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# Singapore invests $17 mn in synthetic biology

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**Singapore:** National University of Singapore (NUS) has taken a new research initiative called the NUS Synthetic Biology for Clinical and Technological Innovation (SynCTI) to develop research capacity and capabilities in the emerging and fast-growing field, which has the potential to be the next engine for economic growth for technologically advanced countries, including Singapore.

Synthetic biology is an interdisciplinary branch of biology, combining disciplines such as biotechnology, evolutionary biology, molecular biology, systems biology, biophysics, computer engineering, and genetic engineering. It involves the creation of complex, biologically based or inspired systems, which display functions that do not exist in nature. Potential applications of synthetic biology include biosensing, therapeutics, and the production of biofuels, pharmaceuticals and novel biomaterials.

The global market for synthetic biology is estimated to be more than $10 billion by 2016. Over the last two years, the Singapore National Research Foundation and Economic Development Board have made concerted efforts to create a conducive environment for synthetic biology to take root and grow in the country by developing local talent in foundational disciplines such as biochemical, metabolic, microbial and genome engineering as well as molecular, structural and systems biology.

Professor Barry Halliwell, internationally acclaimed biochemist and Senior Advisor to NUS President, launched the NUS SynCTI initiative. He said, "Synthetic biology is one of the most promising fields of modern science with far reaching applications, many of which are still undiscovered and unexplored. NUS' strong leadership in translational research stands us in good stead to contribute towards developing Singapore as one of the leading synthetic biology hubs in the world."

NUS SynCTI will be helmed by Associate Professor Matthew Chang, who is a faculty member from the Department of Biochemistry at the NUS Yong Loo Lin School of Medicine. Assoc Prof Chang has been working in the field of synthetic biology for the past 10 years, and has since developed a pioneering approach of reprogramming cells for clinical and

industrial applications.

Established with a total funding of about USD17 million (SGD25 million), SynCTI is a multi-disciplinary programme comprising more than 60 research staff from the University's Faculty of Engineering, Faculty of Science and Yong Loo Lin School of Medicine. SynCTI's work is supported by seven laboratories boasting state-of-the-art equipment, including advanced facilities for Singapore's only Synthetic Biology Foundry, where biological systems are designed and produced for translational research.

The research activities of SynCTI are organised under six themes, namely:
â€¢ Yeast Genome Project: SynCTI is part of an international consortium to synthesise and construct a modified version of the baker's yeast that has new functions and capabilities, paving the way for future breakthroughs, including the making of designer bread and wine.
â€¢ Microbial Cell Factories: Microbial hosts are designed to produce biochemicals, fuels, nutraceuticals and pharmaceutical ingredients from inexpensive renewable raw materials.
â€¢ Therapeutic Cells: SynCTI engineers designer probiotics with prophylactic and therapeutic properties to combat human infectious diseases, immune and metabolic disorders.
â€¢ Bio-Lixiviant Engineering: Microbes are repurposed for the recovery of precious metals, such as gold, from electronic waste, which is a significant and growing problem confronting our society.
â€¢ Mammalian Synthetic Biology: Designer mammalian cells are used in the discovery and production of new medicines.
â€¢ Cell-free & Whole-cell Biosensors: Biosensors are developed for the detection of disease-causing human pathogens, environmental pollutants, heavy metals, and even metabolites from cell factories for applications for the betterment of human civilisations.

SynCTI hopes to train 30 post-graduate and undergraduate students each year and, more than 90 synthetic biologists over the next three years.