Department of Biomedical Sciences
presents a seminar series in Cancer Biology,
Biotherapy and Nanomedicine

"Excessive fatty acid oxidation induces muscle atrophy in cancer cachexia"

Dr NG Shyh-Chang
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Date : 19 May 2017
Time: 2:00 pm to 3:30 pm
Venue: Meeting Room 2-130, 1/F, Block 2, To Yuen Building,
City University of Hong Kong

Abstract

Cachexia is a devastating syndrome that occurs in 80% of advanced cancer patients. One of the primary causes of cachexia-associated mortality and morbidity is involuntary muscle wasting. And while many cachexia patients show hypermetabolism, its causative role in muscle wasting had remained unclear. To understand the molecular basis of cachectic muscle wasting, accurate models of cachexia are necessary. Using transcriptomics and cytokine profiling of human muscle stem cell-based models and human cancer-induced cachexia models in mice, we found that cachectic cancer cells secreted many inflammatory factors which rapidly led to higher levels of fatty acid metabolism and the activation of a p38 stress response signature, before the cachectic muscle wasting is manifested. Metabolomics profiling revealed that factors secreted by cachectic cancer cells rapidly induce excessive fatty acid oxidation in human myotubes, leading to oxidative stress, p38 activation, and impaired muscle growth. Pharmacological blockade of fatty acid oxidation not only rescued human myotubes, but also significantly improved muscle mass and total weight in cancer cachexia models in vivo. A hydrogel microsphere formulation of a fatty acid oxidation inhibitor, for localized controlled drug release, could rescue the treated hindlimb, while the untreated limbs underwent muscle wasting. Therefore, fatty acid oxidation could be targeted to treat muscle wasting in cancer cachexia.

About the speaker

Dr Ng's research group is investigating stem cell metabolism during regeneration and aging, particularly in the skeletal muscles. His vision is to use the latest technologies in metabolomics, next-gen sequencing and single-cell microfluidics, to understand how They can modulate metabolic networks to regulate stem cell proliferation and differentiation. This metabolic understanding will have important implications for treating degenerative diseases during human aging.

After his BS graduation of Princeton University in 2008, he obtained a Ph.D in 2013 at Harvard Medical School in Cambridge. He has been a group leader at the Genome Institute of Singapore.

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All are welcome!