Kolloquium „Statistische Methoden in der empirischen Forschung"

Wann: 9. November 2021, 17:00 – 18:30 Uhr

Wo: Online

Can statistics save preclinical research?
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"To consult the statistician after an experiment is finished is often merely to ask him to conduct a post mortem examination. He can perhaps say what the experiment died of." R. A. Fisher

Specters are haunting biomedical research: It appears that a substantial fraction of published research results cannot be reproduced, while translation of spectacularly successful novel treatments in experimental models of disease too often fail when tested in clinical trials. A reproducibility crisis has been proclaimed, and bench to bedside translation appears to be lost in a 'valley of death' between bench and bedside. There are multiple conspiring reasons for translational attrition and irreproducibility, including (patho) biological complexity, low internal, external and construct validities, as well as numerous biases (selection/performance/detection/attrition/…), to name but a few I will not touch upon in my talk. Instead, I would like to address the question which role 'bad' statistics play in all this? And consequently, can 'good' statistics provide a remedy? I will review the prevalence and impact of small sample sizes and lack of statistical power, sample size sambas, inflation of effect sizes, low statistical thresholds for claiming a discovery, p-hacking, uncorrected multiple comparisons, HARKING; lack of understanding basic statistical concepts (such as ‚statistical significance', ‚regression to the mean', etc.), as well as the effect of the 'Garden of the forking paths', which together lead to an inflation of false positives, false negatives, and effect sizes. Low base rates, small sample sizes, flawed statistics and statistical illiteracy, together with low statistical thresholds for claiming discoveries create a perfect storm in which the vessel of robust science must capsize, results are no longer reproducible and clinical translation must fail. To remedy this situation biostatisticians and biomedical scientists must bring down the divide that they have built up between their domains over the past decades. I will make a few humble suggestions where to start.