

## To the morbidly curious: Here's how you die | Dr. Bob Wilson

By [DR. BOB WILSON](#)

Islands Weekly Contributor

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Have you ever wondered about the details of the death process? Of course you haven't! That kind of thinking is left for disturbed people, the sort that slow down on the freeway hoping to see the details of a car wreck. You spend your day reflecting upon the beauty and wonder of the world while leaving the sadistic and morose details of life to the sick and morbid ... your doctor. On the other hand, if you happen to be a connoisseur of highway carnage, read on.

When we say that somebody died of a heart attack or liver disease or pneumonia, what are we really describing? How do these diseases actually stop life? It's neither by magic nor black magic. The answer for each mode of death – hemorrhage, drowning, concussion, infection, and so on – is different.

However, they all have one thing in common: cell death. If you die, then enough of your cells have died to interrupt the total symphony of activity that we call life.

Since infection has been so much in the news lately, let's look at the example of death by sepsis.

Sepsis can be thought of as an overwhelming infection that has spread throughout the body. Let's say that someone develops a bladder infection, common enough, and let's say that it is left untreated, and that the bacteria "ascends," moves from the bladder, up the urethra, and into the kidneys. Once there, it grows until the kidney is unable to contain the infection. Then bacteria, from the kidney, enter the blood stream whereupon they have access to virtually any organ. Suppose a few thousand bacteria travel to the lungs and lodge in multiple areas. Once there they cause direct damage to the cells.

Surprisingly, even more damage may be done by one's own immune system. White blood cells, activated by the presence of bacteria, release very potent chemicals like histamines, cytokines, tumor necrosis factor, super oxides, etc. These chemicals are intended to do many things such as kill bacteria, and attract and activate other white blood cells. They also cause vessels to become porous and leaky so other white cells can access the infected area.

These chemicals, released in large amounts, can cause enormous damage. For example, if they upset the clotting mechanism of the blood, tiny clots or "micro thrombi" can form in many of the tiny vessels of organs. Blood stops flowing in these tiny vessels and lung cells begin to die.

Soon the lung cannot supply enough oxygen to the body. This triggers a domino effect among the other organs. The heart recognizes the lowered oxygen levels and increases its rate to move more blood faster in an attempt to compensate. Remember that the kidneys have also been injured and do not make urine normally. Water is retained in the body, blood volume rises and the heart must work even harder to move the extra volume.

Heart damage begins to develop from the unrelenting overload. More fluid is retained by the body and begins to spill into the lungs, further hindering them. If the infection finds its way to the heart itself, then the failure is accelerated even more. When blood flow and oxygen delivery drop to a critical point, cell death on a large scale begins to happen everywhere and multiple organs fail.

Hypoxia (low oxygen), acidosis (retained acid waste), hypoglycemia (low blood sugar), and many other problems create an environment that no cell can survive in.

Death soon follows. Other than that everything is fine.

Have a nice day.