

Something fishy in human blood could save lives

March 30 2007

Thousands of people with liver and kidney disease die every year from too much ammonia in their blood, and scientists from the United States and Japan have found a possible solution. In the April 2007 issue of The FASEB Journal they report that a protein which excretes ammonia through pufferfish gills is similar to human Rh blood proteins. By targeting human Rh proteins, new treatments will help people with damaged livers and kidneys remove toxic ammonia from their bloodstream.

"Rh proteins are important targets for treatment of high toxic blood ammonia levels that occur in liver disease," said Shigehisa Hirose, co-author of the study. "Our findings also indicate that the ammonia transport system involving Rh glycoproteins is evolutionally conserved in a broad range of organisms, suggesting an essential role for surviving."

For people with kidney and liver damage, the need to remove naturally occurring ammonia from the bloodstream is critical. Brain cells are particularly susceptible to ammonia, and at low levels, ammonia toxicity can cause mild to severe confusion, drowsiness, or tremors. At high levels, ammonia toxicity leads to coma and eventually death. Rh blood proteins are most commonly recognized as being used to help define blood type. For instance, people who are type A, B, AB, or O positive have Rh blood proteins on the surface of their red blood cells. People who are type A, B, AB, or O negative do not have Rh proteins on the surface of their red blood cells.

"This study has broad implications for practically any disease or trauma affecting the liver or kidneys," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal. "And the evolutionary implications make it even more compelling—hook, line, and sinker."

In addition to describing a new target for removing ammonia from the body, this study describes how fish gills are able to excrete ammonia at the molecular level using Rh proteins. This finding, when combined with the presence of Rh proteins in numerous organisms, adds a piece to the evolutionary puzzle, by suggesting that Rh proteins were developed very early in the evolution of animal systems, and continue to play an important role in removing toxic ammonia.

Source: Federation of American Societies for Experimental Biology

Citation: Something fishy in human blood could save lives (2007, March 30) retrieved 28 March 2023 from <https://medicalxpress.com/news/2007-03-fishy-human-blood.html>

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