pre-eclampsia, 18 pregnant controls) we found no significant difference between the two groups. Our results suggest that the wide range of concentrations of E-selectin between patients may require large numbers of patients to show significant trends. In conclusion, our data confirm our previous observations supporting the hypothesis that neutrophils play a role in the pathophysiology of pre-eclampsia.

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Doppler colour flow imaging of fetal intracerebral arteries and umbilical artery in the small for gestational age fetus

Sir,

We read the article by Noordam *et al.* (Vol 101, June 1994) with great interest. It is a very important conclusion that the end diastolic velocity of the middle cerebral artery (MCA) is the most sensitive Doppler parameter discriminating between small for gestational age (SGA) and control fetuses. However, the time interval between measurement and delivery of the two groups differed considerably (13 and 66 days). The question is whether the significant difference of Doppler indices found between the SGA and controls groups is a consequence of chronic hypoxaemia associated with fetal retardation or it is also related to the redistribution of fetal circulation before delivery.

Our department is a level 3 perinatal unit concentrating on the pre- and dysmature deliveries. We investigated 214 women with singleton pregnancies between the 24th and 38th week of gestation using a Doppler colour flow imaging technique (ATL Ultramark-9). From the 214 pregnancies, 92 SGA and 122 AGA infants were born. The maternal age, parity and gestational week at Doppler measurement were not significantly different in the two groups. The time interval between measurement and delivery in the SGA and AGA groups differed significantly (11·4 and 28·5 days). The PI value of MCA and its standard deviation score (SDS) were also significantly different ($P < 0{\cdot}002$ and $P < 0{\cdot}001$) in the SGA (PI: 1·73 to 0·58; SDS: −0·42 to 1·08) and the AGA (PI: 2·02 to 0·71; SDS: −0·02 to 0·71) groups. However, the difference was more pronounced ($P < 0{\cdot}0001$) if the data were analysed concerning the time interval (0–14 days and more than two weeks) regardless of being the newborn SGA or not. In the first group the PI values were significantly lower ($n = 113$; PI: 1·67 to 0·5; SDS: −0·45 to 0·93) than in the second one ($n = 101$; PI: 2·15 to 0·75; SDS: 0·1 to 1·1). The MCA PI values were decreased in both SGA and AGA groups during the last two weeks before delivery.

Brain sparing effect is an answer for fetal hypoxaemia (Wladimiroff *et al.* 1987), but it is not clear how long before delivery or before the clinical signs of fetal hypoxia the intracerebral vascular resistance decreases. In about half of hypoxaemic infants Chandran *et al.* (1993) found that the MCA PI became low four days earlier than any fetal heart rate abnormality could be detected. Arabin *et al.* (1992) found that the time interval between Doppler examination and delivery had an influence on diagnostic capability of PI measured on fetal common carotid artery.

Our results suggest that the time interval between measurement and delivery should be considered in the analysis of MCA PI values. Further studies need to be performed to investigate the factors that influence and regulate the fetal cerebral circulation.

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Author's Reply

Sir,

The findings by Paulin *et al.* seem to be in agreement with our own study. Indeed, the time interval between Doppler measurement and delivery plays a role in establishing the predictive value of fetal cerebral velocimetry regarding fetal distress. It should be emphasised that in our paper the umbilical artery PI remained the best indicator for SGA.

Recently, we were able to demonstrate that a raised prognostic index representing a combination of umbilical and internal carotid artery PI was associated with fetal distress (as determined by fetal heart rate monitoring) in nearly 50% of women within a period of one week (Groenenberg *et al.* 1993).

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Reference

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