

# Blood test for the diagnosis and monitoring of glioblastoma multiforme

## KEYWORDS

- ☐ EARLY DIAGNOSIS
- ☐ SCREENING PROGRAM
- ☐ SEROLOGICAL TEST
- ☐ IN VITRO DIAGNOSTIC DEVICE
- ☐ GLIOBLASTOMA MULTIFORME (GBM)

## AREA

- ☐ BIOMEDICAL

## CONTACTS

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## Priority Number

n. 102020000031139\_16.12.2020

## Patent Type

Patent for invention.

## Ownership

Sapienza University of Rome 100%

## Inventors

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## Industrial & Commercial Reference

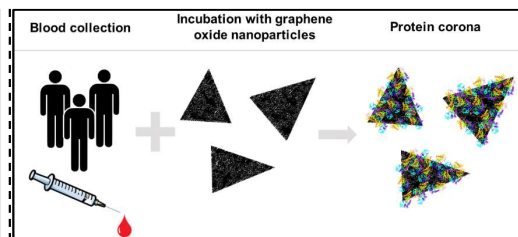
Medical device sector targeted for 70% ca. to the National Health Service ([www.confindustriadm.it](http://www.confindustriadm.it)).

## Time to Market

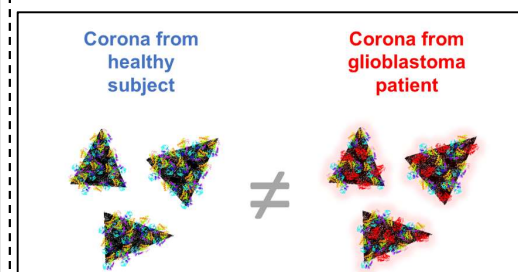
Current state of development is TRL4. Prototyping needs an industrial partnership. We estimate to reach TRL7 within 8-12 months.

## Availability

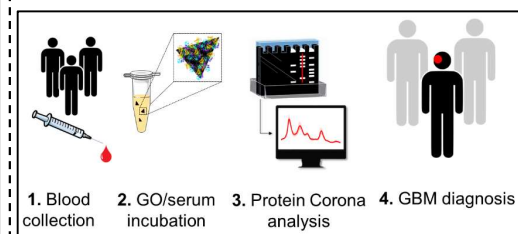
Cession, Licensing, Research, Development, Experimentation, Collaboration, Start-up and Spin-off.



**Fig. 1** Exposing graphene oxide nanoparticles to human plasma leads to formation of a protein corona at the particle surface.



**Fig. 2** Composition of protein corona depends on the protein source; the corona formed in the plasma of healthy subjects differs from that formed in the plasma of cancer patients.



**Fig. 3** Statistical analysis of the protein profiles obtained from the densitometric analysis of the electrophoretic profiles allows to identify subjects affected by glioblastoma with high sensitivity and specificity

## Abstract

The present invention relates to a rapid, effective, and low-cost first level technique to assist in the early diagnosis of glioblastoma multiforme, allowing to identify subjects in an early state of disease or at risk of developing it and for which it is appropriate to carry out second level examinations.

## Publications

- ❖ Personalized graphene oxide-protein corona in the human plasma of pancreatic cancer patients. Riccardo Di Santo, Luca Digiaco, Erica Quagliarini, Anna Laura Capriotti, Aldo Laganà, Riccardo Zenezini Chiozzi, Damiano Caputo, Chiara Cascone, Roberto Coppola, Daniela Pozzi, Giulio Caracciolo. *Frontiers in Bioengineering and Biotechnology* 8 (2020): 491.



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# Blood test for the diagnosis and monitoring of glioblastoma multiforme

## Technical Description

The invention relates to a blood test based on the use of graphene oxide nanoparticles for the diagnosis and monitoring of glioblastoma multiforme by means of electrophoresis on polyacrylamide gel (SDS-PAGE). The experimental procedure consists of three steps: (i) formation of a protein corona on the surface of graphene oxide nanoparticles following incubation in human plasma in vitro; (ii) isolation of the protein corona from nanoparticles through a specific experimental protocol and characterization by SDS-PAGE electrophoresis; (iii) statistical processing of protein profiles obtained from the densitometric analysis of electrophoretic profiles to identify subjects affected by glioblastoma multiforme.

## Technologies & Advantages

At the state of the art, there are no diagnostic systems for glioblastoma that do not involve the use of invasive techniques with a high risk for the patient, such as tissue biopsy, or techniques with high costs and laborious procedures. On the other hand, there is still a lack of valid patient monitoring techniques in response to treatment. Despite these limitations, the instrumentation presented in the patent uses experimental procedures completely compliant with the ASSURED (Affordable, Sensitive, Specific, User-friendly, Rapid and robust, Equipment-free and Deliverable to end-users) criteria established by the World Health Organization for the development of diagnostic and screening technologies. Furthermore, this technique lends itself to being widely used in diagnostic and prognostic screening processes, detecting possible circulating biomarkers associated with the disease without risk of post-treatment side effects.

## Applications

The invention presented in the patent draws on the area of development of medical devices for diagnostic purposes. In particular, its application is aimed at the early diagnosis of glioblastoma. The research sector is suitable for the "Area of medical and surgical clinic" and, more specifically, is aimed at the sub-branch of the development of diagnostic devices. This is a sector of great importance in the field of biomedical research as it consists of a high innovation and technological intensity which results in high investments to keep its growth active. A further application of the invention consists in the design and implementation of research and development activities aimed at the development of a point-of-care device for the screening of glioblastoma multiforme.

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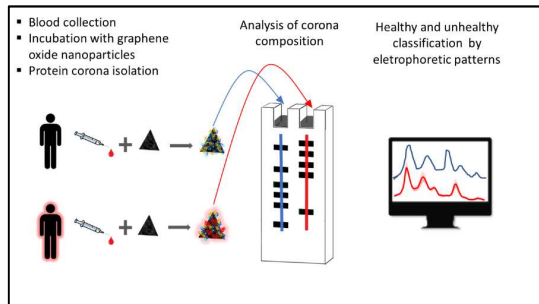


Fig. 4 Steps of the experimental procedure.

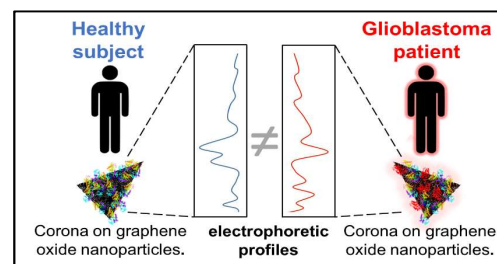


Fig. 5 Schematics describing the developed technology.

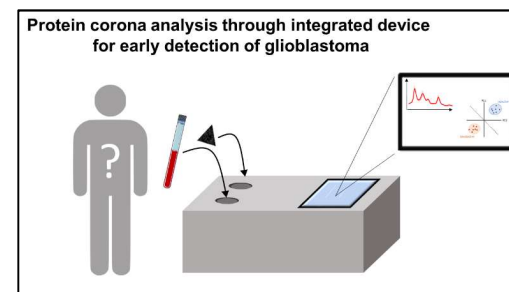


Fig. 6. Scheme of a point-of-care device for the screening of glioblastoma multiforme.



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