

Biotelligences Fortnight

Issue 6 (October 14 2014): Duque-Correa et al. PNAS

Arginase-1 and tuberculosis

In this Biotelligences Fortnight, we selected an article by Duque-Correa and colleagues published in *PNAS* in September 2014 (PMID: 25201986). In this study the authors investigate the mechanisms by which a *Mycobacterium tuberculosis* (Mtb) infection is controlled within lung hypoxic granulomas. This work suggests that arginase-1 (Arg1) in macrophages controls Mtb growth and mitigates lung pathology in the hypoxic microenvironment of granulomas. Despite some results about the possible role of T-cells, the exact link between Arg1 and bacterial growth was not fully clarified in the article. This study was well designed, executed and presented and has exceptional statistics, quantitative analyses and presentation. We especially liked: **(1)** the comprehensive statistical paragraph, which contains information about the software used, together with a detailed description and justification of tests, procedures and graphical presentations (but lacks the explicit disclosure of the alpha threshold); **(2)** the appropriate use of non-parametric tests (Mann-Whitney test, Kruskal-Wallis test and Spearman's correlation) because the assumptions of normality are not met; **(3)** the correction for multiple comparisons in Fig 1 and 3 using the Kruskal-Wallis test and the disclosure of the post-hoc test (Dunn's); **(4)** the systematic disclosure of exact p-values, even for values that failed to reach the alpha threshold; **(5)** the correct use of column scatter plots, which communicate a maximal amount of information to the reader; **(6)** the appropriate use of medians and interquartile range, which is recommended in cases of non-normal distributions and non-parametric tests.

As mentioned in a previous Biotelligences Fortnight (Issue 3, July 2014), there is no consensus among statisticians regarding the use of Kruskal-Wallis test when variances are not equal (heteroscedasticity). This might be an issue in Fig. 3 for instance, where the inequality of variances is marked. Nevertheless as substitute solutions are not consensual either, our opinion is that using Kruskal-Wallis cannot be deemed a mistake.

In conclusion, with the exception of a few very minor flaws, the statistics and data presentation in this article are of an exceptional quality.

The Biotelligences team

Authors' comment:

"We appreciate that our paper has been selected by Biotelligences Fortnight as an example for high quality application of biostatistics. Our lab has become increasingly involved in high throughput data analysis, notably gene expression and metabolic profiling which has confirmed our view on the importance of computational and statistical data assessment. This expertise was of great value for the paper you assessed. Statistical analysis will grow in importance in the future and we appreciate any initiative that aims at strengthening this important research aspect."

January Weiner, Maria Duque-Correa, Perter Murray, Stephen Reece and Stefan H.E. Kaufmann.