Adaptive Group Testing in a COVID-19 Model

Attila Dénes, **Tamás Tekeli**, Gergely Röst University of Szeged, Szeged, Hungary

Various measures have been implemented around the world to prevent the spread of SARS-CoV-2. A potential tool to reduce disease transmission is regular mass testing of a high percentage of the population, possibly with pooling (testing a compound of several samples with one single test). We develop a compartmental model to study the applicability of this method and compare different pooling strategies: regular and Dorfman pooling. The model includes isolated compartments as well, from where individuals rejoin the active population after some time delay. We develop a method to optimize Dorfman pooling depending on disease prevalence and establish an adaptive strategy to select variable pool sizes during the course of the epidemic. It is shown that optimizing the pool size can avert a significant number of infections. The adaptive strategy is much more efficient, and may prevent an epidemic outbreak even in situations when a fixed pool size strategy can not.

- P. Boldog, T. Tekeli, Z. Vizi, A. Dénes, F. A. Bartha, G. Röst, Risk assessment of novel coronavirus COVID-19 outbreaks outside China, J. Clin. Med, 9 (2020), 571. https://doi.org/10.3390/jcm9020571
- [2] H. Nishiura, S.-M. Jung, N. M. Linton, R. Kinoshita, Y. Yang, K. Hayashi, et al., The extent of transmission of novel coronavirus in Wuhan, China, J. Clin. Med., 9 (2020), 330. https://doi.org/10.3390/jcm9020330