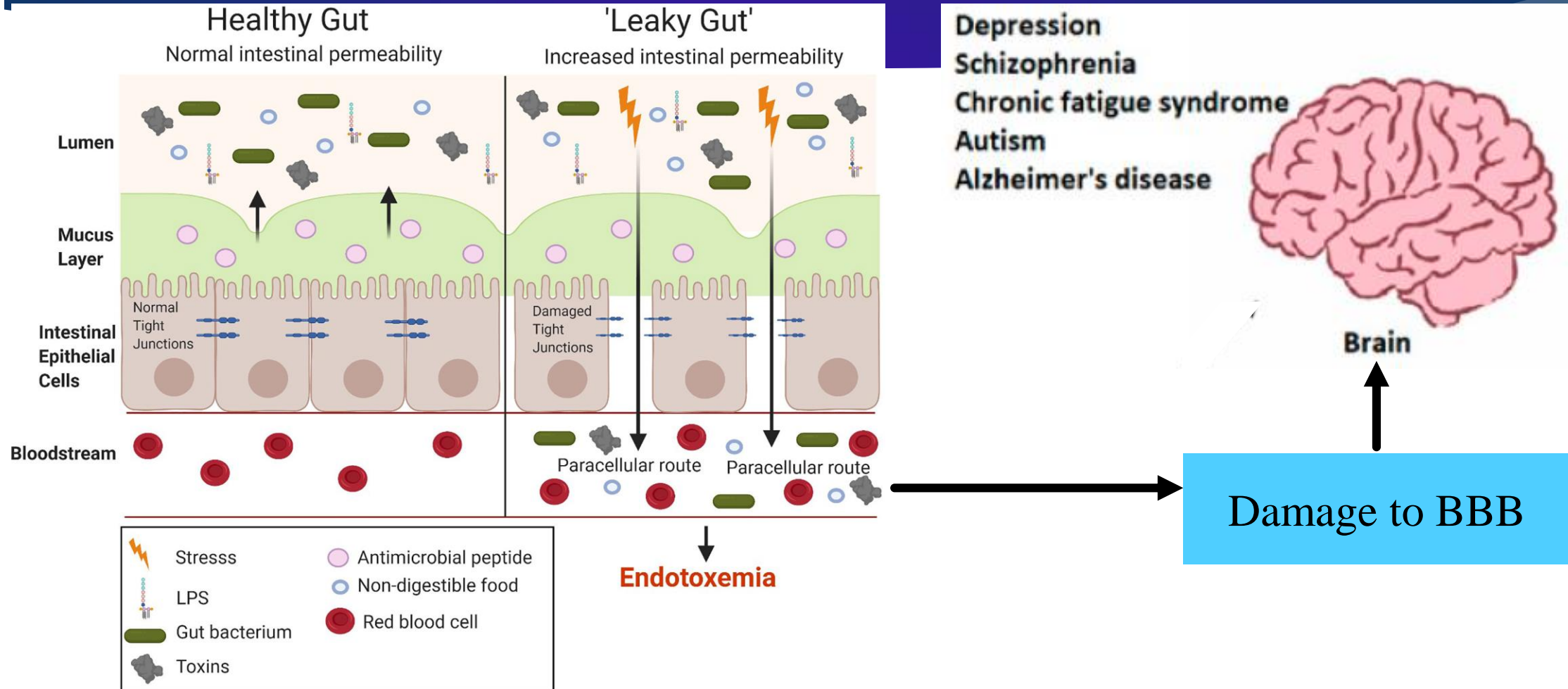
Leaky Gut & BBB



Normal Tight Junction

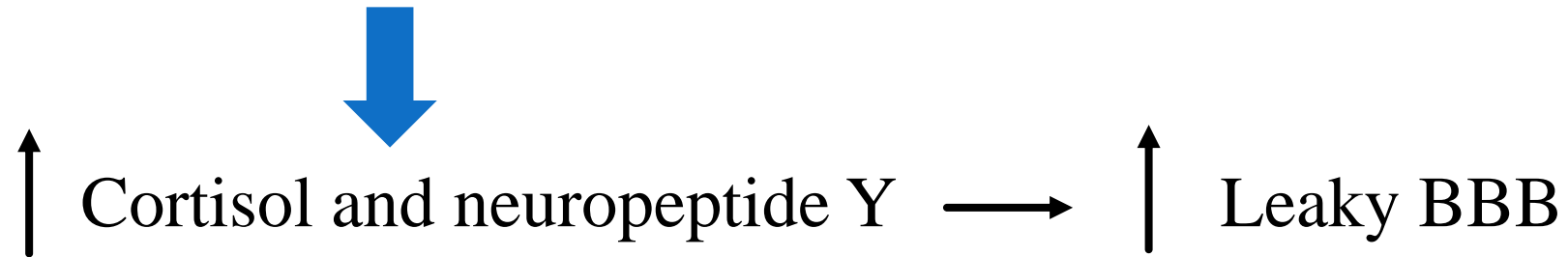
Leaky and Inflamed

Leaky Gut & BBB

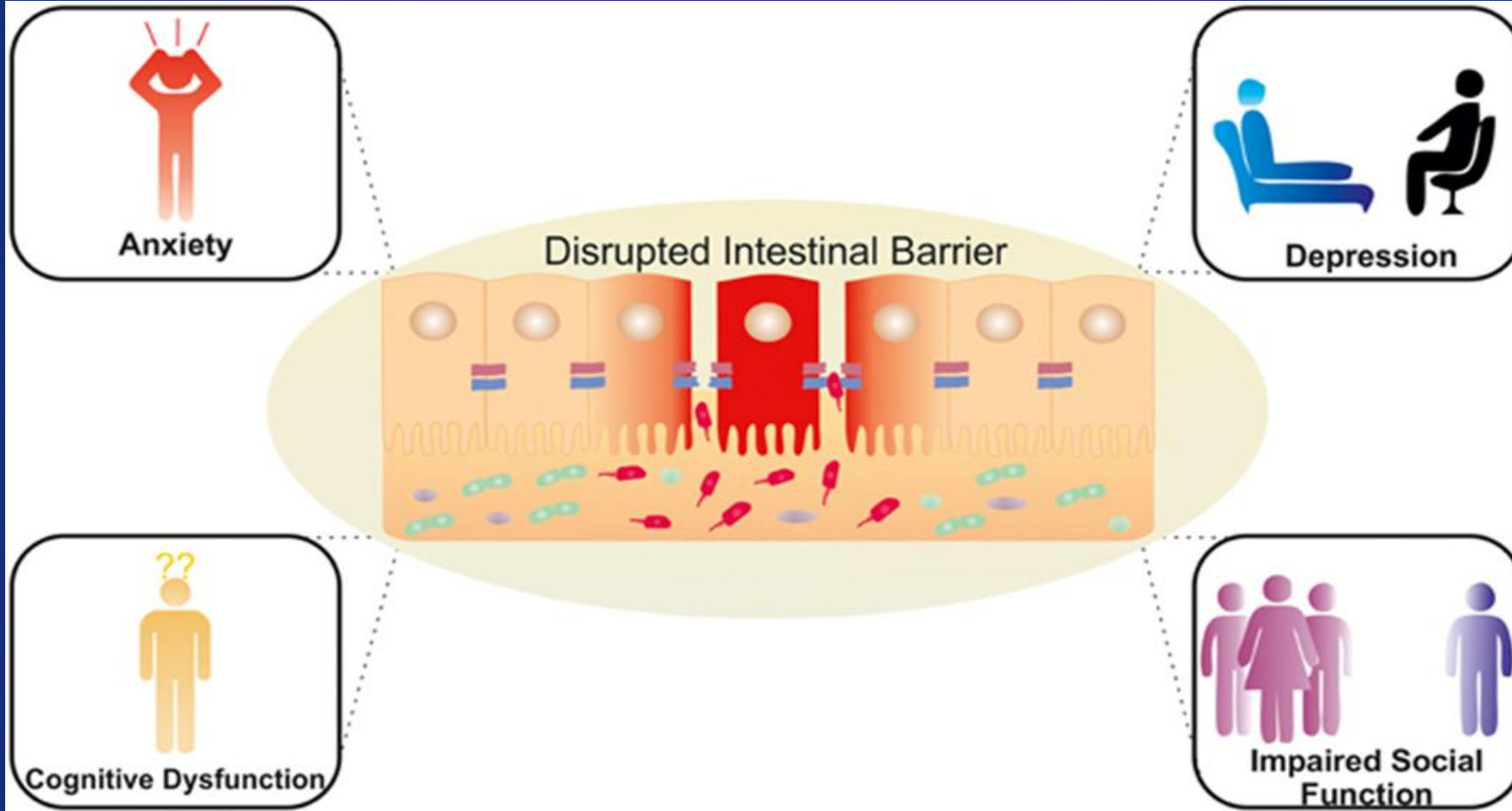


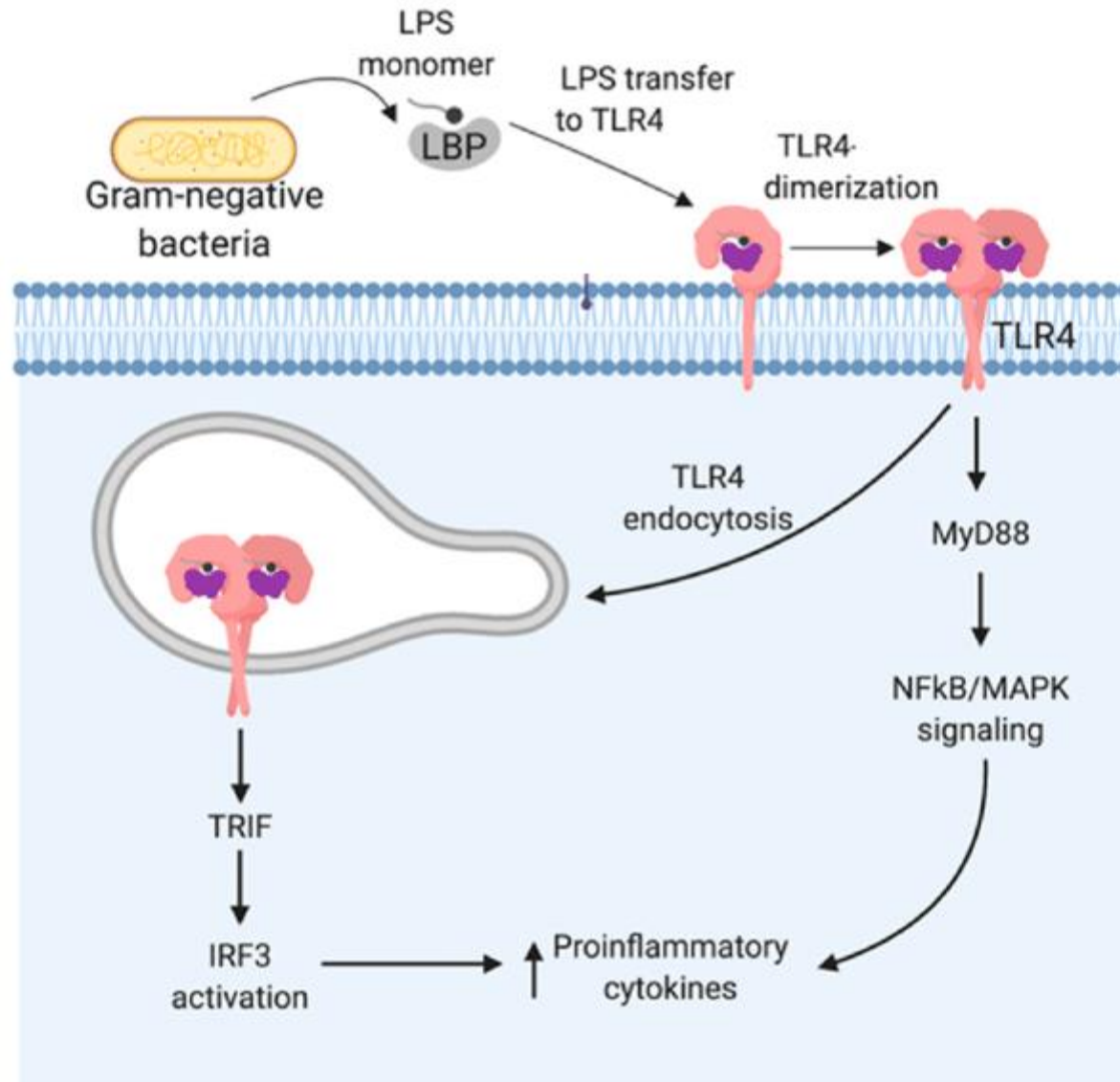
Leaky Gut & BBB

Autonomic nervous system activity and HPA Axis



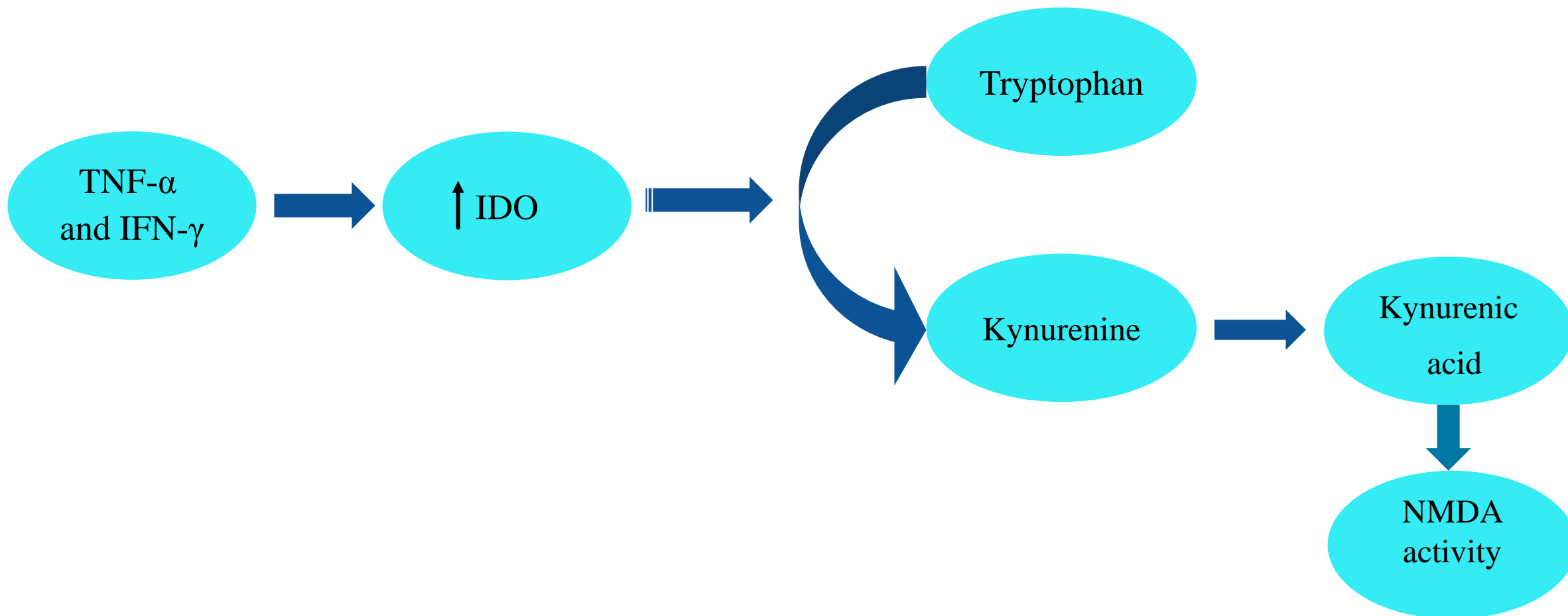
Leaky Gut & BBB





↑ Cortisol

LPS



LPS

↓ AMPA and NMDA in brain regions such as hippocampus and prefrontal cortex

LPS

Serotonin

Decreased tryptophan and increased levels of kynurenine decrease serotonin

Glutamate

Activation of microglia, disruption of synaptic balance and neurotoxicity

Dopamine

Weakening of dopaminergic pathways in striatum and prefrontal cortex

Imbalance of neurotransmitters

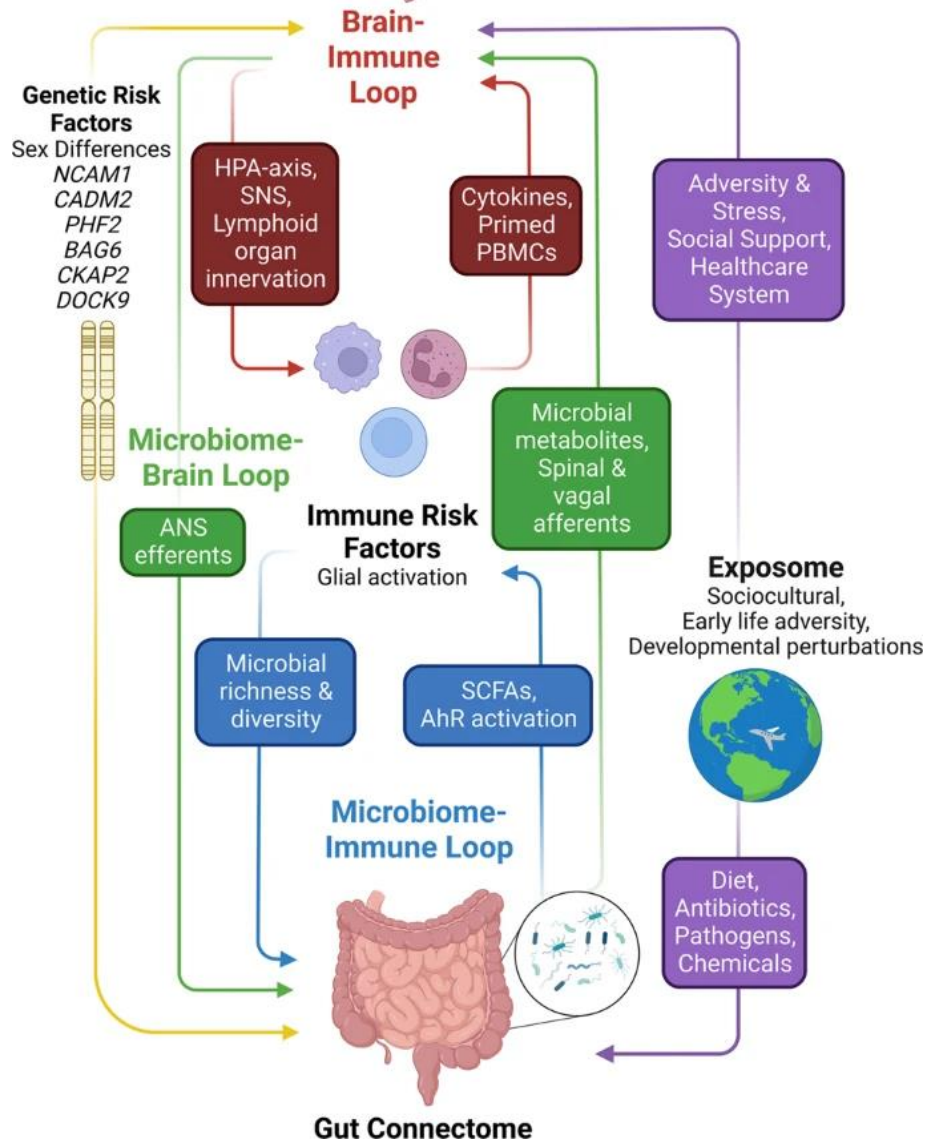
↓ Serotonin

↓ GABA

↓ Dopamine

↑ Norepinephrine

Brain Connectome
Central Sensitization / Multisensory Hypersensitivity
Cortical Reorganization
Neuroendocrine modulation



The cause of the high prevalence of depression in IBS patients is related to which of the pathways?



Thank
you