INTERLEUKIN-2

WHAT IS INTERLEUKIN-2?

Interleukin-2 (IL-2) is a protein made by the body. T-helper cells, a kind of white blood cell, produce IL-2 when they are stimulated by an infection. IL-2 makes infection-fighting cells multiply and mature. Patients who use IL-2 have large increases in their CD4 cell counts. IL-2 is called an immune modulator.

Interleukin-2 has been approved by the FDA to treat some types of cancer, but has not yet been approved for HIV disease. Health care providers can use it "off label" in patients with HIV (see Fact Sheet 105).

Using gene splicing, the Chiron Corporation developed a way to manufacture IL-2. Their version is called Proleukin®.

WHO SHOULD TAKE IL-2?

IL-2 stimulates the immune system and increases the number of CD4+ cells. People who start with higher CD4 cell counts get larger CD4 cell increases.

Scientists do not agree on the value of the new CD4 cells generated by IL-2. That is, a CD4 cell count of 700 after IL-2 therapy might not be as good as a count of 700 before IL-2 therapy. The difference has to do with how many different types of CD4 cells you have.

Before HIV disease attacks your immune system, you have millions of different types of CD4 cells. An easier way to think about them is like the letters of the alphabet. Each letter is programmed to respond to one particular type of infection. With a healthy immune system, you have many copies of each letter. As your CD4 cell count goes down, you have fewer copies of each letter, and you might run out of some letters.

Let's say that you need to spell the word "zebra" in order to fight pneumonia. If you lose all your copies of the letter "z," you can't spell zebra and you might develop pneumonia.

IL-2 makes more copies of "letters" (types of CD4 cells) that still exist, but it doesn't bring back missing "letters." There could still be gaps in the immune defenses.
Scientists are still studying the benefits of the CD4+ cells produced by IL-2 therapy. We do not know if these higher CD4 cell counts mean that people will stay healthier. Two major international studies are underway, studying thousands of patients. The results should be known within the next few years.

Researchers also used IL-2 to try to clear infected "resting" CD4 cells from the blood. These experiments were not successful. Studies are also examining the possible benefits of IL-2 during treatment interruptions (See Fact Sheet 406).

HOW IS IL-2 TAKEN?

IL-2 has been given as an intravenous infusion and as twice-daily subcutaneous (below the skin) injections. Early research showed that the largest increases in CD4 cells occur when IL-2 is given every day for 5 days, once every 8 weeks. If the CD4 cell count climbs enough after the first few cycles, future cycles can occur less frequently.

The best dosage of IL-2 has not been determined. The dosage is stated as "millions of international units," or MIU. Some patients taking IL-2 have been followed for six years or more. After initially using IL-2 every 2 months, they increased the time between cycles to as much as 3 years. They still had significantly higher CD4 cell counts.

WHAT ARE THE SIDE EFFECTS?

Without antiretroviral therapy (ART), IL-2 can increase HIV viral load up to six times its pre-treatment level. These increases disappear within one month. Combination antiretroviral therapy (ART) controls these "spikes" in viral load. You should not use IL-2 unless you are taking antiretroviral drugs (ARVs).

When IL-2 is given by intravenous infusion, the most common side effect is called capillary leak syndrome. This causes weight gain, swelling, low blood pressure, and other problems.

At lower doses, people taking IL-2 get flu-like symptoms, including fever, chills, and muscle aches. Because IL-2 stimulates the immune system, it can make some immune disorders get worse, including arthritis, psoriasis, and diabetes. It can also reduce the number of neutrophils, a type of infection-fighting cell, and can cause low levels of thyroid.

When IL-2 is given by subcutaneous injection, the side effects are usually milder than with intravenous infusions. There is the added side effect of irritation where the injection is given. Side effects show up from 2 to 6 hours after injection of IL-2, and disappear soon after the end of each cycle.

IL-2 can cause mood changes including irritability, insomnia, confusion, or depression. These can continue for several days after IL-2 is stopped.

HOW DOES IL-2 REACT WITH OTHER DRUGS?

The body naturally produces IL-2. No serious interactions with ARVs have been noted. Also, there is no evidence that the body develops resistance to IL-2 when it is given in cycles.

THE BOTTOM LINE

IL-2 stimulates the immune system and can lead to large increases in the number of CD4 (T-helper) cells. We still don't know if these increases in CD4 cells help people stay healthy longer.

IL-2 is usually administered in 5-day cycles of 2 subcutaneous injections a day. At first, one cycle is given every 8 weeks. IL-2 causes irritation where the injections are given and flu-like symptoms. These side effects usually start within a few hours of IL-2 injections and disappear after the end of a cycle. Long-term users of IL-2 can increase the time between cycles up to 3 years and still maintain their CD4 cell counts.

IL-2 has not yet been approved for use in HIV disease.