NEW INSIGHT INTO THE PATHOPHYSIOLOGY OF PREECLAMPSIA / GESTOSIS FROM FETAL NUCLEIC ACIDS

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In 1994 our group reported the novel finding that preeclampsia may be associated with an increased influx of fetal cells into the maternal circulation, a feature we were subsequently able to confirm in a case control study. Since it is likely that the underlying etiology leading to preeclampsia occurs early in pregnancy before onset of the symptoms, we performed a prospective study in which fetal cell numbers were enumerated in maternal blood samples collected at 20 weeks of gestation. This study clearly showed that fetal cell numbers were indeed elevated in those pregnancies with later developed preeclampsia. This indicates that the underlying placental disturbances leading to increased fetal cell traffic in preeclampsia occur early in those pregnancies which develop preeclampsia.

In pursuing the recent finding that cell free fetal DNA is present in maternal plasma, we observed that both fetal as well as maternal free DNA levels were significantly elevated in preeclamptic pregnancies. We furthermore observed that the levels of both these free DNA species increased in a co-ordinate manner with increasing disease severity. On the other hand, the analysis of our prospectively collected samples indicated that only cell free fetal DNA were elevated before onset of disorder symptoms. Since the release of cell free DNA is thought to result from some form of cell turnover or cell death, our result implies that the initiating lesion implicated in preeclampsia initially only involves the fetal/placental compartment, whereas once the symptoms have become manifest, the maternal compartment is also affected.
Our recent data on cell traffic and release of free DNA therefore offer new insights into the underlying etiology of this disorder, and offer the possibility of a new screening tool to detect pregnant women at risk for preeclampsia.