PERINATAL DIOXIN EXPOSURE AND THYROID FUNCTIONS AT FOLLOW-UP AFTER 7 – 12 YEARS: EVIDENCE FOR TRANSIENT EFFECTS ON THYROID FUNCTIONS

Gavin W. ten Tusscher[1ab], Adri Ilsen[1ab], Thomas Vulsma[1ab], Matthijs Westra[1c], Johannes W. van der Slikke[2c] (currently [2d]), Kees Olie[3b], Janna G. Koppe[1ab]

[1]Department of Paediatrics and Neonatology, [2]Department of Gynaecology and Obstetrics, [3]Department of Environmental and Toxicological Chemistry

[a]Emma Children's Hospital/Academic Medical Center, [b]University of Amsterdam, The Netherlands, [c]De Heel Zaans Medical Center, Zaandam, The Netherlands, [d] Vrije Universiteit Medical Centre, Amsterdam, The Netherlands

Correspondence address: G.W. ten Tusscher, Dept. of Paediatrics & Neonatology, PO Box 22660, 1100 DD Amsterdam, The Netherlands. Tel/Fax: NL + (0)229 27 86 27, Email: g.w.ten.tusscher@planet.nl

Objectives

Perinatal exposure to Dutch "background" dioxin levels is rather high but not much higher than other industrialised countries. Previous studies of our cohort reveled abnormal thyroid hormone levels in the perinatal period[1,2], which were no longer evident at follow-up at the age of 2½ years[3]. However, dioxins may cause health effects spanning many years. Therefore we determined plasma thyroid stimulating hormone (TSH) and free thyroxine (FT4) levels amongst our longitudinal cohort at the age of 7 - 12 years, as was done previously.

Study design

The longitudinal cohort consisted of 37 healthy children (7 - 12, mean 8.2 years), with documented perinatal dioxin exposure. The prenatal exposure ranged from 8.74 to 88.80 (mean 34.6) ng TEQ dioxin/kg milk fat. The postnatal exposure ranged from 4.34 to 384.51 (mean 75.4) ng TEQ dioxin. The children underwent venous blood withdrawal for the determination of TSH and FT4, which were performed using routine assays.

Results

Linear regression of TSH and FT4 revealed no relation with prenatal and postnatal dioxin exposure.

Conclusion

This follow-up has shown a normalisation of previously abnormal thyroid hormone homeostasis. This study provides evidence for a transient effect of Dutch background dioxin exposure on thyroid function. This may be a result of the combination of body composition (less adipose tissue) in the perinatal period, higher T4 demand perinatally, decreasing exposure from the relatively high perinatal to the much lower later childhood background exposure, and from a dilutional effect (more adipose tissue).

References

1. Pluim HJ, Koppe JG, Olie K, van der Slikke JW, Kok JH, Vulsma T, *et al*. Effects of dioxins on thyroid function in newborn babies (letter). Lancet 1992; 339: 1303
2. Pluim HJ, de Vijlder JJ, Olie K, Kok JH, Vulsma T, van Tijn DA, van der Slikke JW, Koppe JG. Effects of pre- and postnatal exposure to chlorinated dioxins and furans on human neonatal thyroid hormone concentrations. Environ Health Perspect 1993; 101(6): 504-8
3. Ilsen A, Briët JM, Koppe JG, Pluim HJ, Oosting J. Signs of enhanced neuromotor maturation in children due to perinatal load with background levels of dioxins. Follow-up until age 2 years and 7 months. Chemosphere 1996; 33(7): 1317-26