SURROGATE MARKER VALIDATION: AN INFORMATION THEORY PERSPECTIVE

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The last twenty years have seen a large amount of work in the area of surrogate marker validation. Part of this recent work proposes to undertake the validation exercise in a multi-trial framework which leads to a definition of validity in terms of the quality of both trial-level and individual-level association between a potential surrogate and a true endpoint (Buyse *et al* 2000). However, a drawback of this methodology is that different settings have led to different definitions to quantify the association at the individual-level. In the present work, we use an information-theoretic method to create a unified philosophical approach to the surrogate marker evaluation problem. Based on concepts of information theory we propose a new definition of surrogacy with an appealing intuitive interpretation. This approach offers interpretational advantages and due to its generality can be applied in a wide range of situations. It also provides a better insight in the chances of finding a good surrogate endpoint in a given situation. Additionally, we show that some of the previous proposals in the literature to study surrogacy in different settings, can be seen as special cases of this general information-theoretic approach.