**NEWS IN BRIEF**

**PEOPLE**

**Bill Anderson** was named CEO of Genentech, a member of the Roche Group, earlier this year after 10 years in various leadership positions at the company. He replaces Ian T. Clark, who retired at the end of 2016 after 14 years of service. Anderson, who is also the head of North American commercial operations, most recently served as the head of Global Product Strategy.

**Eric Fearon, MD, PhD,** was named director of the University of Michigan Comprehensive Cancer Center in Ann Arbor last fall. He succeeds Theodore Lawrence, MD, PhD, who will continue to chair the university’s department of radiation oncology.

Fearon is a nationally recognized investigator in cancer genetics. His research has led to a greater understanding of gene defects that cause colorectal cancers to spread and develop. In addition to serving as division chief for Molecular Medicine and Genetics, he assumed the role of deputy director of the cancer center in 2005.

After a 2-year stint as chairman and CEO of the Massachusetts General Hospital (MGH) Physicians Organization in Boston and a member of the MGH Board of Directors, **Thomas J. Lynch Jr., MD,** was named chief scientific officer at Bristol-Myers Squibb. Prior to moving to MGH, Lynch directed the Yale Cancer Center in New Haven, CT, from 2009–2015. He also served as physician-in-chief of Yale New Haven Health Smilow Cancer Hospital.

While at MGH earlier in his career, Lynch was part of the team credited with discovering that certain genetic mutations in patients with lung cancer caused therapies to work in some people but not others.

**Of Cancer and Random Mutations**

Two years ago, researchers from Johns Hopkins School of Medicine in Baltimore, MD, reported a strong correlation between the number of stem-cell divisions and lifetime risk of cancer in 31 tissue types (Science 2015;347:78–81). This correlation accounted for roughly two thirds of the variation in cancer risk across these tissues, they calculated: The more frequently stem cells divide, the greater their likelihood of accumulating random mutations that may induce malignant transformation.

As such, Cristian Tomasetti, PhD, and Bert Vogelstein, MD, co-directors of the Ludwig Center for Cancer Genetics and Therapeutics, called for adding a replicative (R) component to the duet of environment (E) and heredity (H)—this trio, they said, is responsible for all mutations that occur in cancer.

The scientists have since expanded their original study, which was limited to the United States (Science 2017;355:1330–4). Using data from 423 cancer registries, spanning 69 countries and 17 tissue types, they once again found a convincing association between stem-cell division rates and lifetime cancer risk. In both studies, the median correlation coefficient was almost identical: approximately 0.80. Tomasetti also notes that two common cancers previously not on the list—breast and prostate—are included in the new analysis.

Next, “we sought to determine what fraction of cancer-causing mutations results from R, E, or H, which hadn’t been done before,” Vogelstein says. To accomplish this, the researchers developed a mathematical approach based on integrating genome-wide sequencing information from The Cancer Genome Atlas with epidemiologic data from Cancer Research UK.

Applying their method to 32 different cancers, Tomasetti and Vogelstein calculated that overall 66% of driver mutations were due to R, 29% to E, and 5% to H. These percentages varied by tissue type, however. For instance, although the majority of lung adenocarcinoma cases can be traced to E—chiefly tobacco smoke—the team calculated that 35% of mutations in this cancer were still due to R. Meanwhile, R contributed to 77% of mutations in pancreatic adenocarcinoma, and to fully 95% of mutations driving prostate adenocarcinoma as well as “virtually every childhood cancer,” Vogelstein says.

This study “point[s] to a clear need for a precise mathematical understanding of cancer,” observed Martin Nowak, PhD, and Bartłomiej Waclaw, PhD—of Harvard University in Cambridge, MA; and Edinburgh University, UK, respectively—in an accompanying perspective (Science 2017;355:1266–7). The findings “[do] not stand in contradiction with many cancers being preventable,” they noted: This disease usually involves more than one mutation, so a hypothetical cancer that requires two mutations to develop can still be prevented if one is due to R and the other to an avoidable E factor.

In other words, cancer etiology and cancer preventability aren’t equivalent concepts, Tomasetti and Vogelstein emphasize. Because random mutations are also a driving force of evolution, “in a way, cancer is the price we pay for our long-term survival as a species,” Vogelstein adds.

The researchers envision improvements in liquid biopsy and new imaging modalities enabling earlier detection of R mutations. Pharmacologically disrupting mutation sources, which include endogenously produced reactive oxygen species or other metabolites, may be another possibility.

“Strategies to potentially limit the damage of these mutations have been vastly underresearched and underfunded,” Vogelstein says. “We hope this will change.” —Alissa Poh

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