

# Letter to the Editor: The Pundit Speaks

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## “Many Cancers Due to “Bad Luck” Mutations”

For decades we have been told, "Nearly half of cancers diagnosed each year are caused by avoidable life choices including smoking, drinking and eating the wrong things." For example, in the UK, tobacco is the biggest culprit, causing 23% of cases in men and 15.6% in women. Additionally, prolonged periods of inactivity (sedentary jobs or hobbies) is the new equivalent of smoking when it comes to cancer causation. Also, high on the causation list is a lack of fresh fruit and vegetables in men's diets, while for women it is being overweight. New predictions are now saying, "More than half of all people born in 1960 will develop cancer at some point in their lives. This new estimate replaces the previous figure, calculated using a different method, which predicted that more than one in three people would develop cancer at some point in their lives." The increase in lifetime risk is believed to be primarily because more people are surviving into old age, where cancer is more common. In 2014, the media went into a frenzy over a research article in *Science* that suggested that many cancer types can be chalked up to random mutations, or simply "bad luck." The same authors have now published a second study that supports their earlier conclusions, in which the researchers analyzed genome sequencing and epidemiologic data from 32 cancer types and concluded that DNA replication errors (R) are responsible for about two thirds (65%) of the mutations in human cancers. A Johns Hopkins expert said, "This is a complete paradigm shift in how we think of cancer." Most textbooks attribute cancer-causing mutations to two major sources: inherited and environmental factors. These new studies highlight the prominent role of DNA replication errors (R) mutations in cancer. These mutations arise from a third source: unavoidable errors (bad luck) associated with DNA replication. Still, Johns Hopkins experts emphasized that their findings are consistent with epidemiologic studies suggesting that about 40% of cancers can be prevented by changes in the environment. Apparently, these new findings do not negate the importance of factors such as diet, exercise, and smoking, which contribute to cancer development. They said, "Mutations are unavoidable, and cancers to some extent are unavoidable. But, it doesn't mean that we should add to that by smoking or exposure to other noxious influences." The bottom line is that many people will develop cancers because of these random DNA copying errors, regardless of environmental factors.

In the America that I love, growing older is the biggest cancer risk factor and that is something we cannot avoid. Nonetheless, this “bad luck” component appears to explain a far greater number of cancers than do hereditary and environmental factors. Stay tuned.

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