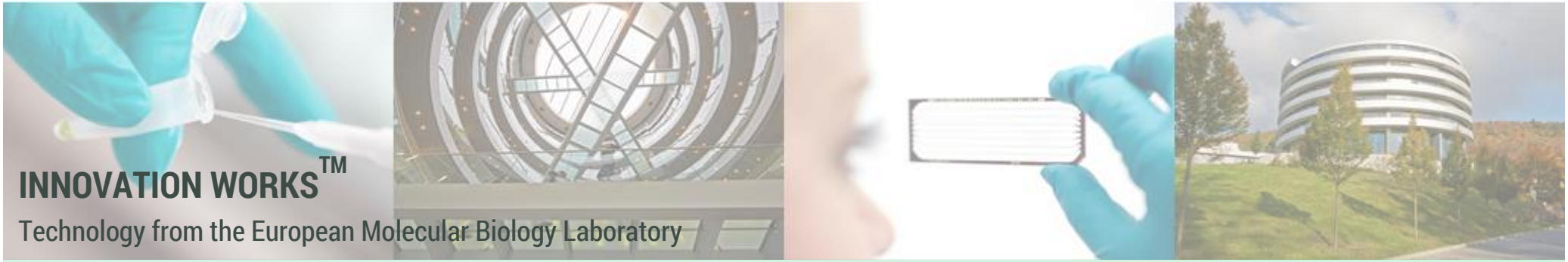

INNOVATION WORKS™

Technology from the European Molecular Biology Laboratory

LiMA: a liposome microarray to systematically study protein-lipid interactions

EMBLEM Ref. 707

Challenge

- interaction of proteins with lipids id of fundamental importance in most cellular processes
- limitations in current technologies are the small number of lipids processed per experiment and the lack of stability of artificial surrogate membranes

Commercial Opportunity

- clear market for off-the-shelf or customized LiMA chips and screening service
- licensing and full transfer of the technology to a licensee

Technology

- microarray chip to measure protein recruitment to membranes
- coupled to high-throughput fluorescence microscopy for data collection
- single lipids or lipid combinations can be screened
- multiplexing of lipids and/or proteins is possible
- the microarray chips can be stored for at least two months, uncoupling the steps of production and experiment
- measurements are conducted in a physiological environment
- LiMA can be adapted to additional downstream analyses such as mass spectrometry

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Key Inventors

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Intellectual Property

GB1212896.3, filed 20.07.2012
PCT/EP2013/065256, filed19.07.2013

EMBLEM
TECHNOLOGY TRANSFER

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Considering that a eukaryotic cell produces more than 1000 different lipid species, each with distinct properties and often acting in combination, a tool is needed that enables the study of protein-lipid interaction in a manner that is on par with the functional genomics resources now available, i.e. a simple device to comprehensively study protein-lipid interaction in a physiological, sensitive, reproducible, cooperative and high-throughput manner. LiMA is such a device and we have to date successfully used it with more than 130 single different lipids including all the main classes (glycerolipids, phosphatidylinositol phosphates, sphingolipids, sterols) and a plethora of combinations, on a wide variety of proteins. In a large-scale study we systematically tested the interaction of more than 90 proteins with a variety of liposome compositions in over 10.000 single assays.

LiMA is a microarray chip designed to measure protein recruitment to membranes. Single lipids or lipid combinations are spotted, together with a carrier lipid on a thin agarose layer. LiMA chips can the be dried and stored under argon for at least 2 months. Before se they are hydrated with a buffer of choice. Giant, unilaminar liposomes, i.e. surrogates of biological membranes, form within 2 mins and stay stable in size, shape and location for at least 6 hrs. LiMA produces liposomes of virtually any composition and size, in a physiological environment. LiMA is amenable to high-throughput microscopy and its fabrication and handling is simple, as is the scale-up. LiMA significantly reduced the amount of lipid and protein needed as it is highly sensitive and interactions with less than 1pmol protein can be measured. It is also quantitati´ve because binding intensities are proportional to the amount of lipid and protein given lipid-protein pair. It also captures cooperative binding mechanisms.

LiMA is capable of identifying discrete changes in binding affinities in response to mutation or drug interference.

References

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