# Progress/Final Report

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Title of Project: Microarray search for radiation-induced markers for vascular targeting of brain AVM tissues.

This progress report is submitted for inclusion in the Brain Foundation's newsletter "brainwaves" and on the website. Please note that it is not a final report, as the project will be completed in December 2017.

The project is progressing smoothly according to the timeline for completion on 31 December 2017. We have finished the optimization of the microarray technique and the experimental work of identifying radiation-induced protein and glycan markers on irradiated cells and their corresponding binding ligands. Currently we are analysing the results and doing the work of validating the markers and their binding ligands by flow cytometry. We are confident that we can finish the project by the end of the year. The progress is well within the planned timeline.

In the application we hypothesized that radiation induces new markers on the surface of brain endothelial cells. These markers and their binding ligands can be profiled simultaneously using high-throughput microarray techniques. Our microarray results confirmed the hypothesis and showed that X-ray radiation at a dose level of 5-25 Gy could induce the expression of ALCAM, PECAM 1, and the glycans that bind to DSA and AAL (Figure). According to our knowledge, the glycan changes were never reported previously and may be good targets for drug delivery.

We encountered some problems during the experimental process and modified the research plan accordingly. One of the problem is that the customer-made array slides with bigger dots are too expensive. We tried the available products in the market and found the results were acceptable. The variation among the samples in the same group was high due to the small dot area. We think we can overcome this problem in the validation step. We will use more quantitative flow cytometry, instead of immunocytochemistry, to validate the results.

If the flow cytometry work can confirm that radiation can induce (i.e. from no expression in control group to some levels after irradiation) the expression of some markers, the results will be very useful in our future work. The markers may be good targets for targeted delivery of

thrombotic agents to the AVM vessels to block the local blood flow, which is our final goal to find a treatment solution for the un-treatable AVM patients.

Parts of the results have been presented orally in 'Innovation in Radiation Applications' conference in Wollongong, Australia on 20-22 April 2017 and 'The 10th Chinese National Conference on Chemical Biology' in Wuhan, China on 23-26 September 2017.

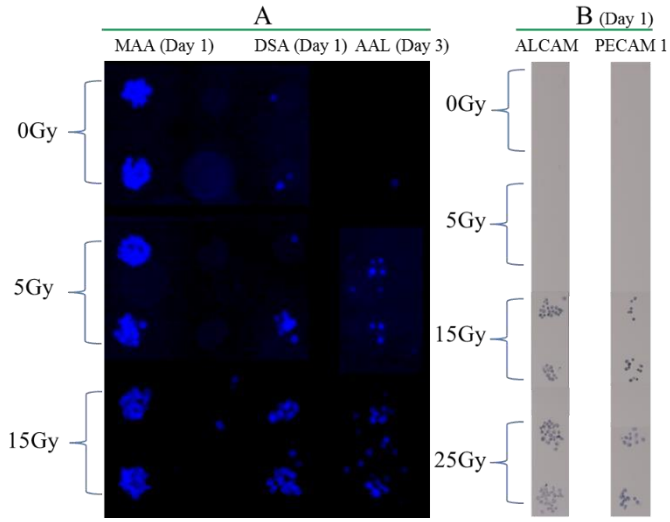


Figure. Cell binding to lectin array (A) and membrane protein antibody array (B) after receiving different doses of radiation.