

## ANTICANCER DERIVATIVES OF USNIC ACID



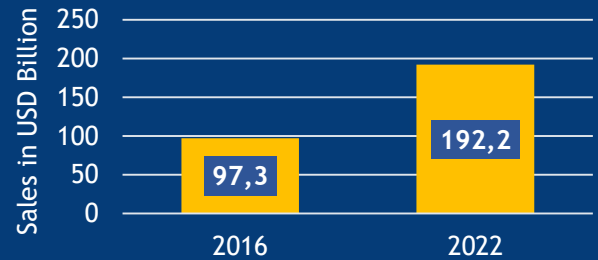
### Technology

The invention concerns the development of new compounds, usnic acid derivatives named Raj-415 and Raj-432, obtained by chemical synthesis and having antiproliferative activity against cancer cells of various origins, even when used at low concentrations. In addition, the compounds induce characteristic changes in tumor cells based on strong vacuolization, what contributes to the death of cancer cells. In cytotoxicity tests Raj-415 and Raj-432 compounds have been shown to inhibit the viability of all tumor cell lines tested, i.e. the MCF-7 breast, HeLa cervix and PC-3 prostate cancer cell lines, while being not cytotoxic to healthy human fibroblasts (HDFa cell line). The subjects of the invention are new chemical compounds - usnic acid derivatives obtained through the chemical synthesis and their cytotoxic activity against cancer cells of various origins. Usnic acid is a known, biologically active compound isolated from lichens, characterized by a wide spectrum of interactions, both in plant and animal living organisms as well as humans. It has many activities such as: antiviral, antifungal, antibacterial, antiprotozoal and immunomodulatory. It is also known from its photo-protective, anti-inflammatory, analgesic and antipyretic activity. The new innovative derivatives of usnic acid have cytotoxic properties in relation to the cancer cells. The modifications introduced into the known structure aim to reduce the toxicity of the original compound towards normal cells, reduce the rotational freedom of the stereoisomers, improve the solubility and increase the selectivity of the resulting compounds against cancer cells. Due to the cytotoxic properties described above, the developed compounds may find application as the therapeutic substances for the prevention and/or treatment of the cancer, in particular breast, cervical and prostate cancers. In addition, new compounds induce a specific type of cancer cell death, associated with vacuolization, so they can be used in basic research as inducers of such a process (currently commercial vacuolization inducers are not available on the market).

## Market

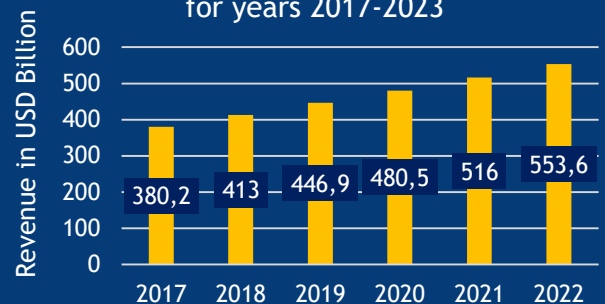
The target market for the invention is the biotechnology and the pharmaceutical market. The biotechnology market value reflects revenues from product sales, licensing fees and research funding. According to the report "Global - Biotechnology" by MarketLine the global biotechnology industry had total revenues of USD 380,2 Billion in 2017 and is expected to reach USD 553,6 Billion in 2022. The medical/healthcare segment was the most lucrative industry of the biotechnology market in 2017. Total revenues value amounted to USD 218,0 Billion and made 57,3% of the industry's overall value. According to the report "2018 Global life sciences outlook" by Deloitte the prescription drugs and OCT products market targeted to personalized medicine is forecast to reach USD 2,4 trillion in 2022 at a CAGR of 11,8%. Growth of the market will be driven by advancements in technology and targeted therapies.

Drug and OTC oncology therapy worldwide sales volume in 2016-2022



source: Deloitte „ 2018 Global life sciences outlook”, 2018

Biotechnology market forecast for years 2017-2023



source: MarketLine "Global - Biotechnology", 2018

## Commercialization opportunities



- ➔ Licensing relationship
- ➔ Partnership for further studies and commercialisation
- ➔ Transfer of ownership

## IP Status



The invention was submitted for patenting according to Polish P.413596 procedures.

## Implementation progress



**TRL 4**  
Technology validated in laboratory conditions

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