
Phytochemical composition for enhancing cytotoxic activity in treatment of acute lymphoblastic leukemia.

Product description

According to the currently adopted classification of the World Health Organization, acute lymphoblastic leukemia (ALL) is defined as a group of neoplasms originating from lymphoid precursor cells. Heterogeneous character of this disease obliges oncologists to perform numerous additional diagnostic tests, such as testing for the presence of BCR-ABL transcript which contributes to poor prognosis or identifying the immune subtypes. ALL is the most frequently observed malignancy in children, with treatment failures and relapses occurring in approximately 20% of cases. Considering the recurrence of the disease in some children, as well as the problem of resistance to steroids and chemotherapy in ALL, it is important to develop novel, more effective and less toxic treatment options.

Efforts to provide improved treatment regimens for children suffering from high-risk ALL are the starting point of the study included in this project. It focuses on the science of natural substances and their anticancer potential in treating children with ALL - a topic not yet fully investigated in oncology. As scientific research rarely concentrates on pediatric patients, this study verified the anticancer effect of plant-derived compounds - such as curcumin, resveratrol, quercetin and genistein - on ALL cell lines, based on the already-published reports regarding adult patients diagnosed with other types of cancer. The anticancer potential of the above-mentioned compounds has usually been verified by examining single substances or combinations of two compounds. However, a composition of four substances has not yet been studied in cases of ALL.

Not only have we managed to confirm positive anticancer activity of the selected compounds but we have also proved that implementation of phytochemical compositions allows to avoid the problem of bioavailability (reaching therapeutic concentrations of the administered substances in the body) which is a commonly faced challenge associated with clinical application of natural substances.

The composition presented in this study is characterized by a strong synergistic effect and a minor, transient interaction with normal cells. Research has shown that, even at low doses, genistein and curcumin demonstrate synergistic anticancer effects on ALL cells. Moreover, mixtures consisting only of resveratrol and quercetin do not significantly affect MOLT-4 cells. However, combining these two substances with genistein and curcumin enhances their anticancer effect. Only the use of phytochemical composition consisting of all four analyzed substances administered in concentrations examined in this study demonstrates anticancer effect without permanent negative effects on control cells (fibroblasts). Discovering the synergistic anticancer effect on ALL cell lines enabled us to propose further studies examining the application of this phytochemical composition in pediatric patients with ALL.

Current scientific reports are focused almost entirely on testing phytochemicals on cancer cell lines without simultaneously conducting similar tests on normal cells. This study involved experiments carried

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out on both neoplastic and normal cells, therefore allowing its authors to assess not only the anticancer potential of this phytochemical composition but also its potentially negative effects on healthy cells. By using various concentrations of the selected compounds we were able to determine the exact amount of this phytochemical composition which allowed us to achieve chemotherapeutic effects, while avoiding harmful consequences for healthy cells.

Key words

phytochemicals, resveratrol, quercetin, genistein, curcumin, lymphoblastic leukemia

Legal status of the product

Patent application of the Patent Office of the Republic of Poland from 2021: Phytochemical composition for enhancing cytotoxic activity in treatment of acute lymphoblastic leukemia.

Application number: P.437273.

Subject of the offer

The subject of this invention is a novel composition of phytochemicals - resveratrol, quercetin, genistein and curcumin - used in supplementation during chemotherapy of acute lymphoblastic leukemias.

Market analysis

It is widely known that cancer treatment involving radiotherapy or chemotherapy can either damage or weaken the immune system of a patient, especially when it comes to the pediatric population. Therefore the search for an adequate composition that will strengthen the immune system during cancer treatment continues. Owing to the supplementation with the above-mentioned combination of phytochemicals, it is possible to enhance cytotoxic activity in treatment of acute lymphoblastic leukemia

Product advantages

Besides enhancing cytotoxic activity in treatment of acute lymphoblastic leukemia, a unique advantage of the proposed phytochemical composition is the potential ability to administer this product to pediatric patients. The new direction in research set by the authors of this discovery may contribute to future changes in therapeutic regimens for high-risk patients by introducing novel treatment options which are more effective, less toxic and better tolerated by patients.