Stopping stroke with extra oxygen: NetWellness

Published: Wednesday, October 12, 2011, 2:18 PM

By Special to The Plain Dealer

Two key findings about using oxygen point to a low-cost way of reducing harm to the brain from a stroke.

During stroke, blood vessels in the brain are blocked and life-sustaining nourishment, such as oxygen and glucose, are not able to reach the brain. Without these substances, brain cells cannot survive. The part of the brain supplied by those blood vessels is lost.

In this oxygen-starved state, the brain releases excessive amounts of a normal brain molecule (called glutamate) which further damages brain tissue. Providing extra oxygen during a stroke seems to be a logical treatment course, and for years, researchers tried to reduce brain injury by doing just that.

But multiple clinical trials failed to show consistent success, and in some cases, the oxygen appeared to actually worsen the damage. The idea of using oxygen during stroke lost steam. Researchers around the world turned their attention to finding new drugs that could limit the damage caused by the toxic chemical reactions in strokes.

**Back to basics**

Recently, researchers have decided to go back to the oxygen basics to search for more clues. Sometimes the research door stays closed, not because the result is not possible, but because the right key to the lock has not yet been found.

To find that key, the new research looked again at the process that happens when oxygen in the brain is very low to see how it contributes to death of nerve cells. Researchers added new scientific tools to the study so they could see what might be happening at the level of molecules or even at the genes to help explain why adding extra oxygen...
during stroke did not always help.

This research has found two key discoveries that may help change the way strokes are treated in the future. First, the study showed that it’s all about the timing. When oxygen therapy was given during the low-oxygen period before surgically removing the blood clot, there was less brain damage.

However, when oxygen therapy came after removing the blockage and blood flow was restored, damage was more severe. This result suggests that there might be an ideal time frame during stroke when extra oxygen can help and not hurt.

Second, the research showed the way that adding in extra oxygen helped. This discovery had to do with the normal brain molecule, glutamate. In stroke, this molecule is released in excess as the body’s attempt to keep the brain working.

The problem is that extra glutamate acts like a poison to nerve cells and causes damage. Adding more oxygen helps to convert the excess glutamate into much-needed energy for the cells. A special protective factor called “GOT” (glutamate oxaloacetate transaminase) facilitates the conversion of glutamate into fuel for the brain. GOT makes the system work even under conditions of lower oxygen so the brain doesn’t release too much toxic glutamate and damage the nerve cells.

This research, conducted at The Ohio State University Medical Center was funded by a pilot grant from The Ohio State Center for Clinical and Translational Science which is funded by the NIH to accelerate the process of turning scientific discovery into cures. This pilot award has added important information to explain how adding oxygen during stroke can reduce damage showing:

1) the right time frame for giving oxygen and

2) how oxygen converts toxic glutamate into fuel for brain cells

These two keys have opened the door for next steps and rapid translation to clinical research and treatment.

Related topics: oxygen treatment, savita khanna, strokes