

How interferon may act on virus infections

by J Newell

Much publicity has been given to the first trials of interferon as a treatment for cancer. The trials are incomplete and the publicity premature, but it appears likely that interferon, while certainly no 'magic bullet' or 'miracle cure', will become a useful additional treatment for some forms of cancer, to be used in conjunction with existing treatments.

However, little publicity has been given to the growing evidence that interferon will prove valuable in combating several common virus infections, ranging from flu and colds to rabies and hepatitis.

Research on these applications, now underway in Britain, is also revealing that interferon is not one but several substances. Each appears to have its own function, and there is also evidence that the functions of interferon in the human body extend far beyond the combating of disease.

Response to influenza

Dr Francis Ennis, on secondment from the Bureau of Biologies in the United States of America, is leading a team of researchers at the Common Cold Research Unit at Salisbury in southern England in an investigation of the human body's response to influenza infection.

The scientists infected volunteer subjects with influenza virus in nasal drops and took blood samples to measure changes as the symptoms of infection developed.

They found that as infection developed interferon appeared in the bloodstream of a number of subjects, while the activity of one kind of white blood cell concerned with defence against disease - the so-called natural killer cells - increased considerably.

The researchers believe that when a flu infection takes hold, the multiplication of viral genetic material causes certain cells, including white blood cells, to produce interferon, and this stimulates other cells to resist infection.

Interferon first stimulates the natural killer cells to attack and destroy cells infected with virus, so that interferon and the natural killer cells are the first line of defence against viruses.

Meanwhile, a slower acting but deadlier second line of defence comes into play. Another group of white cells, known as T cells, produce an antibody that reacts specifically with and destroys virus particles outside cells.

A second form

The T cells also produce a second form of interferon, called gamma interferon, which stimulates further resistance to infection. The first interferon produced in response to infection is known as alpha interferon.

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Another British research team studied children with persistent coughs and colds. They were attending the Northwick Park Hospital in London and were investigated by a team led by Dr David Tyrrell of the Clinical Research Centre at the hospital.

Dr Tyrrell and his colleagues found that about a quarter of the children with persistent colds and coughs - ten or more a year apiece - produce much less than the normal amount of interferon, as shown by measurement of their white blood cell interferon production and of interferon in their nose-blowings. Some produced no detectable interferon.

This is the first time that a defect in interferon production has been linked to susceptibility to a virus infection.

Both these findings suggest that interferon might be used to combat colds, flu and other respiratory infections with nasal sprays and aerosol inhalers employed to deliver the interferon. It would have to be administered at the right time - just before or after exposure to infection - to be of value.

Treatment or prevention

The indications are that, when genetically engineered bacteria make interferon widely and cheaply available, it will be of value for such purposes. Dr Tyrrell thinks that, besides being useful as an accessory treatment for some forms of cancer, interferon will be used to treat or prevent infection with rabies and hepatitis B, as well as local eye infections and colds, flu and bronchitis.

Much more needs to be learned about interferons before doctors will know how best to use them. It is now clear that there are several different forms of alpha interferon alone, and children's bodies may produce a different form to that found in adults.

It is also becoming clear that interferons help to control the whole process of normal cell division, and to prevent abnormal multiplication of genetic material in virus infections and certain forms of cancer.

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