Age-related mitochondrial dysfunction influences the mouse intestinal microbiome composition

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Statement of the Problem: Mitochondrial dysfunction occurs as the gastrointestinal tract ages. We investigated whether changes in mitochondrial function in ageing colonic crypts in mice with or without mitochondrial defects influence the microbial gut communities and whether exercise modulates any such changes.

Methodology: 12 PolgA⁰/⁰ mice and 7 age matched wild type PolgA⁺/⁺ mice were used in the current study. The 12 PolgA⁰/⁰ mice were randomly divided into a sedentary and exercise group at 4 months and PolgA⁺/⁺ remained sedentary throughout. Stool samples were collected at 4, 7 and 11 months and bacterial profiling was achieved through 16S rDNA sequencing profiling. Mitochondrial enzyme activity was assessed in colonic epithelial crypts at 11 months for PolgA⁰/⁰ and PolgA⁺/⁺ mice.

Results: Sedentary and exercise PolgA⁰/⁰ mice had significantly greater mitochondrial dysfunction than PolgA⁺/⁺ mice (78%, 77% and 1%, respectively). Bacterial profiles of sedentary PolgA⁰/⁰ mice were significantly different from the sedentary PolgA⁺/⁺ mice with increases in Lactobacillus and Mycoplasma and decreases in Alistipes, Odoribacter, Anaeroplasma, Rikenella, Parabacteroides, Allobaculum in the PolgA⁰/⁰ mice. Exercise did not have any impact upon gut mitochondrial dysfunction, however, exercise did increase gut microbiota diversity and significantly increasing bacterial genera Mucispirillum and Desulfovibrio.

Conclusion: Mitochondrial dysfunction is associated with changes in the gut microbiota. Endurance exercise moderated some of these changes, establishing that environmental factors can influence gut microbiota despite mitochondrial dysfunction.

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Isolation and characterization of thermophilic Streptomyces sp., with potential production of actinokinase

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The study aimed to produce a potent fibrinolytic enzyme actinokinase from local isolate in batch fermentation, culture of identified thermophilic Streptomyces spp., was grown on glucose yeast extract peptone medium pH of 8.0. The hemolytic activity of the crude enzyme and the time spend for complete lysis was calculated using blood agar media and test tubes containing clotted blood. The time of complete clot lysis in vivo, using the crude actinokinase was found to be faster (20 minutes) compared to the other commercial fibrinolytic enzyme (90 minutes). The enzyme was stable at a broad pH ranging from 5 to 9. The thrombolytic potential of this particular isolate indicated that it could extract a promising actinokinase with potent activity.

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