Cancer remains one of the leading causes of death worldwide, yet despite significant research investment a conventional chemotherapeutic has yet to be reported that does not suffer from side effects attributed to the non-selective delivery of the anticancer agent to both healthy and cancerous cells. This research aims to capitalise on the fundamental differences between cancerous and healthy cells, specifically the increased rate of uptake of nanoparticles by rapidly growing tumour cells and the increased expression of specific enzymes which are required to support this abnormal growth. We propose the design of molecular containers capable of encapsulating commonly prescribed chemotherapeutics. In their encapsulated form the anticancer agents would been unable to interact with key biological agents and thus would not be expected to display toxicity nor anticancer activity. Rapid degradation of the capsule in response to elevated levels of enzymes and biomolecules that have been identified as cancer markers would result in release of the anticancer agent and provides an unexplored methodology for selective release of active anticancer drugs in cancer cells.

Development of a selective method for delivery of anticancer agents to tumour cells would result in a significant increase in the quality of life for patients receiving anticancer drugs. The proof-of-concept study proposed here is the first step towards this goal, and will serve as the first example of a supramolecular drug delivery molecule that disassembles to release a payload in response to a biological stimulus.