Natural Protein Offers New Therapeutic Potential for Pre-Eclampsia

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Scientists at the University of Birmingham have shown that a single protein could help prevent the development of pre-eclampsia.

The research, which is published today (26th Mar) in the journal Circulation, focuses on the ability of the protein, heme oxygenase-1 (HO-1) to block the release of chemicals that inhibit the growth of blood vessels in the placenta.

Pre-eclampsia currently affects around 8% of all pregnancies. Substances released from the placenta (after birth) are believed to cause damage to the lining of the mother's blood vessels, which results in pre-eclampsia. Symptoms can include high blood pressure, proteins in the urine and potentially damage to a mother's kidneys and liver.

The only effective treatment is the premature delivery of the fetus, which presents a risk for both the mother and baby.

The Birmingham team discovered that HO-1 hinders the release of two chemicals (soluble Flt-1 and soluble endoglin), which damage the lining of the blood vessels (the endothelium) in the mother and slow the proper development of the placenta. This damage is believed to play a key role in the development of pre-eclampsia.

Lead author Professor Asif Ahmed explains: *"Recent studies have shown that these two proteins, which stunt the normal growth of blood vessels are present in women before pre-eclampsia sets in, which suggests they play a key role in the onset of the disease itself.*

This is the first time that a naturally occurring chemical that seems to prevent their release has been identified. This is potentially very significant because it offers a new therapeutic target to scientists hoping to target the disease in its early stages. Possibly encouraging the activity of HO-1 could help prevent the development of pre-eclampsia."

The Birmingham also looked at the effects of treating cells from the lining of the blood vessels with statins to try to encourage the activity of this very important enzyme. This treatment significantly lowered the levels of soluble Flt-1 in the cells. Similar experiments with vitamins E and C, which have been unsuccessfully trialled as treatments for pre-eclampsia, produced no similar inhibition.

Professor Ahmed continues: *"The hope is that using drugs to prevent the release of chemicals, which damage the lining of blood vessels in the placenta, could be an effective therapy for pre-eclampsia.*

Showing that HO-1 has an impact on these chemicals is the starting point to look at developing possible therapies. We are grateful to the British Heart Foundation for supporting my student Melissa Cudmore, who conducted a large part of these studies. These findings are exciting but major funding is now needed to take this work further to identify new targets and therapies.

Professor Peter Weissberg, Medical Director of the British Heart Foundation, said *"Pre-eclampsia is a potentially devastating condition for which there is currently no treatment other than delivering the baby. Previous research, a great deal of it funded by the BHF, has shown that it results from abnormal behaviour of blood vessels. The Birmingham team's research brings us ever closer to understanding the chemical signals that are responsible and opens up new possibilities for a successful treatment."*

The full title of the paper is:

Negative regulation of soluble Flt-1 and soluble endoglin release by a heme oxygenase, it is published online in Circulation

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Media Information

For further information or to request a PDF copy of the paper, contact Ben Hill Press Officer, University of Birmingham, Telephone 0121 4145134, Mobile 07789 921 163, email: b.r.hill@bham.ac.uk

Notes to Editors

PRE-ECLAMPSIA

Pre-eclampsia is said to be present when hypertension arises in pregnancy (pregnancy-induced hypertension) in association with significant protein in the urine. (Note: in the U.S. the word is spelled without the hyphen, "preeclampsia," and in most other parts of the world with a hyphen, "pre-eclampsia.") Its cause remains unclear, although the principal cause appears to be a substance or substances from the placenta causing endothelial dysfunction in the maternal blood vessels.

Pre-eclampsia may develop at varying times within pregnancy and its progress differs among patients; most cases present pre-term. It has no known cure apart from ending the pregnancy (induction of labour or abortion). It may also present up to six weeks post-partum. It is the most common, dangerous complication of pregnancy and it may affect both the mother and the fetus. Pre-eclampsia is thought to be responsible for more than 65,000 deaths annually.