lumiblast

Project Factsheet

Lumiblast

A paradigm shift in cancer therapy – using mitochondria-powered chemiluminescence to non-invasively treat inaccessible tumours

Background

Brain tumours like for example Glioblastoma Multiforme (GBM) are very difficult to treat because of their location and aggressive characteristics. Approximately 28,000 new cases of malignant glioma such as GBM are diagnosed every year in the EU and the US and 240,000 patients globally every year.

The current standard therapy consists of surgery, followed by radiotherapy and chemotherapy. However, these therapies offer limited overall patient survival: The combination of surgery with radiotherapy increases the median of survival from 4.5 months (untreated) to 12.1 months. Additional chemotherapy with temozolomide extends survival to 14.6 months.

The relative survival rate for adults diagnosed with GBM is less than 30% within one year of diagnosis, and only 3% of patients live longer than five years after initial diagnosis, showing a high unmet medical need. Such deep lying, hard to reach tumours remain very difficult to treat and existing therapies offer only a minimal increase in survival rates.

Objectives

The overarching goal of Lumiblast is to deliver the proof-of-concept for the intracellular action proposed above, in cell cultures as well as in preclinical studies and evaluate the potential for its future translation into the clinic. The specific project objectives are:

- Design and synthesis of the mitochondria-targeting luminols with various mitochondria targeting groups and spacers of varying lengths;
- Photochemical studies on the mitochondrial luminols with regard to their stability, and luminescence in the presence of various ROS and PpIX with regard to its activation by modified luminols and singlet oxygen production;
- In vitro validation and optimization of Lumiblast in GBM cancer cell lines, and selection of the best performing modified luminols for in vivo studies;
- In vivo evaluation of Lumiblast in the appropriate subcutaneous xenograft GBM cancer models and further validation of the Lumiblast efficacy in syngeneic GBM orthotopic mouse models;
- Assessment of Lumiblast potential for translation into the clinic, based on the project results and design of a tentative business plan.

Funding Programme:
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 712921.

Project Duration:
01/10/2016 – 31/03/2021

Project Budget:
3 million euro

Project Website:
www.lumiblast.eu

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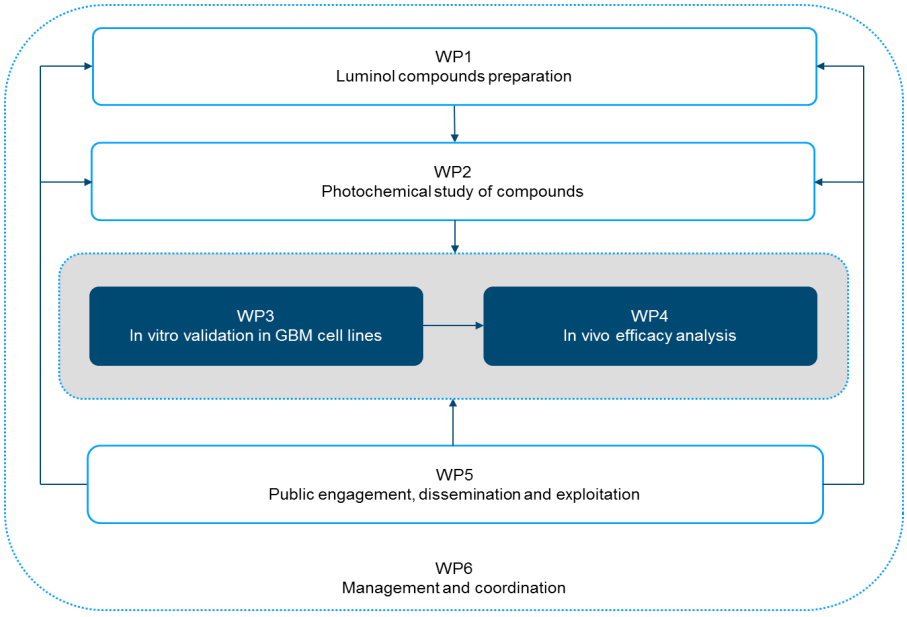
Activities

The proposed project is an ambitious interdisciplinary effort as shown in the Pert diagram below. The overall project management will be the responsibility of Prof. Kristian Berg from the Oslo University Hospital and the leaders oft he individual Work Packages (WPs) will be managing their respective WP:



Impact

The expected impact of Lumiblast will be multifaceted. Although Lumiblast will be a totally drug-based treatment, its effect will be photochemical. In this sense, it will have a curative potential especially in difficult to reach and practically incurable cancers like GBM. The principle utilized in Lumiblast may also be relevant for cancers of other origins. Furthermore, the Lumiblast treatment is expected to be economical for the health systems and for the patients.

- Extremely cost-effective, compared to current therapeutic schemes
- Curative potential, or potential for lifelong disease control
- No invasiveness, radiation or chemotherapeutic drugs involved
- Promotion of novel cancer therapies and development of new drugs by companies
- Synthesis committed to green chemistry
- No chemotoxic waste secretions from patients

Project Coordinator:

Prof Kristian Berg,
Oslo University Hospital, NO

Project Partners:

- accelopment AG (subcontractor)
- Knight Scientific Limited
- National and Kapodistrian University of Athens
- Oslo University Hospital
- Universitat Politècnica de València
- University of Oslo