UNIVERSITY OF GDANSK

TECHNOLOGY TRANSFER OFFICE

TECHNOLOGICAL OFFER
No. 012/2/2018

PIPERIDINE DERIVATIVES OF 9,10-ANTHRAQUINONE WITH ANTICANCER ACTIVITIES

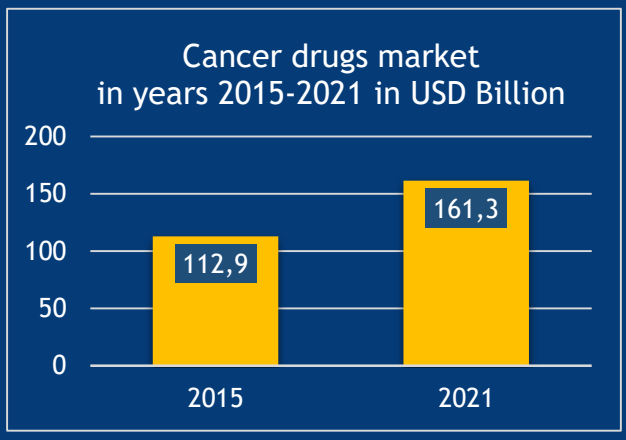
Market

Cancer affects more millions of people worldwide. The number of patients affected by cancer increases every year. According to the report "Cancer Drugs Market by Therapy (Immunotherapy, Targeted Therapy, Chemotherapy, Hormone Therapy and Others) for Breast Cancer, Blood Cancer, Gastrointestinal Cancer, Prostate Cancer, Skin Cancer, Lung Cancer and Other Cancer: Global Industry Perspective, Comprehensive Analysis and Forecast, 2015 - 2021" published by Zion Market Research global cancer drugs market was valued at approximately USD 112,90 Billion in 2015 and is expected to generate revenue of ca. USD 161,30 Billion by end of 2021.

Technology

The first group of developed active substances makes based on 1- (piperazin-1-yl) -9,10-anthraquinone derivatives, functionalised with acid or basic aminoacids or containing selected functional groups. The second group of compounds makes 9,10-anthraquinone derivatives containing a piperazine heterocycle. The above-mentioned compounds generate series of chemical substances obtained by methods not previously used and possessing new cytostatic properties. They show high proliferative activity. None of the new compounds showed drug resistance. All of the anthraquinone derivatives invented were tested for cytostatic activity on morphologically normal cells and showed low toxicity.

Opportunity Analysis and Forecasts to 2021



Increase in revenues of global cancer drugs market is caused by growing worldwide number of cancer incidences. Relevant influence on market increase has also growth in research investment, and development of biological and targeted drug therapies for the cancer treatment coupled along with the expiration of patents. It will probably pave the new ways for cancer drugs market development in the near future.

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Technology highlights

1. Developed methods of synthesis allow to fast and efficient production of cytostatic derivatives of anthraquinone.
2. Obtained derivatives exhibit markedly reduced cardiotoxicity, allowing to use at higher therapeutic doses, with increased effectiveness against tumour cells.
3. Compounds possessing 9,10-anthraquinone skeleton in their structure are the most numerous group of anthracyclic antibiotics inhibiting cancer cells development.

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Commercialization opportunities

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

IP Status

The invention was submitted for patenting according to Polish Nos.: P.407333, P.408238, P.408239, P.408240 and P.408241 procedures.

Implementation progress

TRL 4
Technology validated in laboratory conditions

Summary

Cancer affects more than 100 million people worldwide. Every year, about 15 million new cases of disease are diagnosed. Estimated costs of cancer treatment and patient care exceed USD trillion per year. Compounds possessing 9,10-anthraquinone skeleton in their structure are commonly used in cancer therapies, including treatment of acute leukemia, lymphomas, solid tumors (eg, breast, lung, thyroid, ovary) and many soft tissue tumors. Major disadvantage of anthracyclic antibiotics is their high cardiotoxicity and propensity to generate drug resistance in tumor cells treated with these compounds. Consequently, the demand for new compounds with higher anti-tumor activity is one of the most important challenges of modern medicine. Substances described herein belong to group of antibiotics with cytostatic activity, inhibiting the division of tumor cells. The compounds are based on 9,10-anthraquinone derivatives containing a heterocyclic system in the form of piperidine ring. Obtained derivatives exhibit markedly reduced cardiotoxicity, which allow to their use at higher therapeutic doses, with increased effectiveness against tumour cells and slower resistance generation. Developed methods of synthesis enable fast and efficient production of cytostatic derivatives of anthraquinone.

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