

Gandjour, Afschin

Article — Published Version

Demonstrating the value of cancer biomarkers at the population level

The European Journal of Health Economics

Provided in Cooperation with:

Springer Nature

Suggested Citation: Gandjour, Afschin (2022) : Demonstrating the value of cancer biomarkers at the population level, The European Journal of Health Economics, ISSN 1618-7601, Springer, Berlin, Heidelberg, Vol. 23, Iss. 4, pp. 755-756,
<https://doi.org/10.1007/s10198-022-01474-6>

This Version is available at:

<https://hdl.handle.net/10419/311247>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>



Demonstrating the value of cancer biomarkers at the population level

Afschin Gandjour¹

Received: 3 January 2022 / Accepted: 21 April 2022 / Published online: 13 May 2022
© The Author(s) 2022

Keywords Cancer · Biomarker · Value

JEL Classification I10 · O33

Luís and Seo present a study that aims at “assess[ing] how the introduction of biomarker tests guiding cancer therapy have affected the premature mortality and survival of cancer patients in Norway [1].” To this end, the authors “make use of the fact that they [biomarkers—author’s note] were introduced for different cancers at different points in time.” The authors present two different models. Model 1 starts from the assumption that “[b]iomarker-guided therapies can (...) be targeted to particular types of patients who would otherwise not have an effective treatment available”. Model 2 is based on the assumption that biomarker-guided therapies “can also (...) avoid[...] adverse reactions in potential nonresponders who ultimately do not consume these guided drugs.” The “analysis is based on patient-level data from the Cancer Registry of Norway and on drug sales data”.

I found the research question on the impact of biomarker tests on premature mortality/survival at the population-level quite intriguing. However, as the analysis derives the value of biomarker tests only from analyzing the uptake of biomarker tests and biomarker-targeted therapies over time, it is at best incomplete. Let me outline the two situations in which biomarker tests are able to provide value. In the first, the therapy has no or a negative impact on survival in the biomarker-negative population. When applied to the all-comer population (i.e., regardless of biomarker status),

the therapy does not provide a clinically significant survival benefit and would not be approved. Therefore, the value of a biomarker is determined by comparing—in terms of survival—the uptake of a specific biomarker with no uptake (i.e., the prior situation). This value component of biomarkers appears to be appropriately addressed by Model 1 (with the usual caveats associated with these types of studies).

In the second situation, the therapy, if applied to the all-comer population, yields a clinically significant survival benefit, but the effect in the biomarker-negative population is smaller than in the biomarker-positive population. In this situation, the manufacturer may seek approval in the biomarker-positive population only for commercial reasons. If so, the value of a biomarker is ambiguous: on one hand, the biomarker reduces the survival benefit, because responders in the biomarker-negative population do not receive the therapy.¹ On the other hand, the biomarker increases the survival benefit, because patients in the biomarker-negative population are spared from potential drug toxicities causing death (i.e., grade 5 adverse events). However, to determine the net medical effect (benefit minus harm) requires data on a counterfactual, where the drug is provided in the all-comer population. Yet, this information can only be provided by clinical trials that have tested the therapy in the all-comer population including those patients who are biomarker negative. Hence, this information cannot be retrieved from real-world data, because the latter do not contain information on the effects and adverse events in the non-approved, biomarker-negative population. Neither do they include information on the size of the biomarker-negative population, which is needed to calculate the net survival impact at a population

This comment refers to the article available online at <https://doi.org/10.1007/s10198-021-01290-4>.

An author’s reply to this comment is available at <https://doi.org/10.1007/s10198-022-01475-5>.

✉ Afschin Gandjour
a.gandjour@fs.de

¹ Frankfurt School of Finance and Management, Adickesallee 32-34, 60322 Frankfurt am Main, Germany

¹ The authors are aware of this fact by stating: “Those patients could be deprived of potentially beneficial drugs that target their specific type of cancer better or have an incremental improvement in health relative to earlier drugs.”

level.² Therefore, this value of biomarkers has not been appropriately assessed by Model 2. While Model 2 aims at comparing targeted and non-targeted therapies, it does not compare the same drug in the same patient population, which is the necessary condition for a valid comparison. The only theoretical exception would be a class-effect of all new biomarker-targeted therapies in terms of survival benefits and adverse events, which, of course, does not align with the real-world situation. Hence, the study does not allow determining the full impact of biomarker tests on survival.

Finally, it needs to be emphasized that the net medical effect (benefit minus harm) of introducing a biomarker is negative if patients in the biomarker-negative population forgo therapy with a small but not clinically relevant benefit. In this case, the value provided by a biomarker entirely lies in cost savings to the healthcare system.³ Hence, it would be a mistake to believe—and reading the publication conveys this impression—that a positive value of biomarkers hinges upon a positive impact on survival.

Funding Open Access funding enabled and organized by Projekt DEAL.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

Reference

1. Luís, A.B., Seo, M.K.: Has the development of cancer biomarkers to guide treatment improved health outcomes? *Eur J Health Econ.* **22**(5), 789–810 (2021)

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

² Of note, the presence of off-label use in the biomarker-negative population would still require information on the size of the biomarker-negative population without off-label use and the foregone survival benefit in this subpopulation.

³ The study mentions the goal of “limit[ing] the expenditure ineffective therapies” only in passing and does not determine savings (notwithstanding the question around a valid counterfactual).