CONTENTS

Web Exclusive: The Biology of Cancer and Aging

BY ELIZABETH WHITTINGTON

People 65 years or older are 10 times more likely to develop cancer than younger people, and the mortality rate for older cancer patients is 16 times greater than the rate for those under 65. The risk of certain cancers tends to increase with age, and includes breast, prostate and colon cancers. Some cancers are also more aggressive as one gets older, including certain types of leukemia and lymphomas, while others, such as breast and prostate cancers, are slower growing.

Several studies are examining the correlation between aging and cancer. One preclinical study found that the lack of a specific gene responsible for repairing damaged DNA can cause the body to age, possibly prematurely. Scientists responsible for the mouse study say the findings weren't unexpected since DNA damage is known to cause cancer. DNA can be damaged by stress on the body, carcinogens or just the wear-and-tear of constant cell growth and death, and without functioning DNA repair genes, the damage can lead to cancer.

Scientists say the accumulation of DNA damage causes typical aging characteristics, but how we respond to that damage is mostly determined by genes, including those responsible for growth hormone pathways, which contribute to cell growth and development. As we get older, those hormone levels go down, contributing to decreased muscle mass and bone density, resulting in sarcopenia, osteoporosis and increased bone breaks. Other factors that contribute to aging and cancer risk are environmental factors and lifestyle habits, such as choosing not to smoke or eating a healthy diet.

Another theory is that healthy cells do not infinitely divide and replicate. Most adult cells are believed to have a set number of times it can divide (between 50 to 70 times), and regions of DNA called telomeres located on the ends of chromosomes get progressively shorter after each replication. (Young cells have an enzyme called telomerase that prevents telomeres from becoming shorter for several cycles). Once the telomeres become "too short," the cell stops dividing. The shortened telomeres have also been associated with cancer and increased risk of death. When a cell becomes pre-cancerous, it may divide quickly, and consequently its telomeres become shorter. When it becomes a cancer cell, it activates the telomerase enzyme to prevent the telomere from becoming any shorter. Research has found shortened telomeres in many cancers, including pancreatic, prostate, bladder and lung cancers.