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Molecular painting sparks biologics research

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At the University of Veterinary Medicine in Vienna, Austria, Dr John Dangerfield and Dr Brian Salmons along with Dr Christoph Metzner developed a technology for quick and easy modification of the surfaces of biological membranes and termed it 'molecular painting'.

Molecular painting (MP) reagents are non-antibody based functional biomolecules, which naturally associate with the external face of all biological membranes.

Molecular painting can be applied in the research lab or developed as a tool for improving vaccines; in purifying and isolating viruses and micro-vesicles; and in targeting and increasing transduction of viral gene delivery vehicles. It is a novel and highly effective technique that can be delivered to the client as a made-to-order reagent in a tube or as a self-constructing kit.

In diagnostics, MP reagents can be mixed into clinical or biological samples to tag, isolate (concentrate/purify), detect and quantify viruses, which cause infection; or tag exosomes that may signal a certain disease status. In vaccine development, MP reagents can be used for immunomodulation purposes by signalling and targeting vaccine agents to specific immune cell types that are better able to give an immune response, such as dendritic cells and other antigen presenting cells. In the domain of gene therapy, MP reagents can be used to direct or re-direct the pathway of entry for the gene delivery vehicle to a chosen target cell.

The technology was acknowledged by investors and commercial promise was confirmed through an industrial grant during 2009 and 2010, which was awarded to the developers of the technology by a large biotech company, thus creating success venture for Anovasia. Strong intellectual property and positive market response sparked Dr John Dangerfield, Mr William Ong and Dr Brian Salmons to establish Anovasia in 2011 in order to commercialization the technology. Indirectly, the company is also still strongly supported by the excellent basic research that Dr Metzner continues to do at the University in Vienna.

During 2011, Anovasia was awarded a small mentorship grant from SPRING Singapore through collaboration with the BANSEA (Business Angel Network SE Asia). This grant gave access to expert advice, which ultimately led to Anovasia taking-on several, new strategic shareholders (who each made a small investment) during the late 2011. "These were people who could add value to the company in important places where manpower and expertise was lacking (such as finance and production) and enable Anovasia to move forward with its Molecular Painting technology without additional third party funding," said Dr John Dangerfield, co-founder, Anovasia.

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Molecular painting enables the surface modification of biomembranes. In the past, this has typically been achieved using antibodies that are expensive. Furthermore, another disadvantage is that there was a need for information on the target agent. Also, the protein targeted and bound to is, subsequently, blocked or rendered inactive. Molecular Painting can modify the membrane without the necessity to target pre-existing surface proteins, by inserting directly into the lipid bilayer.

Dr Dangerfield also said, "Currently, there is only one other company world-wide, that Anovasia is aware of, which offers a comparable technology. However, Anovasia's Molecular Painting differs from what this firm is offering, since it is mainly focussed on biological molecules (proteins) rather than generating synthetic molecules."

"Specifically relating to the diagnostics industry, Molecular Painting can allow multiple agents to be targeted from one clinical sample which can have great cost and time savings as-well-as require less sample to be collected from the patient. For example, one blood sample could be used for five preparations undertaken simultaneously rather than collecting five blood samples for five different procedures," he said.

However, the journey from developing a technology to commercializing it has not been easy. Dr Dangerfield, while speaking about the hurdles, said that, "The main challenge for a small company like Anovasia with a novel and innovative technology is creating awareness with the correct target audience fast enough to make business sense. In some respects the market must be created."

"It is the old chicken and egg scenario; in order to create awareness quickly, a large investment should be made. However, it's difficult to attract such investment until sufficient market interest has been shown. In fact, as it is in today's market, concrete customers, orders or signed deals need to be in place to guarantee quick access to funds," highlighted Dr Dangerfield.

Moving ahead in the market, Anovasia is looking for a distribution partner to bring its existing products into more wide-spread use in the basic and applied research markets. Anovasia is currently negotiating with two potential partners for achieving this. In parallel, Anovasia is seeking industrial partners to develop new products in the field of vaccines, diagnostics and drug and gene delivery. With respect to these latter plans, Anovasia will continue key research projects that are being undertaken based on direct interest, shown from commercial partners in these areas.