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THIS IS OUR SHOT – NEW MEASURES OF VACCINE INFECTIVITY

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Whereas modern up- and downstream processes to produce viral vaccines are continuously optimized for high and pure viral titers, analytical methods to determine the infectious titer in a bulk, still lag. TCID50 and plaque assay are gold standard infectivity assays used in the industry, but only show results after 1-2 weeks and thus, hinder process control and development. They are operator-dependent, elaborate and furthermore, the particle content (measured by NTA) and the infectious particle content (measured by TCID50) do not go hand in hand. In this work, cytosolic Calcium, a ubiquitous element involved in all cellular processes is measured as an early indicator of viral infection. As obligate parasites, viruses take over the signaling machinery of the cell for their replication and cause an increase in cytosolic Calcium after a few hours of viral infection. Next to small molecule dyes like Fluo-4, GECI (Genetically Encoded Calcium Indicator)-cell lines are used to measure cytosolic Calcium and this dynamic shift is measured and quantified using fluorescence microscopy as well as flow cytometry. Prior, the cytotoxic compound Staurosporin is used as control substance, because cells treated with the protein kinase inhibitor show a fast Calcium-shift before going into apoptosis. Finally, the results generated by these methods are correlated to the infectious titer obtained by TCID50 and compared through multivariate statistics. Thereby, we create a model fed by several different methods predicting the infectious titer in a more fast and precise way. Especially in pandemic situations, where fast and accurate models monitoring the infectious titer are utterly needed, this will help to speed up and facilitate vaccine production processes.