

Circulation favors placenta over brain in fetuses of diabetic mothers

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Blood flows preferentially to the placenta instead of the brain in foetuses of mothers with diabetes, reveals research presented today at EuroEcho-Imaging 2016.

The annual meeting of the European Association of Cardiovascular Imaging (EACVI), a registered branch of the European Society of Cardiology (ESC), is held 7 to 10 December 2016 in Leipzig, Germany.

"We know that maternal [diabetes](#) mellitus affects the foetal organs," said lead author Dr Aparna Kulkarni, a paediatric cardiologist from the Bronx-Lebanon Hospital Centre, New York, USA. "Babies born to mothers with diabetes are sometimes bigger, especially if the diabetes is uncontrolled, and the [placenta](#) is larger. There is data to suggest that some other organs such as the pancreas and the kidneys in the foetus might be affected."

Dr Kulkarni's previous research identified subclinical changes in the heart muscle of foetuses of mothers with diabetes. In the current study she investigated whether these foetuses had changes in blood circulation.

This study included 14 foetuses of mothers with type 1 or 2 diabetes and 16 foetuses of mothers without diabetes (control group). Nine of the diabetic mothers used insulin, three took oral medications, and two used diet alone to control their glucose levels.

The researchers used foetal Doppler echocardiography to measure [blood](#)

[flow](#) to the brain, the left and right outflow tracts of the heart, the aorta, and the placenta. The data was plugged into a computerised model that mimics the foetal circulation. This model was developed by Dr Patricia Garcia-Canadilla in the Physense research laboratory of Dr Bart Bijmens at the University of Pompeu Fabra, Barcelona, Spain.

This research found that, compared to foetuses in the control group, in foetuses of diabetic mothers more blood flowed to the placenta and was diverted away from the brain. Specifically, foetuses of diabetic mothers had lower placental resistance and compliance, lower blood flow to the arteries in the brain (measured from the cerebral artery radius), a reduced proportion of blood flow to the brain than the placenta and a lower cardiac output.

Dr Kulkarni said: "The computational model equivalent of the foetal circulation is an electrical circuit where there are resistances and compliances. It is easier for blood to flow to the placenta, and harder for blood to flow to the brain."

Dr Kulkarni said the placenta in foetuses of diabetic mothers have changes in their blood vessels and are known to be large; therefore likely receive more blood supply. But she added that the lower proportion of blood supplying the brain is an interesting finding and could have bigger implications.

"The placenta gets taken away after a baby is born so it's no longer a part of the circulation," she said. "But it's possible that the reduced circulation to the [brain](#) in utero could affect the baby through life. We don't know enough about why this redistribution of blood flow occurs or the implications it might have. More research is needed to find out if this has any long-term impact on the health of the baby and whether anything can be done to prevent it."

She concluded: "At the present time, I don't think any changes should be made in management of pregnant women with diabetes mellitus based on these findings. Standard obstetric recommendations for strict glucose control and healthy lifestyle should be continued."

Provided by European Society of Cardiology

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