Next time you drink up or if you’re crazy enough to spliff up or shoot up, be prepared for some unwelcome bodily changes. And we’re not talking constipation, freaky hallucinations, or the midnight munchies here. Evidence is mounting that certain illicit drugs like heroin, alcohol and marijuana subvert the body’s natural defence mechanisms, opening the floodgates to disease.

But all is not doom and gloom for the drug abuser, casual or otherwise. There are hints that cocaine, the traditional bane of New York stockbrokers and Washington mayors, might actually strengthen the body’s defences. The impact on the immune system of ecstasy is a largely unasked question.

Circumstantial evidence that drugs and alcohol harm the body’s ability to fight off disease has been around forever. Intravenous drug abusers, for instance, are prone to tuberculosis and pneumonia. These infections are transmitted through the air, rather than through infected needles, and usually only strike people with weak immune systems. Drug injectors also suffer more than their fair share of food poisoning and intestinal upsets caused by bacteria like *Salmonella typhimurium* and *Listeria monocytogenes*. Alcoholics are prone to hepatitis, tuberculosis and other infections. And young marijuana users have a higher than normal incidence of head and neck cancers that cannot be accounted for by the tobacco in spliffs.

It was tantalising, but about as far from proof as you could get because of the difficulty of disentangling the effects of the drugs from those of the sex and rock and roll. Did addicts get sick because the drugs were messing with their immune systems, or because food, hygiene and medical care took second place to scoring the next fix?

“People thought drug users got ill and died just because of this bad lifestyle,” says Alan Leshner, Director of the US National Institute of Drug Abuse (NIDA) in Maryland. That changed when a small group of immunologists decided to test their gut instinct that drugs were disrupting the body’s immune defences.

It’s now pretty well established that the brain exerts some direct control over the immune system, so it was an obvious first place to look for any drugs like heroin. And in 1993, Barbara Bayer and her colleagues at Georgetown University in Washington DC injected morphine, heroin’s breakdown product in the body and its laboratory stand-in, into the brains of rats. Within 30 minutes, the rats’ T cells, which kill infected cells and ensure that different parts of the immune system work together, had lost their punch. When they were removed from the animals and treated with a chemical that usually makes them divide like crazy, they divided at 80 per cent less than the normal rate.

Bayer’s first thought was that the morphine had set off a chain of command from the hypothalamus to the adrenal gland via the pituitary, stimulating the release of corticosteroids into the blood. These hormones can suppress the immune system. But when she removed the rats’ adrenal glands or pituitary glands and repeated the experiment, she got the same result, suggesting that morphine affects T cells through another as yet mysterious brain mechanism.

But it is the ability of morphine to act at a local level, by latching onto immune cells that excited the most interest. One of the first hints that this is possible came in 1994 when George Stefano of the State University of New York showed that morphine binds directly to human...
granulocytes. These cells are found in pus. They gobble up everything from cancerous cells to bits of viruses and make chemicals such as histamine that increase blood flow to areas of tissue damage.

In the past three years, other research teams have shown that various types of human T cells and B cells (which make antibodies) as well as the granulocytes, turn on genes for the μ receptor – the same receptor the brain uses for morphine and heroin and the body’s own painkilling and anti-stress opiates.

But the evidence has not convinced everyone that heroin-like drugs can have a direct impact on immune cells. They say that just because the μ genes in immune cells produce messenger RNA - the molecular intermediary between genes and proteins – doesn’t mean that the cells actually have functioning μ receptors. “It’s not enough just to find RNA,” says Henry Francis, the head of the NIDA’s clinical medicine branch. “That’s just the smoking gun.” Now, immunologists like Toby Eisenstein and her colleagues at Temple University in Philadelphia have evidence that morphine directly damages immune cells. For example, when mB cells are taken out of mice and treated with morphine they make only half as much antibody as usual.

But the pièce de résistance is an experiment that Eisenstein and her colleagues reported in the Journal of Infectious Diseases. They found that mice that had been given morphine for two days, at doses roughly equivalent to those a heroin addict would use, tended to die of blood poisoning. When they opened up the mice, they found that bacteria had migrated from the intestine, where they normally live, into other organs such as the liver and spleen. Animals that received naltrexone, a chemical that blocks morphine’s action, remained healthy, so it looks as though the morphine causes the fatal migration of the bacteria.

If a similar thing happens in heroin addicts, it would certainly help to explain why they are susceptible to salmonella and listeria infections. Eisenstein points out that morphine and heroin are known to slow gut peristalsis and cause constipation. “Perhaps,” she says, “something happens to the integrity of the gut and the balance of organisms in there, so the gut wall becomes more permeable.” For heroin, the message is clear: it douses immunity.

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