FOR IMMEDIATE RELEASE
March 20, 2025

A High-Fat Diet May Impair Response to Infection

A new study in *The Journal of Immunology* reveals how a high-fat diet may impair the immune system's ability to respond to infection by impacting the function of neutrophils, one of the first immune cells to respond to bacteria or viruses. The study demonstrated that male mice fed a high-fat diet (HFD) to induce obesity had increased neutrophil numbers. Despite increased numbers, the neutrophils present exhibited the markers of either immature or aged cells and showed an impaired ability to kill bacteria.

The prevalence of obesity in American adults is 40.3%. Obesity can be diet-induced over time when a person consumes more calories than they use, exacerbated by a diet high in fat and/or sugar. In recent years, obesity has come to be associated with chronic, low-grade inflammation, which contributes to obesity-related diseases, including increased susceptibility to infection.

The link between chronic inflammation and increased infections emphasizes the need to uncover the impact of obesity on immune cells such as neutrophils. "We hope that by understanding how neutrophil function is altered with exposure to high fat diet, we can take future steps to restore function and improve patient health outcomes," shared Dr. Kanakadurga Singer, Associate Professor for Departments of Pediatrics and Molecular & Integrative Physiology at the University of Michigan Medical School, who led the study.

"We hope this study lets investigators and clinicians know that although neutrophils may be increased in number in individuals with elevated BMI or diet-induced obesity, these neutrophils may not be functional," said Dr. Singer.

In this study, male mice were fed a normal diet or HFD in a model known to induce obesity. Neutrophils were isolated from the blood and bone marrow and compared between the two diet groups. Researchers found that HFD impaired bone marrow neutrophil's ability to store and release TNF-alpha, an immune signal important for regulating inflammation. Neutrophils from HFD mice expressed different genes involved in fat storage and metabolism than normal diet mice. When neutrophils were exposed to *Pseudomonas aeruginosa*, a bacterium that can cause pneumonia, HFD-fed neutrophils were found to have a reduced capacity to ingest and kill bacteria. Altogether, these results indicate that diet-induced obesity can have a range of impacts on immune cells, affecting their ability to properly function.

"We hope to build on these findings by uncovering what is causing the impairment of neutrophils exposed to HFD. My team plans to conduct further studies on why these neutrophils are defective, especially in their bacterial killing function, and if these neutrophils are impaired in killing specific

types of bacteria or a wide range. Hopefully, we can identify other implications of neutrophil dysfunction due to HFD and if there are ways to improve this impaired function," shared Dr. Singer.

The research article is available on *The Journal of Immunology* website, or you can read more on AAI's News site.

Requests for interviews with authors, *The Journal of Immunology*, or the American Association of Immunologists can be made to kpalmer@aai.org.

About The American Association of Immunologists
The American Association of Immunologists (AAI) is one of the world's largest organizations of immunologists and scientists in related disciplines. Our mission is to improve global health and well-being by advancing immunology and elevating public understanding of the immune system. AAI members are responsible for some of the most significant biomedical discoveries of the past century, including the development of life-saving cancer immunotherapies, antibody therapies, transplant technologies, and vaccines. We support scientists across the field of immunology through knowledge dissemination, community building, advocacy, and public outreach.

About *The Journal of Immunology*
The Journal of Immunology (*The JI*) publishes peer-reviewed manuscripts describing novel findings in all areas of experimental immunology, including both basic and clinical studies. *The JI* is owned by the American Association of Immunologists and published in partnership with Oxford University Press.

Contact Information
Katherine Palmer, MPH
Communications Manager
301-634-7823

kpalmer@aai.org