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Bridging knowledge to economy

A New Device to Produce Biomolecular Gradients by « LAPAP »

Reference: VAL-694-HMR

Keywords: Axon guidance, Neuroscience, Cancer, Microscope, Immunology, Embryogenesis

Background

Guiding the growth, migration and differentiation of cells within the dynamic 3D environment of living organisms require highly-regulated signalling mechanisms triggered by biomolecular gradients. Gradients play essential roles in many processes including development, inflammation, wound healing, and cancer. Reliable methods to reproduce *in vitro* the spatial distributions of proteins found *in vivo* are thus required to investigate gradient function.

Several passive procedures including Boyden, Zygmond and Dunn chambers have been used to study gradient function *in vitro*. However, limitations of all these methods are their inability to maintain a stable gradient over time and their incapacity to tailor gradients with specific spatial profiles.

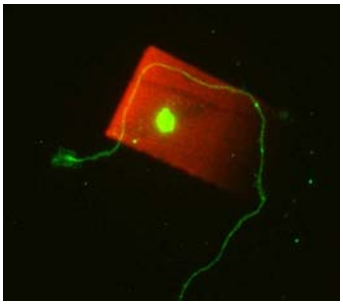
Technology

Dr Santiago Costantino and colleagues from the *Centre de recherche - Hôpital Maisonneuve-Rosemont* in Montreal-Canada have developed a device to create protein concentration spatial patterns by Laser Assisted Protein Adsorption by Photobleaching « LAPAP ». This sophisticated device can be either stand-alone or mounted on any microscope equipped with a camera port. This powerful technique is the first one able to produce patterns in a simple, fast and precise manner.

Results

- Proof of concept results demonstrate the precision of the technique as observed with (a) the "Girl with a Pearl Earring" image and (b) the axonal guidance within a gradient. Biotin-4-Fluorescein is first adsorbed to a BSA-coated substrate by LAPAP. Then streptavidin is incubated on the sample and finally, a biotinylated peptide is added to produce a functional gradient.

(a) Streptavidin-Cy5 staining



(b) DRG neuron are stained by Alexa-546, laminin is stained by streptavidin-Cy5

Applications

This powerful technique can be used to study:

- Neuroscience (Axonal guidance)
- Cancer/Inflammation
- Immunology
- Embryogenesis

Competitive Advantages

- High resolution (~1 µm) and low costs
- Extremely fast (~2 min.) and reproducible
- Simple to use: no specific training
- Stable gradients over time (4 months at 4 °C)
- Final protein pattern remains undamaged

Patent Status

US provisional patent filled (Q3/2009).

Business Opportunity

Univalor is seeking partners for commercialization.

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