**Objective:** Optimize design parameters of nanocarrier formulation to manipulate enzyme dose delivered for Fabry disease treatment.

**Method:** In vivo biodistribution assessment of varied nanocarrier formulations – (1) targeting moiety/enzyme load on nanocarriers, (2) bulk-concentration of nanocarriers administrated.

**Results:** Targeting moiety/enzyme load and carrier bulk-concentration of anti-ICAM nanocarriers can be adjusted without compromising biodistribution, enhancing enzyme delivery to Fabry target organs.

**Future Work:** Assess delivered enzyme’s capability to alleviate Fabry symptoms.