

Distribution of Curcumin and THC in Peripheral Blood Mononuclear Cells Isolated from Healthy Individuals and Patients with Chronic Lymphocytic Leukemia

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Abstract

Background/Aim: Curcumin is being widely investigated for its anticancer properties and studies in the literature suggest that curcumin distributes to a higher degree in tumor versus non-tumor cells. In the current study, we report on investigation of the distribution of curcumin and metabolism to THC in PBMC from healthy individuals and chronic lymphocytic leukemia (CLL) patients following exposure to Lipocur™ (liposomal curcumin). *Materials and Methods:* The time and temperature-dependent distribution of liposomal curcumin and metabolism to tetrahydrocurcumin (THC) were measured in vitro in human peripheral blood mononuclear cells (PBMC) obtained from healthy individuals, PBMC_{HI} (cryopreserved and freshly isolated PBMC) and CLL patients (cryopreserved PBMC) with lymphocyte counts ranging from 17–58×10⁶ cells/ml (PBMC_{CLL,Grp 1}) and >150×10⁶ cells/ml (PBMC_{CLL,Grp 2}). PBMC were incubated in plasma protein supplemented media with Lipocur™ for 2–16 min at 37°C and 4°C and the cell and medium levels of curcumin determined by LC-MS/MS. *Results:* PBMC from CLL patients displayed a 2.2–2.6-fold higher distribution of curcumin compared to PBMC_{HI}. Curcumin distribution into PBMC_{CLL, Grp 1/Grp 2} ranged from 384.75 – 574.50 ng/g w.w. of cell pellet and was greater compared to PBMC_{HI} that ranged from 122.27–220.59 ng/g w.w. of cell pellet following incubation for up to 15–16 min at 37°C. The distribution of curcumin into PBMC_{CLL,Grp 2} was time-dependent in comparison to PBMC_{HI} which did not display a time-dependence and there was no temperature-dependence for curcumin distribution in either cell type. Curcumin was metabolized to THC in PBMC. The metabolism of curcumin to THC was not markedly different between PBMC_{HI} (range=23.94–42.04 ng/g w.w. cell pellet) and PBMC_{CLL,Grp 1/Grp 2} (range=23.08–48.22 ng/g. w.w. cell pellet). However, a significantly greater time and temperature-dependence was noted for THC in PBMC_{CLL,Grp 2} compared to PBMC_{HI}. *Conclusion:* Curcumin distribution into PBMC from CLL patients was higher compared to PBMC from healthy individuals, while metabolism to THC was similar. The potential for a greater distribution of curcumin into PBMC from CLL patients may be of therapeutic benefit.

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