Nanobody platform

SCUOLA NORMALE SUPERIORE & EBRI

The platform allows generation of unique nanobodies for brain studies

TECHNOLOGY DESCRIPTION

Nanobodies are small versatile recombinant antibody fragments. We developed a technology platform for the in vivo isolation of nanobodies directly from antigen genes, with no need to purify the protein antigen. Our nanobodies are ideal reagents in several in vitro and in vivo applications, such as advanced brain imaging and mapping, and subcellular interference, when expressed as intrabodies.

Our libraries are particularly suitable to isolate nanobodies i) against natively folded proteins, ii) against conformational variants or and iii) against post-translationally modified versions of a target protein

Our nanobodies can be labeled with site directed and stoichiometric precision for quantitative imaging applications

Technology platform for the direct in vivo generation of "nanobodies" against native proteins, with conformational specificity

"Nanobodies" are ideal for advanced brain imaging and mapping, and for subcellular interference

AREAS

Experimental neuroscience | Applied biotechnology | Brain imaging
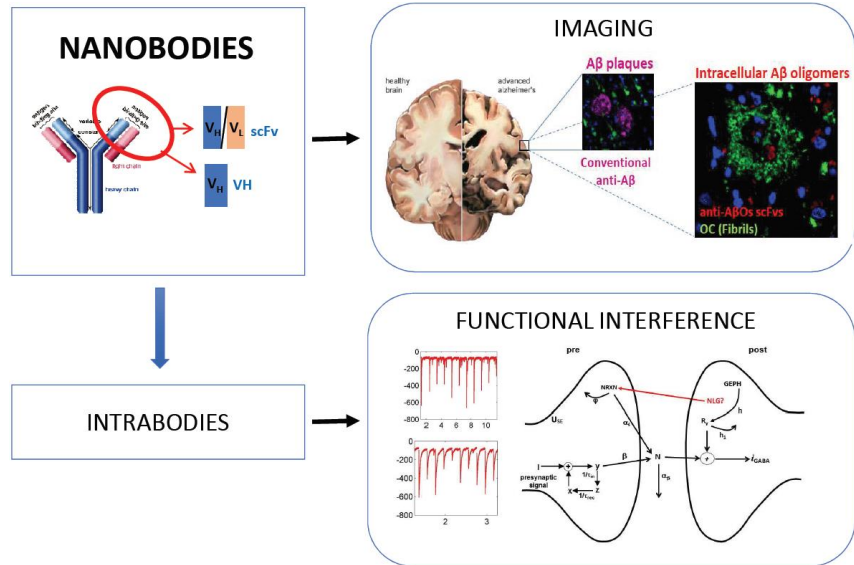
Human Brain Project

Co-funded by the European Union

COMPETITIVE ADVANTAGES

Nanobodies are intrisically equipped with advanced features of antigen recognition (i.e. Sequence- and conformation-selectivity or post-translational modification specificity) and ideal for several in vitro and in vivo applications, due to their small size in comparison to full antibodies.

The most important advantages of nanobodies derived from our platform are:

- Improved performance and versatility compared to whole antibodies
- Direct selection from the gene sequence of antigen;
- Easily engineered . for a direct antigen detection in brain tissues.

NANOBODIES

V_H / V_L scFv

V_H VH

IMAGING

healthy brain — advanced alzheimer's

Aβ plaques

Intracellular Aβ oligomers

Conventional anti-Aβ

anti-AβOs scFvs

OC (Fibrils)

INTRABODIES

FUNCTIONAL INTERFERENCE

pre — post

A versatile platform to streamline the selection and use of nanobodies for brain imaging, subcellular interference and conformational selective targeting.

APPLICATION & MARKET POTENTIAL

The nanobody platform covers a gap in technical needs in neuroscience and brain studies, providing tools exploitable through different approaches, i.e. brain imaging and subcellular interference, to produce data of crucial interest for:

- human brain mapping;
- circuit modelling.

Furthermore, nanobodies can be developed as new diagnostic imaging probes or therapeutics.

TECHNOLOGY READINESS LEVEL

(1) (2) (3) (4) (5) (6) (7) (8) (9)

REFERENCES

- Pioneered the intrabody and nanobody field
- Libraries are available for mouse, human and camelid nanobodies
- For research applications, the technology is already fully validated and applicable
- Patent application filed
- Described in Chirichella et al (2017) Nature Methods and Cattaneo and Chirichella (2018) Trends in Biotechnology.

CONTACT

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