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Attempts to find a Covid Treatment

We are probably all familiar with some of the more stupid suggestions to treat Covid-19! However, there have also been some more rational suggestions which, unfortunately, haven't all lived up to their early promise. Nonetheless, the scientific community have been working tirelessly to find or develop effective drug treatments for patients suffering from Covid-19.

Drug development normally takes many years with companies spending up to 10 years developing and testing a new drug before it comes on the market. However, even with extreme speed this process is still measured in years. Given the urgency that surrounds the development of treatments for Covid-19, 'years' just isn't good enough!

So new approaches have come into the spotlight. A few companies are working to harness Artificial Intelligence (AI) to identify drugs that may be repurposed to fight Covid-19, with some early success. AI is the simulation of human intelligence in machines that are programmed to think like humans in learning and problem-solving. AI is based on the principle that human intelligence can be defined in a way that a machine can easily mimic it and execute tasks, from the most simple to those that are more complex.

In the 2000s early versions of AI-driven telemedicine, called 'medical expert systems' were being discussed as the next healthcare revolution. As early as 2005, a company called Biovista used early forms of AI to match any and all drugs against any and all body mechanisms, pathways, diseases, and clinical outcomes.

When Covid-19 hit, the company began applying AI approaches through Biovista's Project Prodigy AI platform to find treatments that would mitigate disease complications that can arise post infection. They have recently announced that they have identified the antifibrinolytic agent aprotinin and the angiotensin II receptor blocker irbesartan as having potential for reducing the effects of cytokine storm and high viral load associated with Covid-19.

Biovista has also identified caplacizumab and ezetimibe/atorvastatin as potential treatments to address blood clotting and inflammation related to Covid-19. The AI platform has also identified two bioactive compounds, lycopene and vitamin D, as potentially useful in treating Covid-19.

These drugs are part of a 'rolling release' of possible drugs identified by Project Prodigy that could potentially be repositioned for Covid-19. It has been said that Covid-19 has rewritten the book on infectious diseases.

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Treating it has proven especially difficult because it causes multiple complications affecting nearly every organ system.

Their drug-AI helps find the 'needle in the haystack', and the company are optimistic that they have found several of them already.

It should be noted that typical machine learning AI isn't designed for a disease like Covid-19. As a spokesperson for Biovista says: 'Machine learning only looks backwards based on what you've trained it in. If you change a tiny variable, you have to train it again.' In contrast to traditional machine learning AI, Project Prodigy is a 'machine building AI that enables us to build, interrogate and test possible and unanticipated scenarios.' It's being used to map all known drugs against every possible body mechanism in which SARS-CoV-2 operates to cause complications.

The company have committed to continue to publicly release data on potential drugs for Covid-19 for scientists and clinicians to test 'until we collectively' solve Covid-19. Furthermore the company says: 'It's the socially responsible thing to do, with some really badass science and AI behind to support the data. We are also starting conversations with relevant companies to test these drugs against Covid-19,'

AI Can Speed Time to Clinical Trial

Many methods are being used to identify currently existing drugs against Covid-19, from traditional clinical experience to different forms of AI. For example a team at the National University of Singapore is currently using an AI-based platform called IDentif.AI (Identifying Infectious Disease Combination Therapy With Artificial Intelligence) to help accelerate the discovery of optimal combinations of existing drugs that might be effective against Covid-19. They believe that for Covid-19, using drug combinations in lieu of single-drug therapy is likely to be essential. Their head of research has said: 'This creates additional challenges because selecting the right drugs to combine and the right dose for each drug can mean the difference between maximal efficacy or no efficacy at all.' However, 'This is where AI can be particularly helpful,' he said.

For example, testing 12 candidate drugs at 10 different doses each, creates one trillion possible drug combinations. They explained: 'Testing this many combinations is insurmountable for any laboratory or even a major pharmaceutical company.' However, applying an AI platform toward Covid drug combination design 'can potentially lead to rapid clinical trial initiation, as the ranked list of combinations is quite actionable.'

The team in Singapore has already shown the HIV drug lopinavir/ritonavir (Kaletra) to be 'relatively ineffective' against COVID-19. The antiviral remdesivir was shown to be the most effective single drug therapy 'but was still not extraordinarily effective.' However, combining lopinavir/ritonavir and remdesivir resulted in the 'top-ranked combination with complete inhibition of infection.' Actual experimental data confirmed the benefits of this drug combination, he added. 'This is a completely unexpected interaction that was pinpointed with IDentif.AI, which further demonstrates the importance of leveraging AI to optimize combination therapy design.'

What does this all mean?

In the period from 1878 to 1880 Thomas Edison and his associates worked on at least three thousand different theories to develop an efficient incandescent lamp. At the time he said 'Genius is one percent inspiration and ninety-nine percent perspiration. I have not failed. I've just found 10,000 ways that won't work. Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time.'

I wonder what Eddison would have made of Artificial intelligence. What took him and his team *years* could now be achieved in days!

So using computers with artificial intelligence means that drug development can be sped up and that what previously took years can now be achieved in weeks if not days. Furthermore, it means that things that human minds may not have even thought of can be explored and the 'needles in the haystack' can be identified very quickly.

Hope for the future

In a very short period of time these research teams in the USA and Singapore have identified promising treatments for Covid-19. Hopefully, all going well, next year if you get Covid-19 it will be a simple case of going to see your GP for a diagnosis and a prescription for treatment, the same as you might go now for an antibiotic for an infection!