The immune system helps to maintain homeostasis, and is essential for the development, surveillance, protection, and regulation of all systems within the body

- Healing of damage
- Brain plasticity (formation of new neurons)
- Cognitive performance (learning, memory, cognition, and motor function)

Stress management

Brain

Reproductive

system

- Formation of new blood vessels
- Healing and regeneration of cardiac tissue

Cardiovascular

system

- Ovulation
- Maternal-fetal interface during pregnancy
- Mammary gland development

- Insulin sensitivity
- Triglyceride clearance
- Adipocyte development and function

Gastrointestinal tract

- Microbiome composition
- Intestinal barrier
- Intestinal peristalsis

Musculoskeletal system

Metabolism

- Repair of daily microtears in skeletal muscle
- Muscle regeneration after extensive injuries
- Bone development and maintenance

## Immune cells

(major producers of soluble molecules, cytokines, hormones, neuropeptides)

- 1. Sense perturbation (e.g. pattern recognition receptors)
- 2. **Send signals** to communicate the type and extent of damage (e.g. cytokine production)

Homeostasis

Homeostatic breach

Homeostasis

- 3. **Implement response** to return system to homeostasis (e.g. production of reactive oxygen species, lysozymes, defensins)
- 4. Facilitate resolution (e.g. resolving the inflammatory process, repairing the damage caused by the homeostatic breach)