APPLICATION BRIEF

Dose-dependent cytotoxic effect of cisplatin on A549 cells using MTT assay measured on the VICTOR Kira.

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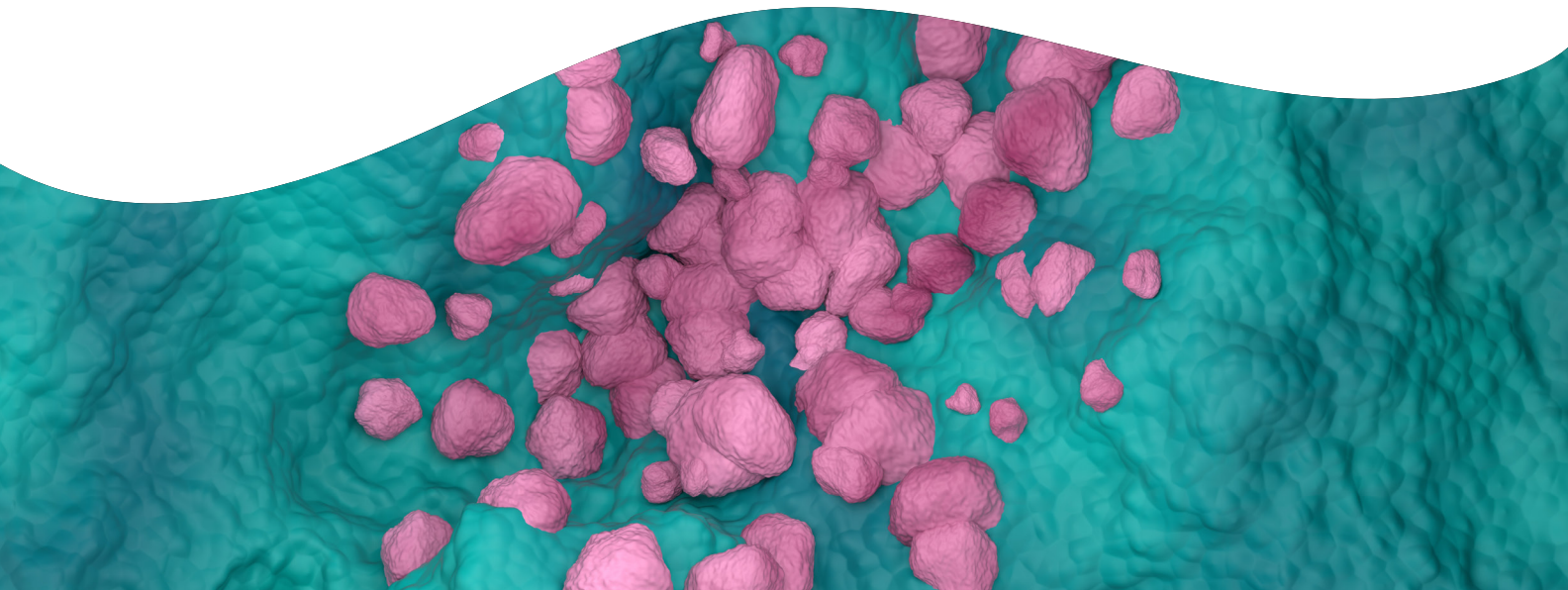
Introduction

Cisplatin (cis-diamminedichloroplatinum II) is a first-line chemotherapeutic drug for various cancers, including non-small cell lung cancer. Its mechanism involves DNA crosslinking, leading to apoptosis. The A549 cell line, derived from human lung adenocarcinoma, is commonly used to study lung cancer therapeutics. The MTT assay is a colorimetric method that measures mitochondrial activity as an indicator of cell viability. This study investigates cisplatin's effect on A549 cells using the MTT assay, with detection performed on VICTOR Kira™, a high-performance multimode plate reader optimized for absorbance and colorimetric assays.

Materials and methods

A549 cells were cultured under standard conditions and treated with cisplatin at concentrations of 10, 50, 100, 200, and 500 µM for 24 hours. Negative control wells contained untreated cells, while positive control wells represented maximum inhibition. After treatment, MTT reagent was added, and cells were incubated to allow formazan crystal formation. Crystals were solubilized, and absorbance was measured at 570 nm using VICTOR Kira.



Dose-dependent cytotoxic effect of cisplatin on A549 cells using MTT assay measured on the VICTOR Kira.

Data analysis

Cell viability was calculated as a percentage relative to the negative control in GraphPad Prism 10. Data were analyzed to assess dose-response trend.

Results

Cisplatin exhibited a concentration-dependent reduction in A549 cell viability. The dose-response curve (Figure 1) demonstrated a sigmoidal pattern, and the calculated IC_{50} value was 17.22 µM. At the highest tested concentration (500 µM), cell viability decreased to 23.43%, whereas at 10 µM, viability remained at 75.37%. Untreated cells (negative control) maintained 100% viability, confirming assay integrity (Figure 2).

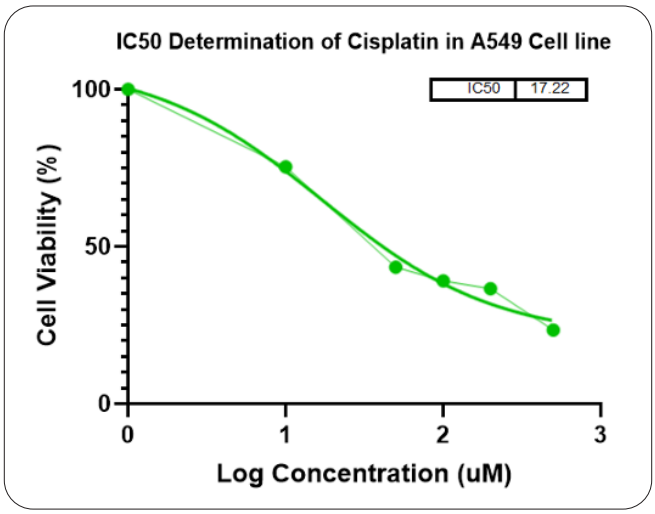


Figure 1: Cisplatin effect on A549 cell viability

Conc.	Cell viability (%)
Positive control	0.704
500	23.425
200	36.601
100	39.159
50	43.440
10	75.371
Negative control	100.000

Figure 2: Cell viability (%)

Discussion

The findings confirm cisplatin's dose-dependent cytotoxicity against A549 cells, consistent with its mechanism of inducing apoptosis through DNA damage. The sharp decline in viability at concentrations above 50 µM suggests that cisplatin effectively inhibits cell proliferation at clinically relevant doses. The use of VICTOR Kira provided accurate and reliable absorbance measurements, highlighting its suitability for endpoint colorimetric assays like MTT. These results align with previous studies demonstrating cisplatin's efficacy in lung cancer models.

Conclusion

Cisplatin significantly reduces A549 cell viability in a concentration-dependent manner, with substantial cytotoxicity observed at concentrations ≥50 µM. The MTT assay combined with VICTOR Kira detection provides a robust method for evaluating drug-induced cytotoxicity in cancer cell lines. These findings support cisplatin's continued use as a chemotherapeutic agent and provide a basis for further studies on combination therapies and resistance mechanisms.