Claims that Cancer Patent Data Indicate NIH Risk Aversion are Unfounded

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I write in response to the article “The declining impact of the US National Institutes for Health on cancer patenting”, published on 2nd July 2019 [ref:¹]. Zingg claims that his investigation supports “the view that the funding strategy [of the National Institutes of Health, NIH] focuses on incremental rather than on uncertain, but potentially game-changing, projects”. This is based on metrics related to the patent value, technological impact, and number and share of NIH funded patents (“NIH patents”). However, caution should be exercised when interpreting the conclusions given the data presented.

Forward citations are used as a measure of the value of patents. It is claimed that while, from 1976 to 1990, NIH patents were of higher economic value than non-NIH cancer patents (mean of 4.6 citations per patent vs. 3.9), the contrary is true since then (mean of 13.6 citations per patent vs. 15.8). However, no measures of variability are provided for these summary statistics (e.g. standard deviations or ranges), nor are statistical analyses to compare the groups performed, without which little insight can be drawn². Even if statistically significant differences exist, the differences are small and may not imply a meaningful difference in practice. The use of 1990 as a cut-off point for the groups is not justified which could imply bias in its selection, and if data over time are available, unnecessary categorisation will have resulted in information loss³. If possible, data should instead be analysed and presented as a time series to allow examination of trends.

A measure of technological impact of patents provided is the number of FDA approvals resulting from NIH funded drug and chemistry cancer patents. According to the article, the number of approvals resulting from NIH patents has remained constant over the years; however, data or analysis are not presented so this claim cannot be evaluated. If they have remained constant, it is not clear that the argument of a slowdown in technological impact is supported because the number of granted patents has been falling since 1995. This could in fact imply an increase in the impact per patent in recent years. More detailed analysis is needed.

The fall in patent share and number of NIH patents over time could be due to a number of confounding factors not examined: for example, the amount of funding available for cancer research from NIH and/or other funders, or changes in culture or policy in relation to patenting of NIH funded work.

Finally, regardless of the existence of confounding factors, patent counts do not necessarily provide a good indicator of NIH's risk tolerance. Inventions that constitute relatively small changes in the design or application of technologies that arise from low-risk work can be patented, and "game-changing" or "transformative" research may not be patentable or patented. For example, the original work relating to the chemical probe JQ1 was made freely available and not patented, and hundreds of patents were subsequently filed on related compounds by many institutions⁴. It is difficult to argue that the patented inventions represent the transformative or high-risk research. Using patent counts as a metric also implies that each patent is equally game-changing, which is not the case; the foundational CRISPR patents, for example, surely represent a greater breakthrough than the majority of granted patents.

Taken together, further analysis is needed to draw conclusions regarding NIH's funding strategy.

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Author Contributions

JAS conceived, designed and wrote the article and is responsible for its contents.

Competing Interests Statement

No competing interests.

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