

PLASMA EPIDERMAL GROWTH FACTOR RECEPTOR AS A BIOMARKER OF DIOXIN EXPOSURE

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Introduction

Animal models suggest that dioxins have a negative effect on the level of expression of the epidermal growth factor receptor (EGFR) in cells. In vivo the level of expression in tissue of EGFR can be monitored by assaying for the extracellular domain (ECD) in blood. Therefore, in this study, we have quantitated the EGFR ECD in the plasma of individuals with various levels of blood dioxin to test the hypothesis that individuals with higher dioxin levels would have lower levels of EGFR ECD.

Materials and Methods

EGFR ECD levels were determined by ELISA (1) in the plasma of 30 individuals with varying blood dioxin levels: 10 with high blood dioxin levels (TEQ range = 318-673 ppt), 10 with medium blood dioxin levels (TEQ range = 16-60 ppt) and 10 with low blood dioxin levels (TEQ range = 3-10 ppt).

Results and Discussion

The plasma EGFR ECD levels were: 45 ± 26 fmol/ml (range = ND-100 fmol/ml) in the high dioxin group; 41 ± 23 fmol/ml (range = ND-81 fmol/ml) in the medium dioxin group; and 73 ± 43 fmol/ml (range = ND-133) in the low dioxin group. Since the results in the high and medium dioxin groups were essentially identical, the values for these two groups were combined (EGFR ECD = 43 ± 24 fmol/ml). The results in the combined group were statistically significantly lower than those in the low dioxin group ($p=0.02$). No similar effect was seen in the plasma levels of the ECD of the c-erbB-2 p185 protein, a transmembrane growth factor receptor which is highly homologous to EGFR. These results suggest that plasma EGFR ECD may be an in vivo marker of the biological effect of dioxin exposure.

References

1. Partanen R, Hemminki K, Koskinen H, Luo JC, Carney WP and Brandt-Rauf PW; J. Occup. Med. 1994, 36, 1324.

