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Targeting the obesity-cancer link via adipose tissue inflammation

Neil M Iyengar
Memorial Sloan Kettering Cancer Center, USA

The rates of obesity are rapidly rising worldwide. Obesity is now a leading cause of cancer incidence and mortality. One in five female and one in seven male cancer deaths are attributable to obesity. My research program is focused on the development of precision medicine-driven interventions to prevent obesity-related cancers and improve outcomes. Our team was the first to demonstrate that inflammation of breast white adipose tissue (WAT) occurs in association with obesity and is detected by the presence of crown-like structures (CLS). Consisting of a dead or dying adipocyte surrounded by macrophages, CLS are associated with increased levels of proinflammatory mediators and locally enhanced estrogen signaling, which directly promotes tumorigenesis. Additionally, we have discovered WAT inflammation at other organ sites, including the tongue and prostate, suggesting that adipose inflammation and its systemic effects have a role in the development of several cancers. Alarmingly, we have also identified WAT inflammation and its associated metabolic alterations in one third of lean women. It is particularly important to develop tools that identify this cohort of at-risk individuals, given their healthy appearance. The identification of these biologic processes underlying the obesity-cancer link has allowed us to begin developing novel and exciting interventions to combat the ill effects of obesity. This new mechanism-based understanding of the ways by which obesity promotes cancer is poised to transform the way we prevent and treat cancer.

iyengarn@mskcc.org

Converging fields-microbial forensics, epidemiology and biosurveillance are key to resolving investigations of questionable infectious disease outbreaks

Randall S Murch
Virginia Tech University, USA

From the origin in 1996 of the U.S. program for the forensic and law enforcement investigation of suspicious and actual bioterrorism events, it was recognized by the Federal Bureau of Investigation and Centers for Disease Control that law enforcement and public health must work together closely to resolve whether or not questionable infectious disease outbreaks were or a natural, accidental or deliberate origin. Today, in the U.S. and elsewhere, law enforcement and public health closely coordinate their efforts in many ways, routinely and during crises. There are three key scientific contributors to informing processes and decisions in these events: microbial forensics, infectious disease epidemiology and infectious disease biosurveillance. For both law enforcement and public health, decisions can be informed by all three sources. Microbial forensics, supported by traditional forensics, seeks to identify evidence, and extract as much information of value to investigators and Government officials as possible, leading to the determination of whether a crime has been committed and identifying who was responsible so that legal action can occur. Epidemiology seeks to identify the causative agent and pathways and source of the outbreak so that public health measures can be instituted to manage and minimize the effects on populations and society. Biosurveillance monitors routine disease background as well as identifies eruptive events of note that require further investigation. All three should be leveraged to inform actions and decision making. The dynamics between these fields will be discussed and scenarios will be used to illustrate the interactions.

rmurch@vt.edu