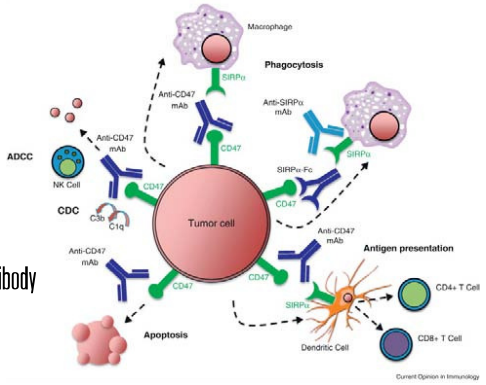
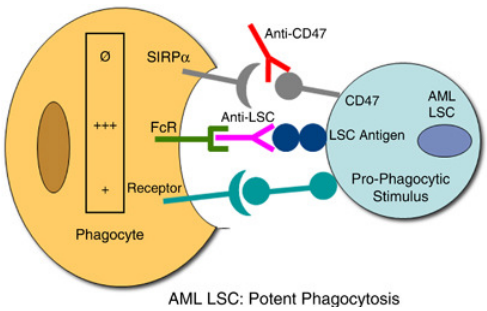
Do This, Not That



The Anti-CD47 antibody

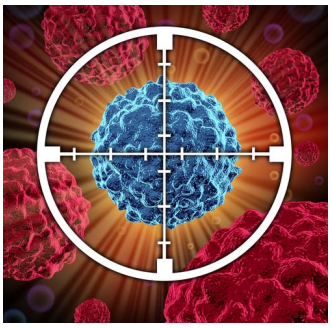
Control is important. Any complicated process must be controlled or it breaks down. Human biology provides many examples of control mechanisms which start, guide, and stop important physiologic functions. In essence, they say, "Do this, but not that." For example, some blood clotting happens constantly in the body because our blood vessels leak. We don't die from massive circulatory blockage because clotting is limited to small areas on the inside of blood vessels and is not allowed to spread.

Another example of control is found in cells of the immune system, called macrophages, which eat other cells. Macrophage cells must be able to tell the difference between damaged, dying, or abnormal cells that should be eaten, and normal, healthy cells which should not. Without the ability to control which cells macrophages eat, we would literally eat ourselves up from the inside.



AML LSC: Potent Phagocytosis

In the last decade, researchers have identified the signal on worn-out or damaged cells which tells the macrophage cell to "eat me." And, as you might expect, there is also a "don't eat me" signal on healthy cells to turn the macrophage off. Red blood cells carry the "don't eat me" CD47



signal molecule on their surface, but as the cell ages and wears out over its lifespan of 120 days, the CD 47 molecule changes shape, eventually becoming an "eat me" signal. Every second, 2.5 million red blood cells are destroyed in organs such as the spleen because the "don't eat me" signal has changed into an "eat me" signal.

Cancer cells, however, are not normal cells. They are genetically damaged (mutated) cells that should be recognized and eaten by macrophages. One way some cancer cells avoid being eaten by a macrophage is by having lots of "don't eat me" CD47 molecules on their surface.

When macrophage cells invade a tumor they are stopped by the "don't eat me" signal. But unlike normal cells, cancer cells also have a separate "eat me" signal molecule called calreticulin.[1] If the "don't eat me" signal on a cancer cell is blocked, and the "eat me" signal is not blocked, macrophages will recognize the cancer cells as abnormal and eat them. One way to block the "don't eat me" signal is by giving a protein designed to stick specifically to CD47. This strategy has proven very successful in animal tests using human ovarian, breast, colon, bladder, brain, liver, and prostate cancer cells and could lead to an effective cancer treatment that does not depend on toxic chemotherapy drugs but allows the patient's own immune cells (macrophages) to kill the cancerous cells .[2]

The more closely we look at how living systems are controlled, the more the details point to the hand of a loving, intelligent Creator who knows how to program responsive control mechanisms able to direct cells to do this, not that. And even when those mechanisms are damaged, as in cancer cells, it is our ability to understand how the original design should work that suggests new ways to correct what has gone wrong.

—Michael G. Windheuser, Ph.D.

1 http://med.stanford.edu/ism/2010/december/crt- signal.html

2 http://www.genengnews.com/gen-news-highlights/blocking-don-t-eat-me-signal-on-cancer-cells-lets-phagocytes-clean-up/81246548/