

SEMINAR

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THE THREE-SIGMA RULE: IS IT A BEAUTY OR A BEAST IN SEROLOGY DATA ANALYSIS?

ABSTRACT:

Serological data analysis has often the objective of estimating the seroprevalence, i.e., the proportion of antibody-positive (i.e., seropositive) individuals in the population. However, serological data are intrinsically quantitative and, therefore, seropositive and seronegative individuals need to be estimated from the data. A simple approach to this estimation problem is to classify individuals as seropositive if their antibody values exceed a certain threshold; otherwise, they are considered as antibody-negative (or seronegative). The threshold for antibody positivity is routinely determined by the three-sigma rules based on extreme quantiles of the normal distribution. In this rule, the threshold for seropositivity is estimated as the mean plus three standard deviations from the estimated antibody distribution of the seronegative population. In this talk, I will discuss two inferential problems - estimation bias and apparent control of specificity - arising from this rule. These problems will be discussed with public data on serological testing against the SARS-CoV2. In the end, one can ask the question: is the three-sigma rule a beautiful statistical construct or rather a little beast hidden in serological data analysis?



2:30 PM



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Nuno has a PhD on theoretical immunology awarded by University of Oporto, Portugal. In his PhD thesis, he studied how T-cell repertoire is shaped throughout life. Since 2010 he is a researcher from the London School of Hygiene & Tropical Medicine (LSHTM). His current researcher interests are related to (i) humoral responses against malaria parasites in the context ...