Research Theme: Metabolomics Science; Integrative Oncology
PhD Research Project Title: Sleep Metabolome in Cancer and Effect of Integrative Therapies
Scholarship category (Please indicate the source of funding for this project): (a) SBS Research Student Scholarship (for SBS faculty only)
Principal Investigator/Supervisor: Mingxiao Yang
Co-supervisor/ Collaborator(s) (if any):

Project Description
a) Background: Sleep disturbance affects up to 60% of individuals living with cancer, severely impairing quality of life. Despite its prevalence, effective interventions remain limited, partly due to a lack of understanding of the biological mechanisms underlying sleep disruption in complex cancer care settings. Alterations in tryptophan–kynurenine metabolism have been linked to cancer-related insomnia. Our previous work suggests acupuncture and herbal medicine improve sleep possibly through modulating dopamine catabolism. Emerging evidence also indicates that the gut microbiota profoundly influences the host metabolome, impacting circadian rhythms and sleep regulation. However, the specific metabolic pathways and the role of gut-derived small molecules in sleep-wake cycle modulation remain unclear. This project aims to characterize the sleep metabolome and investigate the effects of integrative therapies on metabolic and microbiome profiles in cancer populations. Findings will advance cancer symptom science and support the development of novel therapeutic strategies to improve sleep health in patients and survivors. **b) Proposed work:** • Longitudinal metabolomics cohort study to identify metabolic signatures associated with objective and subjective sleep outcomes in cancer patients/survivors. • Randomized clinical trials to assess the effects of acupuncture and herbal medicine on the sleep metabolome and gut microbiome in cancer patients with insomnia. • Basic science study to elucidate the biological mechanism involving host-gut microbiota interaction in circadian rhythm and sleep-wake cycle regulation in animal models. **c) Preferred skills: translational science, metabolomics, clinical trial, and/or Chinese medicine. Computational work on data analysis and bioinformatics is preferred, but not indispensable.**

Supervisor contact: **If you have questions regarding this project, please email the Principal Investigator:** mingxiao.yang@ntu.edu.sg
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