

## **National Institute of Diabetes and Digestive and Kidney Diseases: Understanding Anemia of Inflammation and Chronic Disease**

*NIH-supported investigators have identified mechanisms underlying disturbances of iron balance that cause “anemia of inflammation and chronic disease” (AICD), a common and debilitating form of anemia in older people. These research findings have laid the groundwork for developing novel therapeutic drugs with which to effectively treat this common type of anemia in the elderly.*

### **Lead Agency:**

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)/  
National Institutes of Health (NIH)

### **Agency Mission:**

- Conduct and support basic, clinical, and translational research on diseases of internal medicine and related subspecialty fields, including diabetes and other endocrine and metabolic diseases; liver and other digestive diseases; nutritional disorders; obesity; kidney and urologic diseases; and hematologic diseases; as well as fundamental research in many basic science disciplines.
- Foster research training and mentoring at multiple career stages to maintain pipeline of outstanding investigators in these research fields.
- Disseminate science-based knowledge gained from NIDDK-funded research to health care providers and the public through outreach and communications.

### **Principal Investigator:**

Tomas Ganz, MD, PhD  
Division of Pulmonary and Critical Care Medicine  
David Geffen School of Medicine at UCLA  
37-055 Center for Health Sciences  
10833 Le Conte Avenue  
Los Angeles, CA 90095-1690

### **Partner Agency:**

National Heart Lung and Blood Institute

### **General Description:**

#### **Understanding Anemia of Inflammation and Chronic Disease**

Many chronic diseases and inflammatory conditions are associated with anemia (abnormally decreased numbers of circulating red blood cells). This type of anemia has been called “anemia of inflammation and chronic disease” (AICD) and is characterized by disturbances in iron metabolism that impair red blood cell production. AICD is particularly common among the elderly, and it can seriously limit not only the function and quality of life but also the longevity of those affected. Until recently, the underlying

cause of disturbed iron metabolism in AICD was unknown and a longstanding unsolved mystery in medicine. Research supported by the NIH identified *Hepcidin* (a small molecule hormone produced by the liver) as a central regulator of iron balance in humans. This research has also determined the mechanisms by which *Hepcidin* negatively regulates the transport of iron into the blood stream from the GI tract, where dietary iron is absorbed, and from tissue sites where recycled iron is stored. Moreover, this research has defined signaling pathways by which *Hepcidin* production in the liver is regulated, including those responsible for the abnormally elevated circulating levels of *Hepcidin* that are now recognized to be hallmarks of AICD. This research has not only provided new insights into the causes of AICD and anemia of the elderly, but has also laid the groundwork for the development of novel therapeutic drugs that may provide the means to effectively treat AICD and anemia of the elderly in the future.

***Excellence:*** What makes this research exceptional?

By determining the cause of AICD, a very common form of anemia, this research has not only solved a longstanding medical mystery, it has provided the basis for developing new effective treatments for this form of anemia, which is particularly common and debilitating in elderly people.

***Significance:*** How is this research relevant to older persons, populations and/or an aging society?

Analysis of the most recent National Health and Nutrition Examination Survey (NHANES III) data indicates that approximately 10 per cent of all non-hospitalized men and women older than 65 in the United States anemic and that a substantial proportion of these have laboratory evidence of AICD as the cause of anemia. This research has not only defined the underlying mechanisms for this common form of anemia, it has also provided the basis for developing novel, effective treatments.

***Effectiveness:*** What is the impact and/or application of this research to older persons?

Further research is now underway to realize the promise of this basic research with respect to developing new and more effective approaches to detect, prevent, and treat AICD, a common and debilitating form of anemia among the elderly.

***Innovativeness:*** Why is this research exciting or newsworthy?

Effective approaches for accurately detecting and effectively preventing or treating the so-called “anemia of inflammation and chronic disease” (AICD) have the potential to positively affect the quality of life and longevity of millions of Americans. This research has provided for the first time a clear path forward to achieve these goals.