Volume 12

Washington University
Undergraduate Research Digest

Spring 2017

# Purification Chip for Radiolabeling Antibodies

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# Purification Chip for Radiolabeling Antibodies

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In recent years, the use of radiolabeled antibodies as positron emission tomography (PET) imaging agents has increased in clinical trials. But, many challenges exist with the conventional labeling method. It requires a large laboratory space and inefficient process of removal of non-specific bound radiometals. In order to accelerate the preparation time and increase efficiency, the Reichert lab has employed microfluidic chips to create an on-demand system for radiolabeling antibodies and peptides.

The lab has successfully prepared single-patient doses of $^{89}$Zr-labeled Trastuzumab antibody that is used to target metastatic breast cancer cells, with microfluidic chips. Using their chip, they found the microfluidics approach generated a labeling yield over 2.5 times greater than conventional methods under similar conditions. However, these radiolabeled antibodies and peptides must go through extensive purification processes before they can be administered to patients in order to ensure accurate doses of radioactivity.

This research focuses on developing a purification chip to easily remove non-specifically bound radiometals. The design requires a chip that has tanks with small posts. Since the whole chip is made of polydimethylsiloxane (PDMS), linker silanes can be attached to these posts. These silanes can contain a variety of functional groups; however, we primarily focus on (3-aminopropyl)trimethoxysilane that contains an ammine group. Using peptide coupling reaction, we can covalently bond silanes to bifunctional chelators such as diethylenetriamminepentaacetic acid (DTPA) that binds radiometals. Each post will then have a molecule of DTPA that can bind radiometals. Then, solutions containing radiolabeled antibodies can be passed through the chip, and the immobilized DTPA can remove non-specifically bound radiometals from antibodies. Although preparation of the chip may be more time-consuming than conventional purification methods, the chip can be used multiple times and ultimately reduce the time for purification.