DIFFERENCES IN PHOSPHOLIPID METABOLISM OF BLAST CELLS FROM PATIENTS WITH ACUTE LYMPHOBLASTIC LEUKEMIA (ALL) AND ACUTE MYELOBLASTIC LEUKEMIA (AML) - $^{31}$P MRS IN VITRO STUDY

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Introduction

$^{31}$P MRS is a convenient and precise analytical tool for phospholipid analysis of extracts from biological samples [1]. The purpose of this investigation was to evaluate the changes in phospholipid metabolism in lymphoblasts of patients with acute lymphoblastic leukemia (ALL) in comparison with myeloblasts of patients with acute myeloblastic leukemia (AML).

Material and methods

This assay was conducted on PL extracts originating from peripheral blood mononuclear cells (PBMC) of 15 healthy volunteers aged from 22-55, 77 patients with acute leukemia (AL) aged from 17-79 (57 with AML and 20 with ALL). Methanol-chloroform PL extraction from $6 \times 10^6$ cells was performed according to the modified Folch’s method. The dried phospholipids were dissolved in 0.2 ml methanol and 0.4 ml chloroform. $^{31}$P MRS analyses were conducted on an AMX 300 Bruker spectrometer (7.05 T). $^1$H decoupling was used only in acquisition time. Methyleneephosphonic acid (MDPA) served as an external reference substance (16.726 ppm referenced to $85\% \text{H}_3\text{PO}_4$).

Results and discussion

$^{31}$P NMR spectra of PL extracts from PBMC and BMMC of patients with AML differ from these originated from patients with ALL. Integral intensities of peaks due to PC, CPLAS, SM, PI+PE, and PS in spectra of patients with ALL were decreased in reference to patients with AML (fig. 1-2). These differences in PL levels between AML and ALL groups were observed both for phospholipid extracts from PBMC, as well as BMMC. There were no differences between AML M2 and AML M4 in $^{31}$P NMR spectra (fig. 1) as well as PL composition. The difference in PL composition between ALL and
AML is due to another phospholipid metabolism in lymphoblasts and myeloblasts. For example, unlike with the lymphoid compartment, the release of CPLAS from myeloid cells may occur mainly in more advanced stages of differentiation [2].

fig. 1. $^{31}$P NMR spectra of PL extracts from PBMC of patients with ALL (A), AML M2 (B), and AML M4 (C).

fig. 2. $^{31}$P NMR spectra of PL extracts from BMMC of patients with ALL (A), AML (B).

References