Institut "Jožef Stefan" Ljubljana, Slovenija

TECHNOLOGY OFFER

SOLUTION FOR BACTERIAL SURFACE DISPLAY OF RECOMBINANT PROTEINS IN THE ABSENCE OF GENETICALLY MODIFIED ORGANISMS

Fields of use

Medical Technology / Biomedical Engineering, Medical Biomaterials, Cellular and Molecular Biology, Genetic Engineering, Micro- and Nanotechnology related to Biological sciences, Medical genetic engineering applications, Genetic Engineering, Molecular diagnosis, Therapeutic services, Oncology

Current state of technology

Concept stage

Type of cooperation

Joint venture agreement, License agreement, Research cooperation agreement

Intellectual property

The patent protection is in preparation

Developed by

Jožef Stefan Institute

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Summary

A research institute from Slovenia developed, tested and optimised biotechnological procedure for heterologous surface display of recombinant proteins in the absence of genetically modified organisms. The proposed solution reduces high regulatory documentation requirements for marketing approval in case of medicinal applications, simplifies the harvesting process, reduces production costs and time to market. Partnership agreement for joint venture, licensing or research cooperation is sought.

Description of the invention

R&D institute from Slovenia developed, tested and optimised biotechnological procedure for heterologous surface display of recombinant proteins in the absence of genetically modified organisms (GMOs) which reduces high regulatory documentation requirements for marketing approval in case of medicinal use. The method presented simplifies the harvesting process, reduces R&D and production costs, time to market. Partnership agreement for further testing and application development is sought.

R&D institute from Slovenia specialised in recombinant protein expression systems developed and tested a biotechnological approach for display of specific proteins on nonGMO bacteria.

Recombinant proteins are generally produced with the help of genetically engineered organisms (also GMO) which present a very complex and demanding regulatory requirements for the assessment of quality, safety, efficacy and environmental risk, which need to be approved by designated regulatory authorities before use in commercial products for human use, in particular for food or for medicines in European Union. The GMOs have also very negative public perception which presents a significant commercial set back.

The authors of the solution are expert scientists in the field of cancer progression and immune response study with modern biotechnological methods.

The R&D team achieved recombinant protein expression in a host different from the one on which it is displayed (heterologous display). Such an approach enables recombinant proteins production without presence of GMO in the final manufacturing steps.

Additional application potential was achieved by engineering the biotechnological production system, where the desired protein is secreted into the growth medium from where it anchors to the outside surface of a wild-type lactic-acid bacteria (LAB) or to carefully selected non-viable bacteria-like particles (BLPs) by a non-covalent binding.

KONZORCIJ ZA PRENOS TEHNOLOGIJ IZ JRO V GOSPODARSTVO

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

REPUBLIC OF SLOVENIA
MINISTRY OF EDUCATION, SCIENCE AND SPORT

The investment is co-financed by the Republic of Slovenia and the European Union under the European Regional Development Fund.

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Microbial surface display is an emerging technology with numerous potential applications. Engineering microorganisms to display proteins of choice or recombinant proteins on their surface renders them useful as whole-cell bio-catalysts, vaccines, biosensors, delivery vectors, bio-adsorbents and other. Microbial surface display can also be exploited for screening peptide libraries, detecting mutations and selecting binders.

Main Advantages

LAB are attractive platforms for the surface display of heterologous proteins due to their "generally recognised as safe" status, industrial applicability and assumed beneficial health effects as probiotics. The Slovene development team demonstrated the possibility of a biotechnological expression system:

- Bacterial surface display without the GMO organisms present in the last stage of the production system.
- Recombinant protein surface display, recombinant protein secretion to the growth medium and non-covalent anchoring of the particular protein to the BPL or microorganism surface, simplifies the extraction process and increases the protein yield.
- Adapt LAB which are well-studied and registered as "generally recognized as safe" (GRAS) for human consumption.
- LAB have positive effect on human health.
- Absence of GMO in the final production step significantly reduces regulatory requirements for regulatory marketing approvals hence significantly reduces R&D costs, time and reduces general reluctance of final users towards GMO.

Partner Sought

The Slovene research institution wishes to implement the presented technology as a therapeutic or diagnostic tool or a method. For this purpose an industrial partner, public or private research institution is sought, who wishes to establish:

- A joint venture or fund and/or have the know-how, the capacity, and accreditation to carry out pre-clinical studies, including, for example, laboratory animal tests (mice, primates), and ultimately scale up the manufacturing to industrial scale.
- License agreement for implementation of the presented technology and development commercially interesting products in the medicinal sector.
- A research cooperation agreement for further development of the presented technology.

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