MEDIA RELEASE
FOR IMMEDIATE RELEASE

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MISSING PROTEIN EXPLAINS LINK BETWEEN OBESITY AND DIABETES
A*STAR scientists pioneered a molecular connection between the two health conditions

Singapore, 30 June 2014—Scientists from the Institute of Molecular and Cell Biology (IMCB), a research institute under the Agency for Science, Technology and Research (A*STAR), have discovered that obese individuals lack a protein that is essential for regulating blood glucose levels, causing them to face higher risks of developing diabetes. The protein is one of the first molecular links found between obesity to diabetes and is potentially a target for treatment or prevention of diabetes in obese individuals.

Obesity and diabetes are two common health problems faced today. Based on a recent analysis reported in The Lancet medical journal, nearly a third of the world’s population is obese or overweight. In Singapore, one in nine Singaporeans is obese and the situation is becoming more prevalent with an increase of one percent each year. Obesity inflates the risks of diabetes, which already affects more than 11 percent of the country’s population. While statistics indicate a link between the two conditions, the mechanism of how obesity leads to diabetes has always been unclear.

How Diabetes Develops from Obesity in the Absence of NUCKS Protein
In the latest study reported in Cell Reports journal online, researchers at IMCB discovered that a protein, called NUCKS, is missing in obese individuals. The NUCKS protein is a key player in insulin signalling, an important biochemical

1 http://www.ipsnews.net/2014/05/nearly-one-third-of-worlds-population-is-overweight/
3 Nuclear Ubiquitous Casein and cyclin-dependent Kinase Substrate
pathway that is needed to respond to insulin hormones, which promote the uptake of glucose to regulate blood glucose levels. Without NUCKS, obese individuals develop insulin resistance and are unable to regulate their blood glucose levels effectively. This causes their bodies to constantly experience high levels of blood glucose, making them more susceptible to developing diabetes. These findings were supported by Singapore Bioimaging Consortium’s (SBIC) cutting-edge bioimaging and metabolic profiling technologies, for identifying the parameters for obesity and diabetes.

The NUCKS protein is an important clue for controlling diabetes development in obese individuals. It is the first direct molecular link found between the two health conditions and will open up new areas of research to identify drugs and explore lifestyle changes, such as dietary habits and exercises that could restore the level of NUCKS in the body.

Dr Vinay Tergaonkar, Principal Investigator at IMCB and the lead scientist for the study, said, “It is alarming that obesity is a huge risk factor for many ailments, including diabetes. Having identified this protein, we are now a step closer towards removing one of these complications from individuals suffering from obesity.”

“The world is paying a lot of attention to diabetes. Every year, billions of dollars are spent on metabolic diseases and a big part of the expenditure goes to the drugs for diabetes. The findings in our study have immense therapeutic implications as they will be applicable not only to diabetes in obesity, but also to diabetes as a whole,” Dr Tergaonkar added.

Professor Hong Wanjin, Executive Director at IMCB, said, “IMCB is now focusing research on molecular mechanisms underlying diseases, which is important in developing future treatments for prevailing human diseases. We are excited to be a pioneer in uncovering a molecular link between these two common health problems. The incidence of metabolic disorders such as diabetes and obesity has been rising over the years, and these findings will prove valuable in further developing therapeutic approaches for them.”

Notes to Editor:

The research findings described in this media release can be found in the Cell Reports Journal, under the title, “NUCKS is a positive transcriptional regulator of insulin signaling” by Beiying Qiu\textsuperscript{1,7}, Xiaohe Shi\textsuperscript{2,7}, Ee Tsin Wong\textsuperscript{1,7}, Joy Lim\textsuperscript{2},
Marco Bezzi¹, Diana Low¹, Qiling Zhou¹, Semih Can Akıncılar¹, Manikandan Lakshmanan¹, Hannah L.F. Swa¹, Jill Mae Lan Tham¹, Jayantha Gunaratne¹, Kenneth K. Y. Cheng³, Wanjin Hong¹, Karen S. L. Lam³, Masahito Ikawa⁴, Ernesto Guccione¹, Aimin Xu³,⁵, Weiping Han²,⁶, Vinay Tergaonkar¹,⁶

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Full text of the Cell Reports paper can be accessed online from: http://www.cell.com/cell-reports/pdf/S2211-1247(14)00424-0.pdf

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About the Institute of Molecular and Cell Biology (IMCB)

The Institute of Molecular and Cell Biology (IMCB) was launched on 23 January 1985, with its official opening ceremony held on 2 October 1987 at the National University of Singapore (NUS). It subsequently became an autonomous research institute (RI) of A*STAR, moving to Biopolis in 2004. IMCB’s vision is to be a premier cell and molecular biology institute which addresses the mechanistic basis of human diseases and its mission is to conduct cutting-edge discovery research in disease pathways; to groom early career researchers to be future leaders in research; and to collaborate with medical and industry communities for research impact. IMCB plays an important role training and recruiting scientific talents, and has contributed to the development of other research entities in
Singapore. Its success in fostering a biomedical research culture in Singapore has catalysed Singapore’s transformation into an international hub for biomedical research, development and innovation.

Funded primarily by the Biomedical Research Council (BMRC) of A*STAR, IMCB’s current discovery research includes cell biology in health and disease; animal models of development & disease; cancer & stem cell genetics & genomics; and structural biology & drug discovery. IMCB’s translational research includes humanised model organisms for human diseases; systems approach for disease target identification & validation; and protein engineering & antibody development for diagnostics & therapeutics. Research activities in IMCB are supported by cutting edge infrastructure and facilities including quantitative proteomics; humanised mice; mouse models of human cancer; protein crystallography X-ray; zebrafish for drug metabolism & toxicology; advanced molecular histopathology; imaging & electron microscopy; and DNA sequencing.

For more information about IMCB, visit www.imcb.a-star.edu.sg.

**About the Agency for Science, Technology and Research (A*STAR)**

The Agency for Science, Technology and Research (A*STAR) is Singapore’s lead public sector agency that fosters world-class scientific research and talent to drive economic growth and transform Singapore into a vibrant knowledge-based and innovation driven economy.

In line with its mission-oriented mandate, A*STAR spearheads research and development in fields that are essential to growing Singapore’s manufacturing sector and catalysing new growth industries. A*STAR supports these economic clusters by providing intellectual, human and industrial capital to its partners in industry.

A*STAR oversees 18 biomedical sciences and physical sciences and engineering research entities, located in Biopolis and Fusionopolis, as well as their vicinity. These two R&D hubs house a bustling and diverse community of local and international research scientists and engineers from A*STAR’s research entities as well as a growing number of corporate laboratories.

For more information on A*STAR, please visit www.a-star.edu.sg.