Antibodies against Oxidized LDL in Infants

To the Editor:

We conducted two studies of serum antibodies against oxidized LDL (IgoxLDL) in mothers and their infants during the past 2 years. We used an ELISA (oLAb; Eli-Tec Labor- reagenzien GmbH) based on the use of Cu2+-oxidized LDL particles bound to the surface of microtiter plate wells and an anti-human IgG- peroxidase conjugate. In the first study of mothers and their infants at birth and again at the age of 3 months, we had the opportunity to analyze the records of these infants in detail. Surprisingly, the infants with extremely high IgoxLDL had not been breast-fed during the first 3 months of life, whereas the others had been (Table 1). The difference between the values in breast-fed and formula-fed infants was statistically significant (P < 0.001, Wilcoxon unpaired test).

The Spearman rank correlation between IgoxLDL concentrations in the sera of mothers and their newborns was statistically significant (r = 0.79; P < 0.001); on the other hand, no significant correlation was found between values for 3-month-old infants and their mothers. The early correlation reflects transplacental transport of class G IgoxLDL, whereas the infants were later able to produce their own antibodies. The production rate was individual and could be influenced by nutrition type. We also compared the number of DNA breaks in peripheral lymphocytes from 3-month-old infants by singlecell gel electrophoresis (comet assay). This method in combination with endonuclease III (endoIII) treatment of cells is able to detect oxidized pyrimidines (2). When compared with breast-fed infants, formula-fed infants had a higher number of DNA strand breaks (0.39 ± 0.06 vs 0.14 ± 0.02 DNA strand breaks/10⁹ Da) and endoIII-sensitive sites representing predominantly oxidized pyrimidines (0.24 ± 0.10 vs 0.07 ± 0.04 endoIII sites/10⁹ Da; P = 0.027 and 0.007, respectively, Mann–Whitney). Because the nutrition of infants contributes for their future health (3), our preliminary data may be important.

There are several possible ways to interpret our findings. One possibility is that milk formulas contain higher concentrations of IgAoxLDL than breast milk; this explanation can be omitted because our method was sensitive only to IgGoxLDL. Another explanation for these results is that milk formula diminishes oxidative stress more than breast milk and consequently leads to increased free IgoxLDL in the circulation of infants because these antibodies are unable to bind to oxidized LDL (4).

A completely different explanation is that formula feeding might cause some kind of gastrointestinal inflammatory reaction followed by early production of IgoxGDL in these children. This may be likely if the milk formula is of nonhuman, e.g., bovine, origin, but we are also aware of the hypothesis that self-non-self recognition develops after the third month of life. On the other hand, our results show a significant increase of oxidative DNA damage in formula-fed infants compared with breast-fed infants. This increase may be a consequence of a higher oxidative load in formula-fed children, resulting from metabolic processes, or a consequence of higher antioxidative protection in breast-fed infants. The higher number of oxidized LDL particles, which are cytotoxic and able to induce apoptosis (5), may explain the enhanced oxidative DNA damage.

On the basis of our preliminary findings, we are not able to answer these questions properly, but we are convinced that additional studies should be initiated to get clearer recommendations regarding optimal nutrition for children during the first months of life.

Table 1. Serum IgoxLDL in mothers and in their children at birth and 3 months later.

<table>
<thead>
<tr>
<th>Group</th>
<th>At birth</th>
<th>3 months later</th>
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<tbody>
<tr>
<td></td>
<td>Mothers</td>
<td>Newborns</td>
</tr>
<tr>
<td>Breast-fed (n = 6)</td>
<td>803 ± 375</td>
<td>657 ± 316</td>
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<tr>
<td>Formula-fed (n = 8)</td>
<td>1418 ± 1271</td>
<td>739 ± 605</td>
</tr>
<tr>
<td>Total (n = 14)</td>
<td>1059 ± 874</td>
<td>691 ± 435</td>
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* Values expressed as mean ± SD.

References

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