

FLUORESCENT PROBE FOR BLADDER CANCER DETECTION

Market

Bladder cancer is one of the ten most common cancers worldwide, afflicting both genders and being the 13th most common cause of death associated with cancer. A mixture of immunotherapy, chemotherapies, and surgery are currently used in its treatment. The management of early-stage bladder cancer contributes to a significant healthcare burden due to the high risk of recurrence, frequent monitoring of the disease, and high treatment costs.

According to report “Bladder Cancer - Opportunity Analysis and Forecasts to 2018” by GlobalData, bladder cancer market is estimated expand to \$1.1 billion by 2025.

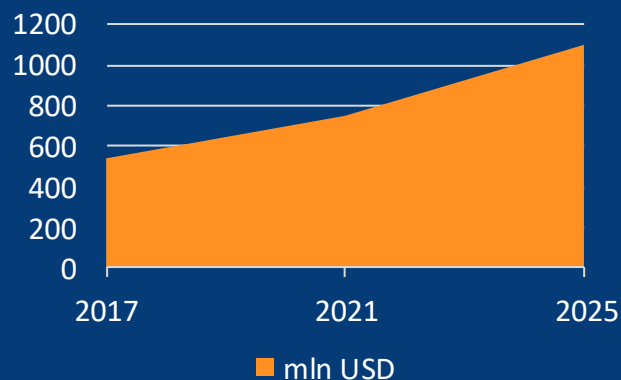
Technology

Fluorescent probe described herein can be used as an effective diagnostic test for bladder cancer. It relies on synthesized internally quenched fluorescent substrate of the 20S proteasome. This peptide, 2-aminobenzoic acid (ABZ)-Val-Val-Ser-Tyr-Ala-Met-Gly-Tyr(3-NO₂)-NH₂, is cleaved by the chymotrypsin 20S proteasome subunit and displays an excellent specificity and sensitivity and detection limit of 32pM and 5pM respectively. These values clearly indicate that probe is hydrolyzed by proteasome with very high efficiency, at enzyme concentrations as low as 32 pM. Consequently, the entire procedure of proteasome detection is very simple (involves mixing of 2 solutions), requires very small amount of biological sample (i.e. urea) and can be accomplished very quickly (within 60 minutes). Positive result, signified by increase in fluorescence, marks proteasome 20S presence in urine, which gives the opportunity to confirm the presence of cancer.

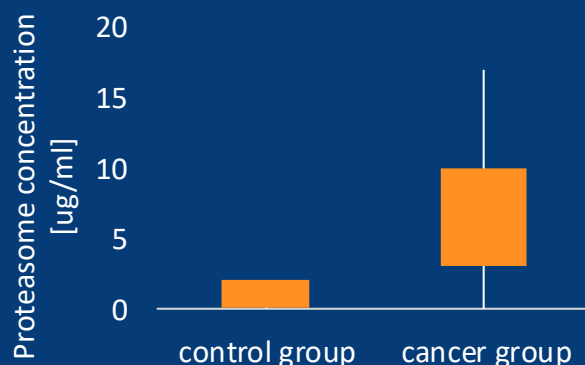
Bladder Cancer - Opportunity Analysis and Forecasts to 2025



Bladder cancer market



Proteasome 20S concentration determined using fluorescent probe in 6 healthy patients (control group) and 15 patients with diagnosed bladder cancer (cancer group).



Technology highlights

- 1 Very strong correlation between the presence of 20S proteasome in urea and incidence of bladder cancer
- 2 Fluorescent probe can be used as an effective diagnostic test for bladder cancer - increase in fluorescence marks proteasome 20S presence in urine
- 3 Relies on synthesized internally quenched fluorescent substrate of the 20S proteasome (2-aminobenzoic acid (ABZ)-Val-Val-Ser-Tyr-Ala-Met-Gly-Tyr(3-NO₂)-NH₂), cleaved by the chymotrypsin 20S proteasome subunit
- 4 Displays an excellent specificity and sensitivity with detection limits of 32pM and 5pM respectively
- 5 Very fast (60 minutes) detection time

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Commercialization opportunities



- ➔ Licensing agreement
- ➔ Transfer of ownership
- ➔ Spin off

IP Status



The invention was submitted for patenting according to Polish (P.408905) procedures.

Implementation progress



TRL 4
Technology validated in laboratory conditions

Summary



Proteasomes are a group of cellular protein complexes responsible for degradation of unnecessary or damaged proteins by proteolysis, which breaks proteins into constituent polypeptides. Several-amino-acid-long peptides yielded by this process can then be further degraded into shorter amino acid sequences and used in synthesizing new proteins. Recently, a very strong correlation has been described between the presence of 20S proteasome (which can be secreted from cells) in urea and incidence of bladder cancer. Several diagnostic approaches have been developed that detect 20S proteasome activity in plasma, but these suffer from problems with efficiency and sensitivity. Consequently, a new, highly efficient and sensitive diagnostic method allowing for detection of S20 proteasome in urea is needed.

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