

MEDIA RELEASE

For immediate release

Mangosteens could provide new cure for TB

The fruit contains xanthenes, a natural compound with antioxidant and antibacterial properties, which has been found to be effective against common and multi-drug resistant strains of tuberculosis (TB).

Singapore, 23 March 2017 – A study by researchers from the National University of Singapore's Yong Loo Lin School of Medicine (NUS Medicine) has uncovered that *xanthenes* in mangosteens could provide a suitable new drug in the fight against tuberculosis. The study published in the European Journal of Medicinal Chemistry found that *xanthenes* were very effective at inhibiting and killing *Mycobacterium tuberculosis (Mtb)*, the bacterium responsible for causing TB. Carried out under the Singapore Programme of Research Investigating New Approaches to Treatment of Tuberculosis (SPRINT-TB), a multi-party programme based in Singapore, the study also demonstrated that xanthenes had a low propensity for developing drug resistance, making it a promising candidate in developing anti-TB drugs.

TB is an infectious disease affecting an estimated 8.6 million people globally and is responsible for some 1.3 million deaths annually. Developed nations in Europe and North America have reduced TB rates of between 5 and 10 per 100,000 people each year compared to Singapore, which sees over 40 cases per 100,000 people. Asia accounts for 59% of the world's TB cases¹. A rapidly ageing population and the prevalence of diseases such as diabetes also contribute to the high incidence of TB cases, as compromised immune systems make the aged more susceptible to infections. Many elderly TB patients could also have been latently infected when the disease was far more prevalent in the past, with the infection reactivating as they age.

Earlier studies in Singapore using mangosteen fruit extracts found that *xanthenes* were effective against bacterial infections such as *Staphylococcus*². This prompted the researchers to investigate the potential for this class of compounds in tackling multi-drug resistant TB bacteria.

¹ World Health Organization (2016). Global Tuberculosis Report 2016. Retrieved from http://www.who.int/tb/publications/global_report/en/

² Biochim Biophys Acta. 2013 Feb;1828(2):834-44. doi: 10.1016/j.bbame.2012.09.004. Epub 2012 Sep 13. Rapid bactericidal action of alpha-mangostin against MRSA as an outcome of membrane targeting. Koh JJ1, Qiu S, Zou H, Lakshminarayanan R, Li J, Zhou X, Tang C, Saraswathi P, Verma C, Tan DT, Tan AL, Liu S, Beuerman RW.

“We discovered that xanthonones are effective in killing off persistent strains of bacteria, a property that could result in treatment shortening therapies,” said head of SPRINT-TB Professor Nicholas Paton, Division of Infectious Diseases, NUS Medicine, a member of the National University Health System (NUHS). “The discovery of this new potential TB drug candidate is significant; aside from two new drugs approved in recent years for multidrug-resistant TB, the disease had not seen new drug developments in over 40 years. Using a proven antibacterial compound like *xanthonones* means we do not have to re-invent the wheel by searching for and testing totally new compounds.”

The fight against TB is an uphill struggle. Common strains of TB have developed multi-drug resistance, rendering existing drugs ineffective against the disease. There is also a worryingly low number of potential new chemical entities in the TB drug pipeline at present. With patients facing a daunting treatment regimen lasting six months or more, xanthonones could prove an attractive option in tackling multi-drug resistant TB.

“The average TB patient currently expects to undergo six to 24 months of tedious treatment. *Xanthonones* offer a realistic avenue towards developing new and more effective drugs for TB with potentially shortened treatment times as well. All these factors can help in reducing the disease burden faced by Singapore’s ageing population, as well as treatment costs incurred by patients and their families” said Associate Professor Thomas Dick, the study’s principal investigator and head of the Antibacterial Drug Discovery Laboratory and Director of the Biosafety-level 3 (BSL-3) Core Facility at NUS Medicine.

While laboratory and preclinical testing on xanthonones will take at least several more years, the discovery of its efficacy against the disease is a step in the right direction for TB research. SPRINT-TB is also working with BSL-3 to speed up the investigation into xanthonones and other potential TB treatment methods.

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About SPRINT-TB

SPRINT-TB (Singapore Programme of Research Investigating New Approaches to Treatment of Tuberculosis) is a leading research programme focused on creating new improved treatments for tuberculosis. It commenced in 2014 and spans areas from mycobacterial target discovery and drug development to clinical trials and treatment delivery.

SPRINT-TB is based at National University of Singapore (NUS), with collaborations extending to academic and industry partners in Singapore, Asia, Europe, and USA. The programme is led by Professor Nicholas Paton, and is overseen by the Scientific Advisory Board.

For more information, please visit <http://www.sprinttb.org/>

About the NUS Yong Loo Lin School of Medicine

Established in 1905, the NUS Yong Loo Lin School of Medicine is the first institution of higher learning in Singapore and the genesis of the National University of Singapore.

The School offers one of the finest medical undergraduate programmes in the Asia-Pacific region and commands international recognition and respect. The Times Higher Education World University Rankings 2016 by subject and Quacquarelli Symonds (QS) World University Rankings by Subject 2016 list NUS Medicine as Asia's leading medical school.

It admits 300 students to the MBBS degree programme annually and its principal missions are to educate and train the next generation of healthcare professionals, and foster research that will help to advance the practice of medicine.

The 18 NUS Medicine departments in the basic sciences and clinical specialties work closely with the Centre for Medical Education, the Centre for Biomedical Ethics, the Centre for Healthcare Simulation as well as the restructured public hospitals to ensure that teaching and research are aligned and relevant to Singapore's healthcare needs. The School is a founding institutional member of the National University Health System.

For more information, please visit <http://nusmedicine.nus.edu.sg/>

About the National University Health System (NUHS)

The National University Health System (NUHS) is an integrated Academic Health System and Regional Health System in Singapore that delivers value-driven, innovative and sustainable healthcare.

Institutions in the NUHS group include one tertiary hospital - National University Hospital (NUH); three National Specialty Centres - National University Cancer Institute, Singapore (NCIS), National University Heart Centre, Singapore (NUHCS) and National University Centre for Oral Health, Singapore (NUCOHS); and three academic health sciences institutions - National University of Singapore (NUS) Yong Loo Lin School of Medicine, NUS Faculty of Dentistry and NUS Saw Swee Hock School of Public Health.

With member institutions under a common governance structure, NUHS creates synergies for the advancement of health by integrating patient care, health science education and biomedical research.

As a Regional Health System, NUHS works closely with health and social care partners in the public, private and people sectors to develop and implement programmes that contribute to a healthy and engaged population in the Western part of Singapore.

For more information, please visit <http://www.nuhs.edu.sg/>