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Serum antioxidants may modify the systemic immunological response induced by exposure to passive smoke in non smoking healthy adolescents

by

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Objective: Second hand smoke (SHS) is a potent mixture of toxins, free radicals and carcinogens. While it has been indicated that exposure to SHS can cause a local *in vivo* response, we investigated into whether exposure to SHS has the potential or capability to induce a systemic immunological response in healthy non smoking adolescent subjects and how this is altered by serum antioxidants.

Methods: Blood was drawn from a subset of non-smoking, SHS exposed adolescents participating in the Heraklion HELENA cohort (n=68, mean age 14.2 years) and analysed for cotinine, immunophenotyping of lymphocyte subpopulations and plasma antioxidants. Correlations and regression analyses were performed investigating into circulating B-cells (CD19), T-cells (CD4+CD45RO+, CD4+CD45RA+, CD3+CD45RO+, CD3+CD45RA+, CD8+CD45RA+, CD8+CD45RO+) and natural killer (CD3+CD16CD56+) cells in relation with biomarker quantified exposure to SHS, controlling for age, gender, body mass index and plasma antioxidants (Alpha-Tocopherol, TEAC, Vitamin C, Retinol).

Results: According to our findings, biomarker quantified exposure to SHS was correlated with a linear dose-response reduction in the percentages of memory CD4+CD45RO+ (p=0.005) and CD3+CD45RO+ T cell subsets (p=0.005 and p=0.003, respectively) and a linear increase in the percentage of naïve CD4+CD45RA+ and CD3+CD45RA+ T cell subsets (p=0.006 and p=0.003, respectively). Additionally, when investigating into quartiles of exposure (lowest quartile of exposure to SHS *vs*. highest quartile of exposure to SHS) similar results were derived for all the above lymphocyte subsets (p=0.004), further indicating the noticed dose response relationship.

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Moreover, after controlling for age, gender, body mass index and plasma antioxidants, SHS exposure was found to be associated with the percentage of circulating naïve and memory CD4+ and CD3+ T cell subpopulations, as revealed through a linear regression analysis. Moreover, TEAC levels were also independently found to be related to the above changes in T cell subsets between quartiles of exposure, indicating its possible role as an effect modifier.

Conclusions: These findings point out a systemic immunological response in healthy, non-smoking adolescents exposed to SHS. Moreover, it is plausible that circulating serum antioxidants, notably TEAC, i.e therefore dietary habits, may modify the systemic immunological response induced by exposure to SHS.