

# Scientists tap AI to find optimal drug combinations

Platform makes recommendations based on dosage, mix for infectious diseases

**Cheryl Tan**

A group of researchers in Singapore are tapping artificial intelligence (AI) to figure out the optimal dosage of drugs that can be used in combination for the treatment of Covid-19 patients.

The IDentif.AI platform uses a pool of 12 carefully selected drugs and multiple ways in which they can be combined.

The scientists say the AI platform can make precise recommendations based on dosage and mix.

“Drug dosing impacts which

drugs belong in an optimal combination and vice versa, requiring a remarkable level of precision which cannot be arbitrarily derived – an important part of drug development that IDentif.AI seeks to address,” said Professor Dean Ho, director of the N.1 Institute for Health and Institute for Digital Medicine at the National University of Singapore (NUS).

He led the team that worked on the platform, including researchers from the Shanghai Jiao Tong University. Their research was first published in the journal *Advanced Therapeutics* on April 16.



Professor Dean Ho, director of the N.1 Institute for Health and Institute for Digital Medicine at the National University of Singapore, led the team that worked on the IDentif.AI platform. PHOTO: NATIONAL UNIVERSITY OF SINGAPORE

IDentif.AI, which stands for Identifying Infectious Disease Combination Therapy with Artificial Intelligence, combines the unpredictable synergies of different drugs to derive an effective combination that can be recommended for the treatment of bacterial and viral infection.

It is currently being used to address infectious diseases such as dengue, but the team is working on

an ongoing study to use it to target the coronavirus that causes Covid-19.

Prof Ho, who is also the head of the NUS Department of Biomedical Engineering, said that in traditional drug screening, increasing doses are given until it is observed that the growth of bacteria or viruses has been maximally prevented.

Additional drugs will then be

added to amplify the effect of combating these infections.

But such a method becomes challenging when several drugs are considered simultaneously as potential therapy candidates.

The team’s research was conducted using an in-vitro model, where a strain of the vesicular stomatitis virus (VSV) was taken and placed on a dish.

Both VSV and Covid-19 have the same genetic material, and the two share similarities in that they have high mutation rates and can infect healthy cells in a potent way.

The A549 lung cell line was chosen as the host for the virus infection.

Using IDentif.AI, the best combination of drugs was then identified from a pool of 12 candidates.

The selected ones optimally prevented the VSV’s ability to infect the host cell, while ensuring that surrounding cells remained healthy.

The researchers found that the top five contributing drugs each displayed antiviral properties beyond their original intended use.

“For instance, when given at a low dose, (each drug’s) mechanism of action may not be leveraged at all, but instead, it is unexpectedly boosting the activity of another drug in the combination – which are all unpredictable and unforeseen interactions that the AI platform can uncover,” said Prof Ho.

A subsequent round of experiments with 30 drug combinations was conducted, mediating the VSV infection to 1.5 per cent, nearly completely eradicating the infection.

In a treatment setting, Prof Ho said, fighting an infection is a coordinated effort between the medicine and one’s own immune system.

He and his team will be conducting further studies to identify a potential group of drugs to enter clinical trials which will be conducted with clinicians and infectious diseases experts.

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