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Mathematical modeling of infrared detection of respiratory viruses[1] MADISON SMITH, Texas AM University-Commerce, HANA DOBRO-VOLNY, Texas Christian University — As an alternative to nasal swabs as a means to diagnose respiratory viral infections, we propose using carbon nanotubes as a dye to allow viral infections to be detected via infrared emission. The carbon nanotubes can bind to free viral RNA in the nasal passages. Binding of free viral RNA to the carbon nanotube system changes its emission spectrum. To test the feasibility of this detection system, we use mathematical modeling and computer simulation. The mathematical model used in this study has been adapted to include the infrared detection system. The model allows us to calculate a time scale for detection of the infection. We find that the time constant depends on the RNA association rate and the initial amount of viral RNA, but does not depend on how quickly the virus replicates.

Madison Smith
Texas A
M University

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