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Interpreting Data from in Vitro Methods for Determining Cellular Cytotoxicity of Anticancer Drugs and Therapies

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The ability to induce cellular cytotoxicity in *in vitro* cell culture systems is often viewed as an absolute prerequisite in the developmental process of anticancer drugs. However with developments in basic research revealing a plethora of potential biochemical, genetic and biological pathways that may affect cellular viability, it has become increasingly difficult to select a single *in vitro* assay or assay protocol that represents a suitable readout for cellular cytotoxicity. This situation complicates robotic processes such as high throughput screening and comparison of results between laboratories. Certain assays have become popular due to their ease of performance, automation or low cost and the data they generate are often reported as cellular cytotoxicity, even though they actually measure rates of metabolism. A case in point is the XTT assay. Furthermore, different assays that propose to measure similar biochemical properties of cells often produce different results when the same drug is tested on the same cells under similar conditions. Pharmaceutical and research laboratories alike need to better understand the cellular mechanisms underlying the assays they employ and to report the data accordingly. This lecture will explore the more common assays available, emphasizing the breath of cellular activity that can today be measured with assays appropriate for routine laboratory practice. In order to produce a broader picture of the affects of anticancer drugs and therapies, laboratories should aim to adopt 3-4 routine assays that measure different cellular activities.