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Medicine for Managers

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A Pill for Covid

Since the time of the ancient Egyptians, medication has been at the centre of all medical care. To be able to prescribe and administer a drug to control, treat or eliminate symptoms or disease has long been a holy grail for physicians and the countless advances in medication have provided immeasurable improvements in healthcare. The drug treatment of viral infections has been less successful than many would have hoped.

There has, of course, been considerable research at an academic and a pharmaceutical level to identify and manufacture medication which would be effective against viruses in the same way that antibiotics are effective against bacteria.

There is, of course, a key difference between bacteria and viruses which makes the treatment of viruses much more difficult.

Screening programmes, for antiviral drugs, have been in place for decades…

Bacteria are microscopic single-celled organisms which contain ***DNA***. They have a capsular covering and they exist in the body ***between*** the constituent cells in the intercellular fluid.

They multiply by ***binary fission*** (asexual reproduction) where they simply divide into two, a process which often occurs as frequently as every twenty minutes.

Bacteria attack by multiplication and the release of toxins.

Viruses are generally much simpler and smaller than bacteria. They contain ***DNA*** or ***RNA***.

Viruses are ***obligate parasites***. When a virus attacks the body it actually ***enters body cells***, taking over the cells' metabolism. The cells are prevented from carrying on their own functions and their activity is diverted to the manufacture of further virus particles.

The cells become stuffed with virus particles and ultimately the cells die and rupture, releasing the viral particles into the circulation enabling them to infect further cells and replicate the process.

The body identifies bacterial attacks as 'foreign' and the immune system will attack them. White blood cells are able to fight off bacteria and antibodies are manufactured which lock on to the bacteria and destroy them.

The body has more difficulty in trying to overcome viruses because, for most of their time, they are within the body cells and therefore not accessible to the body's immune system.

It is only when the virus bursts out of the cells that the body's defence system has the opportunity to attack and destroy them.

The period outside the body cells is short and it gives the body's immune system little time to recognise the ***virions*** (virus particles) and to destroy them.

The challenge of viruses is increased by their ability to mutate. It is well-known that the Covid-19 virus has mutated, which is making the disease more infectious and transmissible.

Mutations are not uncommon and, if Covid is not overcome through vaccination, more mutations will develop and the danger is that one will emerge which will be much more lethal.

The drug is reported to work by introducing errors into the genetic code of the virus.

Bacteria are susceptible to appropriate antibiotics but the anti-viral drugs which are available are commonly less effective and are generally available only for some specific viruses.

Screening programmes for antiviral drugs have been in place for decades and one such programme operated by the pharmaceutical company Burroughs Wellcome resulted in the discovery of ***acyclovir*** in 1971.

The drug is activated by viral activity within cells and works by deactivating viral enzyme activity. It causes little effect on uninfected cells although it may have a toxic side-effect on kidneys. Initially it was made available as a topical ointment but subsequently was released in tablet form.

Further research has shown it to be very effective against the herpesvirus, less so against varicella zoster (shingles), still less against the Epstein-Barr virus (glandular fever) and largely ineffective against cytomegalovirus (which can cause a variety of symptoms, especially in immuno-compromised patients).

Shortly afterwards, the drug ***idoxuridine*** was identified for the treatment of herpetic infections.

Since then at least fifty drugs have been approved for use against viruses.

Antiviral therapy for HIV was developed relatively quickly in response to the disease but the research into other antiviral drugs has not been anything like as dramatic.

Some were limited in use by their toxicity, whilst many are more effective at inhibiting the multiplication of viruses rather than eliminating infection.

Azidothymidine (AZT), already in existence in the 1980s was found to selectively toxic against HIV and other drugs followed over the next twenty years, stimulated by the public health impact of the virus.

During that time over fifteen new drugs were identified for HIV.

Viral developments in other areas were less dramatic.

However, particularly over the last ten years, some different agents with varying actions have been approved for use for specific infections.

These have included developments in drug treatment of hepatitis infections.

It comes as no surprise to know that the search is on globally for an effective antiviral drug against Covid-19.

At the end of September, an alliance of pharmaceutical companies announced progress with ***favipiravir*** as a treatment for Covid-19.

The report states that clinical trials have been promising and continue in several countries including the UK, US and China.

The drug, originally developed in Japan by Toyama Chemicals as an anti-influenza drug, and approved in 2014,was found to significantly reduce mortality from Covid-19 compared with control patients.

Their latest press release describes an 87% reduction in hospital admission for some groups of patients suffering from Covid-19. The drug also reduces complications and the severity of the disease.

In addition, the US pharmaceutical company Merck reported that interim clinical trial results showed that the drug ***molnupiravir*** would reduce hospitalisation or death due to Covid-19 by a half.

A trial of 775 patients was reported which showed no deaths in the group treated with the drug and that the number of patients hospitalised was cut by half compared with a placebo group.

The drug is reported to work by introducing errors into the genetic code of the virus.

As with some other antiviral drugs, it is important to start the course as quickly as possible after any symptoms develop for the effect to be achieved.

At the least it is hoped that this will be a useful tool in controlling the pandemic

With several of the giant rival pharmaceutical companies all investigating drugs which will inhibit or destroy the virus, it is hoped that, in the not too distant future, it will be possible to effectively treat Covid-19 in its early stages.

Before it becomes established simply by taking pills.

I think we can all drink to that!

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