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# Mathematical insights into tumour-immune dynamics: Navigating a shifting landscape

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The presence of immune cells within solid tumours was initially viewed as a positive sign of the body's attempt to eliminate a foreign threat. However, it is now understood that tumours can hijack immune cells, turning them from tumour-fighting agents into tumour-promoting allies. Immunotherapy seeks to counteract this by enhancing or restoring normal immune function. While immunotherapy has shown significant promise, the underlying tumour-immune dynamics are highly complex. This complexity makes it challenging to predict why some patients respond well to immunotherapy while others do not. In this talk, we will investigate how diverse mathematical approaches – including mathematical modelling and topological data analysis – can help unravel these intricate interactions. We will present recent findings that demonstrate the complementary insights these methods offer in understanding and improving immunotherapy outcomes.