Background and Aim

Cancer is one of the most fatal malignancies, responsible for the death of more than 7 million people in the world during last year [1]. The disease can target practically any tissue or organ in the human body, with varying degrees of malignancy. Cancer is caused by DNA damage in the genes governing normal cell growth and cell death, which will lead to uncontrolled cell division. DNA damage can be caused by chemicals, radiation, viruses or spontaneous mutations. As most treatments are still not fully satisfying, the need for new strategies is important. One of these strategies may be chemoprevention through eating habits.

Materials and Methods

To study the cytotoxic effects of bovine lactoferricin (L1290, Sigma-Aldrich Co) on the human colon cancer cell line, CaCo-2 (American Tissue Type Collection), different concentrations of lactoferricin were tested in a 96-well plate MTT assay [4]. A bromodeoxyuridine DNA flow cytometry method was used to study the effect of physiologically relevant doses of lactoferricin on cell cycle kinetics and cell proliferation [5]. The concentrations used were 0.0002 µM, 0.02 µM and 2 µM lactoferricin.

Results

Dose-response curve for CaCo-2 cells exposed to lactoferricin for 72 hours

Effect of lactoferricin exposure on the length of S phase in CaCo-2 cells

Table 1. Prolongation of the S phase by 2 µM of lactoferricin. The chromosomes are duplicated in the S phase (Fig. 1).

<table>
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<tr>
<th>Lactoferricin concentration (µM)</th>
<th>Reduction of MTT (IC50) [%]</th>
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<tbody>
<tr>
<td>Control</td>
<td>13.4±0.5</td>
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The data are from one representative experiment out of two with n=3.

Results

• The results from the MTT assay (Fig. 3) showed that lactoferricin is not cytotoxic to the colon cancer cell line CaCo-2. As lactoferricin is a food component, a low degree of cytotoxicity is imperative, since it otherwise would risk harming normal cells.

• The results from the growth curve assay (Fig. 4) indicate inhibition of proliferation in CaCo-2 cells treated with 2 µM lactoferricin.

• These findings are supported by the prolongation of the S phase presented in table 1. A low degree of cell cycle kinetic effects are likely to be part of health beneficial properties.

Conclusions

• The level of lactoferricin achieved in the intestine by milk consumption can prolong the S phase in human colon cancer cells.

• A prolonged S phase may result in decreased intestinal cancer development.