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# INFLUENCE OF EXERCISE ON THE GUT MICROBIOME AMONG CANCER SURVIVORS: A SCOPING REVIEW AND CLINICAL TRIAL SUMMARY

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## BACKGROUND

- Cancer treatment efficacy and toxicity can be modulated by the gut microbiome.
- Emergence of clinical interventions targeting gut microbiome to enhance cancer-specific and overall health outcomes (i.e., diet, probiotics, and faecal transplant).
- Physical activity or exercise may provide a supportive care intervention to restore, protect, or improve gut function in cancer survivors.

## METHODS

- Scoping review (PubMed, Scopus, SportDiscus, CINAHL, EMBASE) using terms (cancer AND microbiome OR microbiota AND exercise OR physical activity).
- Completed, ongoing, and planned (i.e., not yet recruiting, but registered) exercise and gut microbiome trials were also identified through searching ClinicalTrials.gov, ANZCTR.gov.au, Korean Clinical Trials Registry, and published protocol papers.

## RESULTS

- 3 published studies (1 observational and 2 single arm) were identified until 2023.
- Involved 12 to 20 people with breast cancer or acute lymphoblastic leukaemia.
- Interventions spanned 8 to 12 weeks involving physical activity (up to 150-minutes per week) or exercise (aerobic only training; or combined aerobic and resistance training; 2 to 3 times per week at moderate-to-vigorous intensity)
- Diet was not controlled but was monitored via 3-day diet diary, or with people provided probiotics, or encouraged to adhere to a Mediterranean diet.
- Twenty-four (n=24) unpublished clinical trials were identified:
  - 4 completed, 15 ongoing, and 6 planned.

## CLINICAL TRIAL SUMMARY

### Trial Designs:

- Single-Arm Clinical Trials (x 4)
- Non-Controlled Trials (x 2)
- Randomised Controlled Trials (x 18)

### Interventions:

- 5 to 52 weeks in duration
- 2 to 5 times per week
- Moderate-to-High intensity
- Physical Activity / Behavioural
- Exercise (Aerobic: MICT to HIIT)
- Exercise (Aerobic plus Resistance)

### Solid Tumours:

- Breast Cancer (x 9)
- Colorectal Cancer (x 4)
- Extracranial Tumour (x1)
- Lung Cancer (x 1)
- Melanoma (x 1)
- Oesophageal Cancer (x 1)
- Prostate Cancer (x 4)
- Rectal Cancer (x 1)
- Testicular Cancer (x 1)

### Hematological:

- Acute Lymphoblastic Leukaemia (x 1)
- Multiple Myeloma (x 1)

### Treatment-Specific:

- Allogenic Stem-Cell Transplant (x 1)
- Chemotherapy (x 1)
- Radiotherapy (x 1)
- Any Treatment (x 1)



## CONCLUSION

- Exercise-microbiome scarcely examined among cancer survivors.
- Exercise appears to facilitate a more diverse gut microbiome by optimizing the ecosystem through which microbial life is supported.
- Most physical activity and exercise studies have been conducted in healthy or athletic populations using aerobic modalities, with poorly controlled diet.
- Well-designed, controlled, randomised trials using high-fidelity exercise targeting the gut microbiome across various cancer treatments and cancer survivor populations are required.

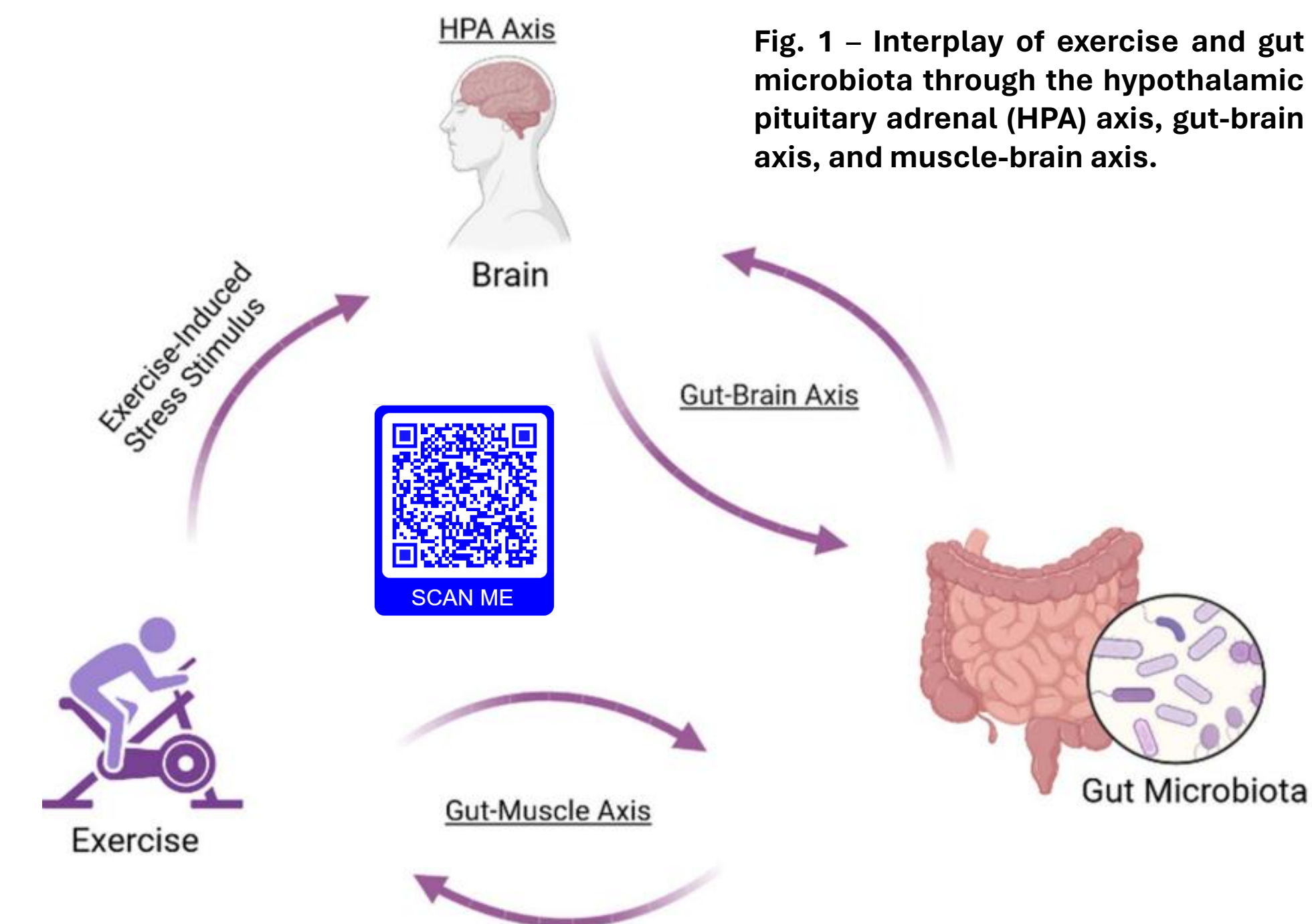


Fig. 1 – Interplay of exercise and gut microbiota through the hypothalamic pituitary adrenal (HPA) axis, gut-brain axis, and muscle-brain axis.