

large numbers of individuals who, when provided with accurate risk prediction, will change their behavior to mitigate their personal risk. Although this may seem intuitively plausible, current data suggest that individuals do not change their behavior much even when they become aware of being in a high-risk group.<sup>3</sup>

Overemphasis on precision medicine by the scientific community and health systems could pose a challenge to the health of populations for other reasons. First, the United States faces extraordinary challenges to the health of its population. Over the past 30 years, the United States has fallen behind other high-income peer nations in health attainment on many metrics, including life expectancy and infant mortality, and there are persistent gaps in health outcomes by income and race/ethnicity.<sup>4</sup> The solution to these challenges is probably not an increased focus on the individual, but rather involves focusing on the social, economic, and structural drivers of population health that are ubiquitous and inevitably linked to health achievement as a country. The centrality of the precision medicine effort to the US national health research agenda may distract from efforts to remedy the foundational causes of ill health such as poverty, obesity, and education. Without addressing these causes, there will be little, if any, success in reversing the trends of poor achievement in US population health.

Second, precision medicine could (and to some extent has) led to a shift from which projects are funded by health research agencies. Funding for grants with a population health or public health goal has declined over the past 10 years at the National Institutes of Health, whereas funding for *-omic* research has increased substantially. This shift in funding may lead to an emerging generation of health scientists who see the world through an individualist lens and may not engage in factors that can improve the health of populations.

Third, the promise of precision medicine may lead to other promises such as the recently announced cancer “moonshot,” which may echo previous efforts that have not lived up to expectations. The hype, which could become unrealized health benefits, could lead to disillusionment in the goals of health science, with potential lasting consequences affecting public confidence and investment in medical research.

## Precision Medicine Can Improve Population Health

By contrast, there are 3 fundamental reasons that advances in precision medicine might improve population health. First, population health could improve by applying complementary individual and public health approaches to health care and disease prevention. A focus on the wider environmental and social determinants of health is of great importance in addressing health inequities. However, pitting the health of individuals against the health of populations risks widening an unnecessary divide between medicine and public health. Population health planning requires directing efficient use of resources toward those most at risk. Stratification of populations into risk groups for multiple chronic diseases could provide more efficient and effective prevention and treatment strategies and potentially reduce cost of care. For example, a recent large population study suggested that use of age and polygenic risk score (even though individual genetic variants have small effect sizes) may be more effective in stratifying women into risk categories for breast cancer screening than use of age alone.<sup>5</sup>