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# A Topological Analysis of Targeted In-111 Up- take in SPECT Images of Murine Tumors.

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*A Topological Analysis of Targeted In-111 Uptake in SPECT Images of Murine Tumors.*

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In this talk we employ computational topology methods to quantify heterogeneous uptake behavior across time series of single-photon emission computed tomography (SPECT) images of murine tumors. This behavior cannot be captured by standard aggregate measures such as percent injected dose per gram or tumor-to-heart ratio. Inspired by Morse Theory, we analyze critical points of each tumor image. To quantify the uptake behavior in neighborhoods of local maxima, we utilize a modified form of zeroth order persistence diagrams as well as develop the novel concept of childhood diagrams. Statistical methods are applied to time series persistence and childhood diagrams to detect heterogeneity of uptake within and across study groups in two studies. This behavior is explained in terms of the underlying biological mechanisms.