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Common Errors in Tissue Score Analysis

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Description

In biomedical research, histopathology continues to be a valuable source of descriptive biological data. The importance of tissue scoring in research investigations has increased in response to recent calls for improved reproducibility in scientific studies. Appropriate statistical analysis is necessary for effective tissue scoring in order to validate group comparisons and provide the pathologist confidence when interpreting the data. Every statistical test often has underlying data assumptions at its core. The likelihood of incorrect interpretations of the data is increased when the underlying assumptions of a statistical test do not match the data. The experimental design of the study and the collected data has an impact on the selection of the most appropriate statistical test. In this article, we point out three frequent errors that can be made while analysing tissue scores: shopping for significance, overusing paired t-tests, and incorrectly analysing several groups. Finally, we urge pathologists to take advantage of all the resources at their disposal, including statistical software, reading important works about statistical methods, and recruiting a statistician to work with them on interdisciplinary research teams. In order to give the pathologist the most accurate interpretation of the tissue-scoring data, these collective resources can be useful in selecting the proper statistical test.

Biomedical research frequently examines cells and tissues to provide a biological perspective that can elucidate and supplement clinical and genetic data. Images in a figure might, at a basic level, synthesise the histological assessment and description of tissues to show group differences. Although morphologic descriptions can be useful, they have inherent flaws that make it difficult to discern between treatment groups. Group changes can be counted by semi-quantitative and/or quantitative scoring to combat this as well as to improve the rigour and repeatability of tissue research. The results of appropriate statistical tests applied to the tissue-scoring data can then be used to establish a more rigorous level of confidence in the interpretations and conclusions.

To be confident in the analysis that results, statistical tests typically have underlying assumptions about the data that must be met. The analysis may be susceptible to inaccurate conclusions if the assumptions for a statistical test are not met. Therefore, choosing a statistical test that is appropriate for the experimental design and data is the best course of action. To help with the choice of a statistical analysis, one frequent concern is whether the data satisfy the assumptions of parametric or nonparametric (e.g., discontinuous data or absence of normal distribution) tests.

As seen in the examples above, typical pathology investigations consist of just two basic test groups (a control and a treated group), but some studies are more involved, such as those that involve numerous (3 or more) treatment groups. In these circumstances, researchers may attempt to use a number of t-tests to compare the groups. T-tests are created for research that compares two groups, hence this is invalid. Multiple groups increase complexity, necessitating many kinds of statistical analysis. While we have briefly covered the most popular methods for analysing tissue scores, it is crucial to note that there are other methodologies that can be used to examine tissue scoring data. The strategies we've outlined are widely employed and documented in the literature. Other statistical approaches might be preferable to use, and the statistician may advise you to do so, depending on the data, experiment designs, or questions being asked.

We have highlighted a number of strategies to steer clear of typical blunders when examining tissue scores. Access to basic statistical tools is necessary for pathologists who undertake tissue scoring, and there are many of these tools available. Statistics software platforms have improved in usability over the past few years, making them popular tools in biomedical papers. It is also possible to learn more about tissue scoring, experimental design, and statistical analysis.

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