Evaluation of the telomeric activity during Lymphoid cell development from umbilical cord blood stem cells.

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Abstract

Background: The telomere is a nucleoprotein complex at the end of eukaryotic chromosomes and its length is regulated by telomerase. The number of DNA repeat sequence $(TTAGGG)_n$ and telomere length is reduced with each cell division in differentiated cells. The aim of this study was to evaluate the effect of Interleukin-2, 7 and 15 on telomere length and hTERT gene expression in mononuclear and umbilical cord blood stem cells ($CD34^+$ cells) during development to lymphoid cells.

Methods: The mononuclear cells were isolated from umbilical cord blood by Ficoll-Paque density gradient. Then cells were cultured for 21 days in the presence of different cytokines. Telomere length and hTERT gene expression were evaluated in freshly isolated cells, 7, 14 and 21 days of culture by real-time PCR. The same condition had been done for $CD34^+$ cells but telomere length and hTERT gene expression were measured at initial and day 21 of the experiment.

Results: Highest hTERT gene expression and maximum telomere length were measured at day14 of MNCs in the presence of IL-7 and IL-15. Also, there was a significant correlation between telomere length and telomerase gene expression in MNCs at 14 days in a combination of IL-7 and IL-15 ($r = 0.998$, $p = 0.04$). In contrast, IL-2 showed no distinct effect on telomere length and hTERT gene expression in cells.

Conclusion: Taken together, IL-7 and IL-15 increased telomere length and hTERT gene expression at 14 day of the experiment. In conclusion, it seems likely that cells maintain naïve phenotype due to prolonged exposure of IL-7.

Keywords: Telomere; Telomerase; Interleukin; Mononuclear cells; $CD34^{+}$ cells