Discovery of Drugs for COVID-19

Innovation in the Time of COVID
Associated Medical Schools of New York

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COVID-19

Research Challenges as the Pandemic Emerged

• Inadequate systems for studying SARS-CoV-2 biology
  o Non-human or cancer cells
  o Broad spectrum of disease
    o Mild disease (80%) to multi-organ failure (1-5%)

• Poor understanding of which cells are infected
  o Respiratory system is a primary target
  o Clear complications of the heart, gut, brain, etc.
Goal: Develop a human pluripotent stem cell-based platform

- Human cells will better represent cellular response to infection.
- In principle, many cell and tissue types can be evaluated.
- Can be adapted for high-throughput small drug screens.

It Takes a City: A New York Consortium

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COVID-19 colon biopsy

SARS-CoV-2 RNA

A screening platform to identify drugs that block SARS-CoV-2 infection

Colon organoid
“mini-organ”

24 hpi

Relative Luc signal

0 0.5 1 1.5 2 2.5 3 3.5

0 200 400 600 800 1000 1200 1400 1600

imatinib

mycophenolic acid (MPA)
Summary

• Human stem cells can be used to model SARS-CoV-2 infection.

• Lung, colon, liver, pancreas and cardiac cells support SARS-CoV-2 infection and these cells respond similar to COVID-19 patient cells.

• Screens could identify FDA-approved drugs that inhibit SARS-CoV-2 and can be considered as candidates for clinical trials.
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