Could There Be a Cancer Moonshot to Prevent Cancer?

Even the healthiest lifestyle can't prevent every cancer. But implementing prevention guidelines could prevent 4 out of 10 U.S. cases.

March 10, 2022 By Nigel Brockton

President Biden has reignited the Cancer Moonshot initiative with the bold goal of reducing death rate from cancer by 50%. The creation of a cancer cabinet to oversee such a complex and ambitious initiative is particularly welcome and appreciated. However, it is disappointing that President Biden claimed in his speech that "we know cancer as a disease we have few good ways to prevent."

This sentiment disregards 40 years of progress in cancer prevention research that clearly demonstrates that approximately 40% of cancers in the United States are preventable with the scientific knowledge that we have right now. One reason for this disconnect may be the challenge of communicating individual risk reduction and population-level prevention in a way that empowers governments versus individuals to make effective choices regarding cancer risk and prevention.

Almost one in two men and one in three women will be diagnosed with cancer in their lifetime, in the United States. We are all at risk of cancer, but understanding and communicating cancer risk can be difficult. So how do we make sense of that risk?

Why do some people with healthy lifestyles develop cancer, while others, who do all the things that we are told not to, don't?

Cancer risk is like a bathtub

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We can think of cancer risk as the water in a vintage claw-foot bathtub. The faucet that fills this bathtub can never quite be turned off, and, in that behavior, it mimics the trickling accumulation of cancer-causing genetic damage over a lifetime. As we go about our lives, our cancer risk bathtub fills up.

Nobody is born with an empty bathtub, and we all start with our bathtubs filled at different levels. For example, inherited risk factors can be thought of as starting life with an already partially filled tub.

As we age, if our water level stays below the brim of the bathtub, we end up avoiding cancer. However, if the water reaches the top and overflows, it's a different story. This tipping point represents the fundamental defining feature of cancer: the ability to escape, invade its surroundings and wreak its havoc.

Cancer also has a random spontaneous element to it that we can think of as a wonky leg on the vintage bathtub; our bathtubs are all a bit unstable. Since we all have some water in our cancer risk bathtub, a chance push in the wrong direction can cause water to escape even when nowhere near full. We are all at risk for these chance events, but keeping our water level as low as possible

helps reduce the chances that such disturbances will cause water to escape.

Although the faucet can never be fully turned off and the wonky leg can never be fixed, the flow from the faucet is at least partially under our control. The more cancer risk factors that we expose ourselves to, the higher the flow rate and the faster our bathtubs fill. Conversely, the more healthy choices that we make, the slower that rate. Some additional choices, such as screening and vaccinations, even allow us to safely let off some water.

The peak age of cancer incidence is in the seventh and eighth decades of life, but there is a marked increase in cancer rates, for both men and women, in their 50s. So following the bathtub analogy, our bathtubs are already getting pretty full by our 50s.

Many chronic conditions have reliable clinical markers to alert clinicians to disease development, but for cancer, these are much less evident. Screening for premalignant disease is available but only for relatively few cancer sites. Multifactor risk assessments based on lifestyle factors, age, genetics and gender may provide some clues, but most of these are, like screening, validated only for individual cancer sites. And although we often refer to cancer as one disease, cancer is really a collection of over 200 diseases, each with different risk factor profiles. In short, we often don't know how full our tub is until things are close to overflowing.

How do we stop our bathtubs from filling up?
For best results, start early, but it is also never too late! For most people in the earlier decades of their lives, cancer is a distant and abstract specter. It's something that happens to other people and is seldom a driver of everyday lifestyle choices. However, those lifestyle choices control how fast our bathtub fills up. So while it's never too late to make changes, it's also never too early to think about how your lifestyle might be filling your cancer risk bathtub.

In the last 40 years, cancer prevention has been transformed; evidence-based lifestyle recommendations, tobacco cessation, screening and vaccinations mean that we have effective tools at our disposal.

Screening for various cancer types can identify precancerous growths or early-stage tumors. Treating these is akin to catching that bathtub just as it begins to overflow, and that is much easier to control than arriving on the scene too late! This approach can only address the cancers that are detectable through screening, though.

Combining screening and vaccinations with following evidence-based cancer prevention recommendations, which address the strongest cancer risk factors, offers the most effective and feasible cancer prevention strategy. The American Institute for Cancer Research proposed such rigorous, evidence-based guidelines over 25 years ago. It has refined them twice (in 2007 and 2018), and recent research clearly demonstrates the significant impact that following these recommendations has on cancer risk and outcomes after diagnosis.

Cancer prevention, however, should not be the sole responsibility of the individual. Individuals making healthier choices can reduce how quickly their own bathtubs fill up, but implementing policies relevant to cancer risk factors, including diet, physical activity and obesity, would “lower the pressure in the system” and make it easier for everyone to make healthy choices to slow the flow into our tubs.

Risk reduction versus prevention

Finally, the term “cancer prevention” has attracted justifiable criticism, particularly from cancer patients and survivors, because it can insinuate that a person could have prevented their cancer. The bathtub analogy makes it clear that there is always a cancer risk. Since there is always water and there is always instability, accidents do happen. At an individual level, following all relevant lifestyle and health-related recommendations will reduce our cancer risk but cannot guarantee cancer prevention.

However, at a population level, implementing all of the current cancer prevention recommendations and relevant effective health-related choices would prevent 4 out of 10 cancer cases in the United States.

We already have several good ways to prevent cancer; by disregarding those, we may miss the moon by chasing the stars.

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