

Synthesis and In Vitro Evaluation of a Ruthenium(II) Bipyridyl Complex as a Cancer Therapeutic

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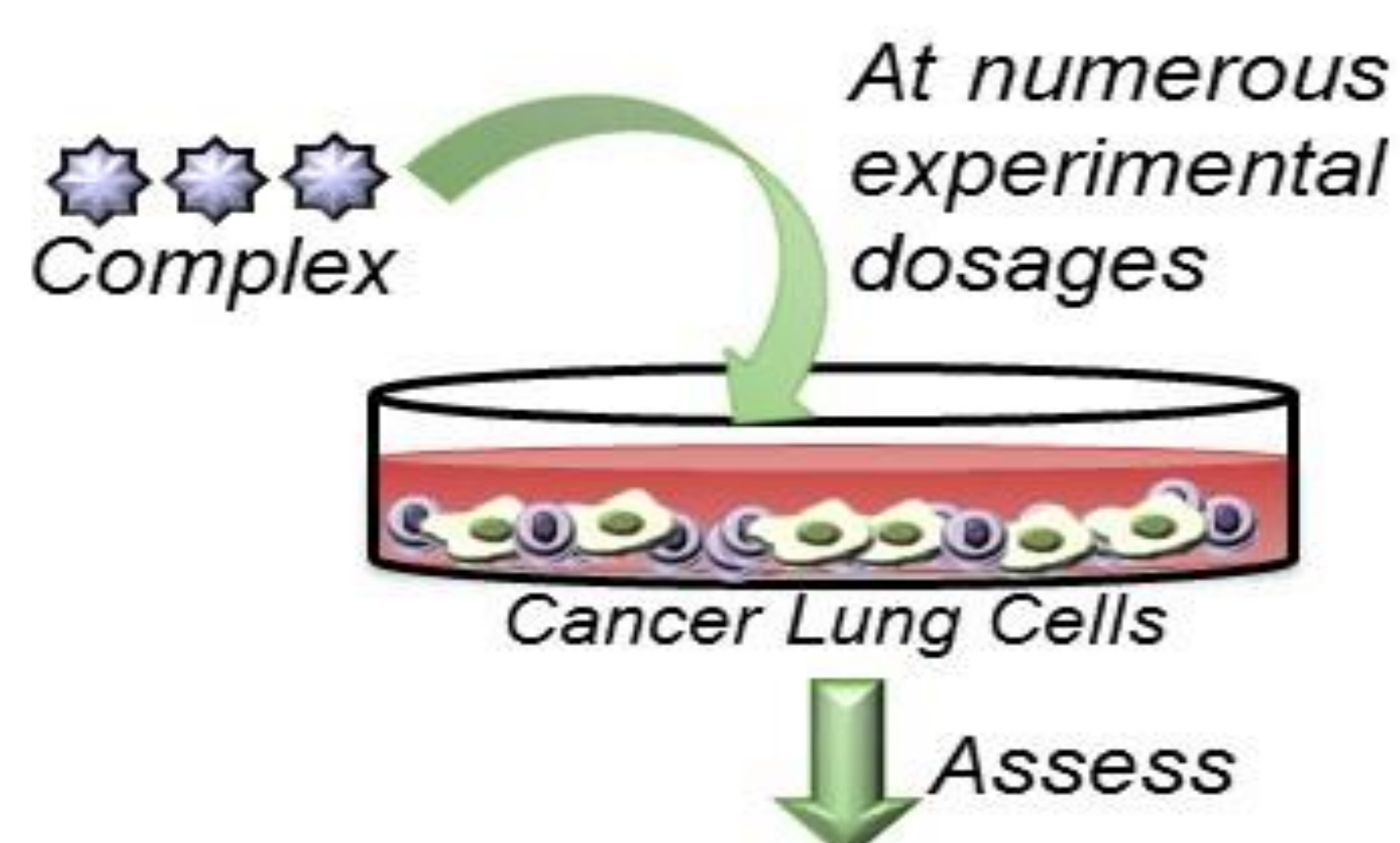


Rationale

- Lung cancer is one of the leading causes of cancer related deaths in the United States.
- Although there are other forms of treatment available, there is a high demand for less invasive methods.
- Bronchoscopes will deliver appropriate amount of light to the tumor site
- Ruthenium complexes have potential to serve as a photodynamic therapy agent, however, their safety in a mammalian environment needs to be evaluated

Methodology

- Lung model: Alveolar A549 epithelial cells
- Molecule: Ruthenium complex synthesized at UD by Dr. Shawn Swavey
- Safety evaluation: Introduce complex into the culture on multiple dosages, incubate for 24 hours, then assess the biological response of the cellular system



- Culture Viability (MTS assay)
- Culture Stress (ROS levels)
- Complex-Cellular Interactions

Figure 1: Experimental Approach

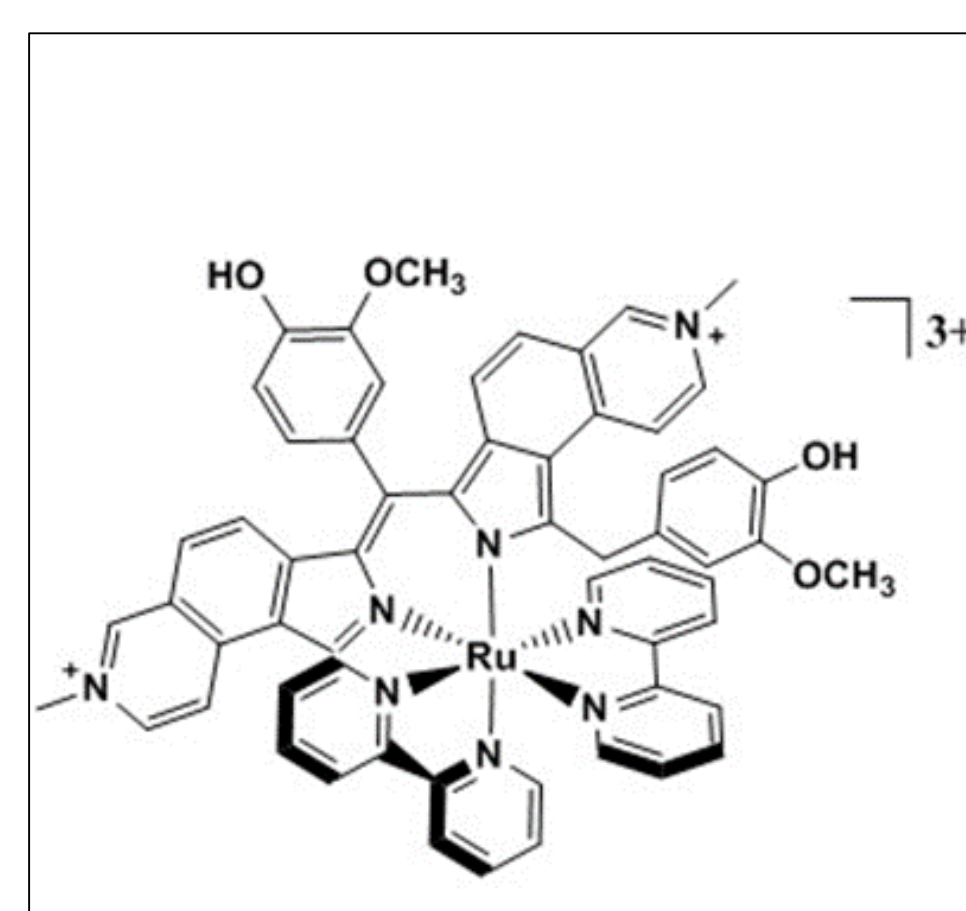


Figure 2: Ruthenium complex structure

Results

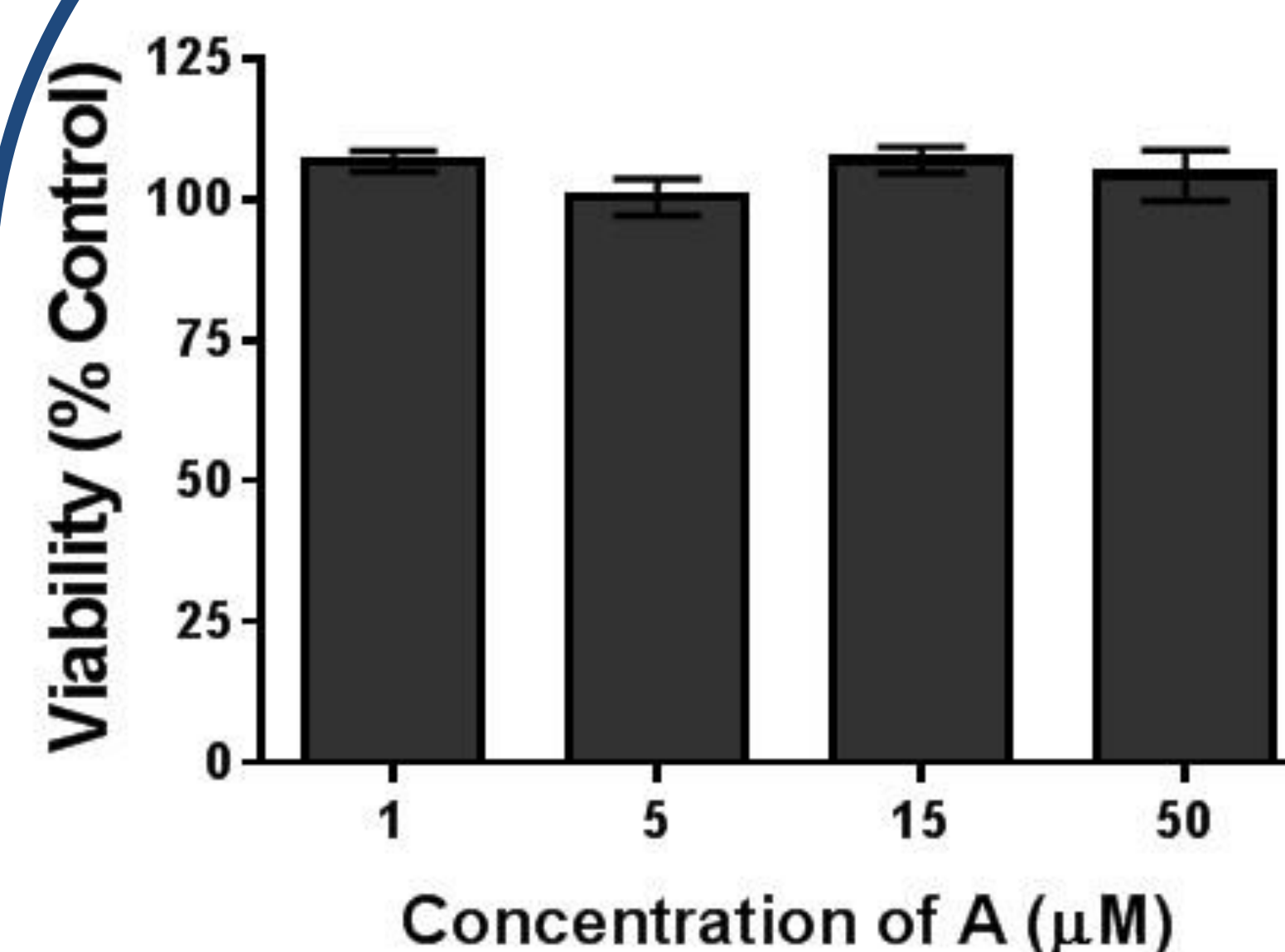


Figure 3: Culture cell viability in dark following complex exposure

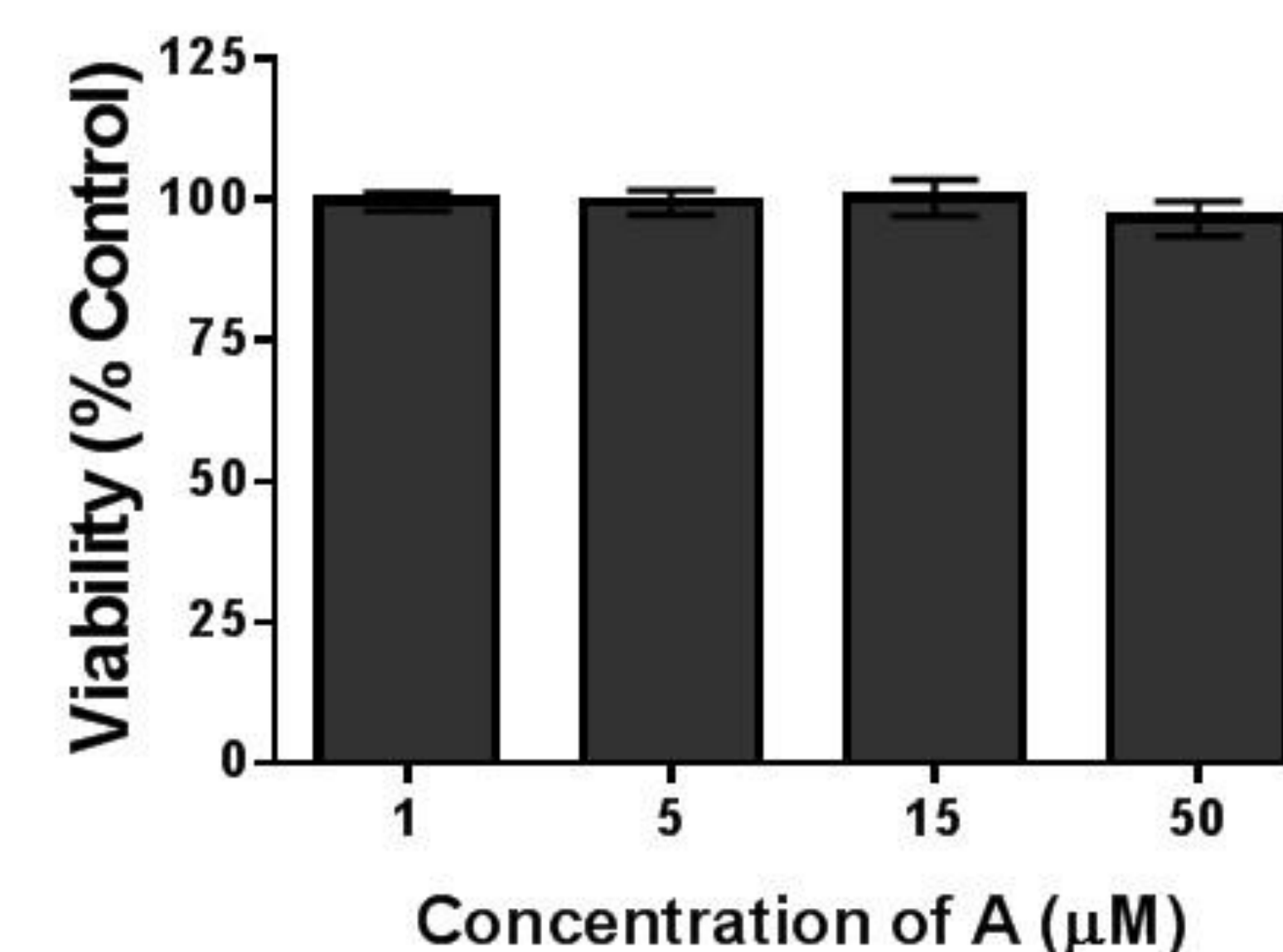


Figure 4: Culture cell viability following complex exposure and irradiation

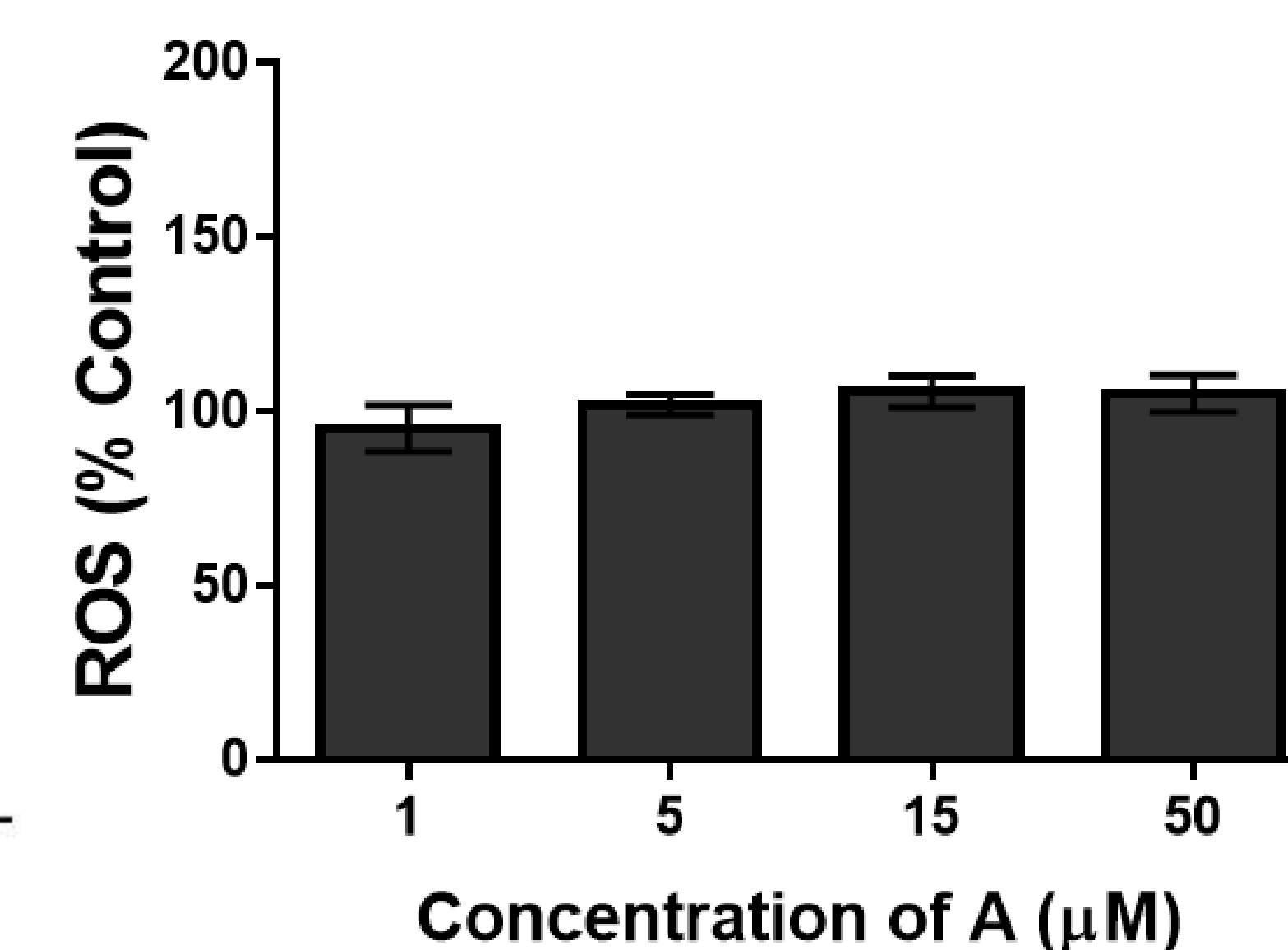


Figure 5: Complex-induced stress response post irradiation

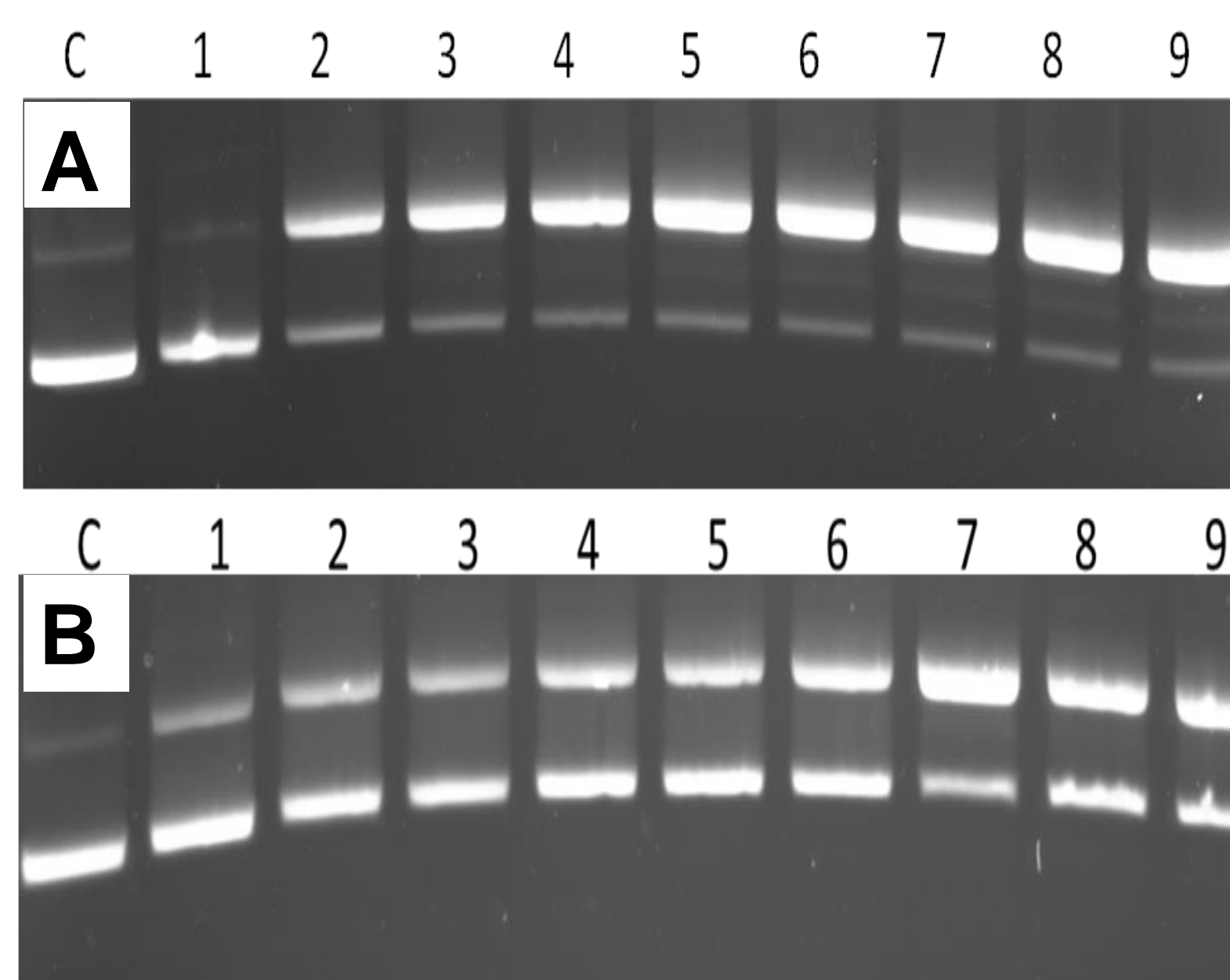


Figure 6: DNA cleavage in the (A) presence and (B) absence of oxygen following irradiation.

While the complex was able to damage DNA, no targeted destruction occurred, likely due to low cellular delivery.

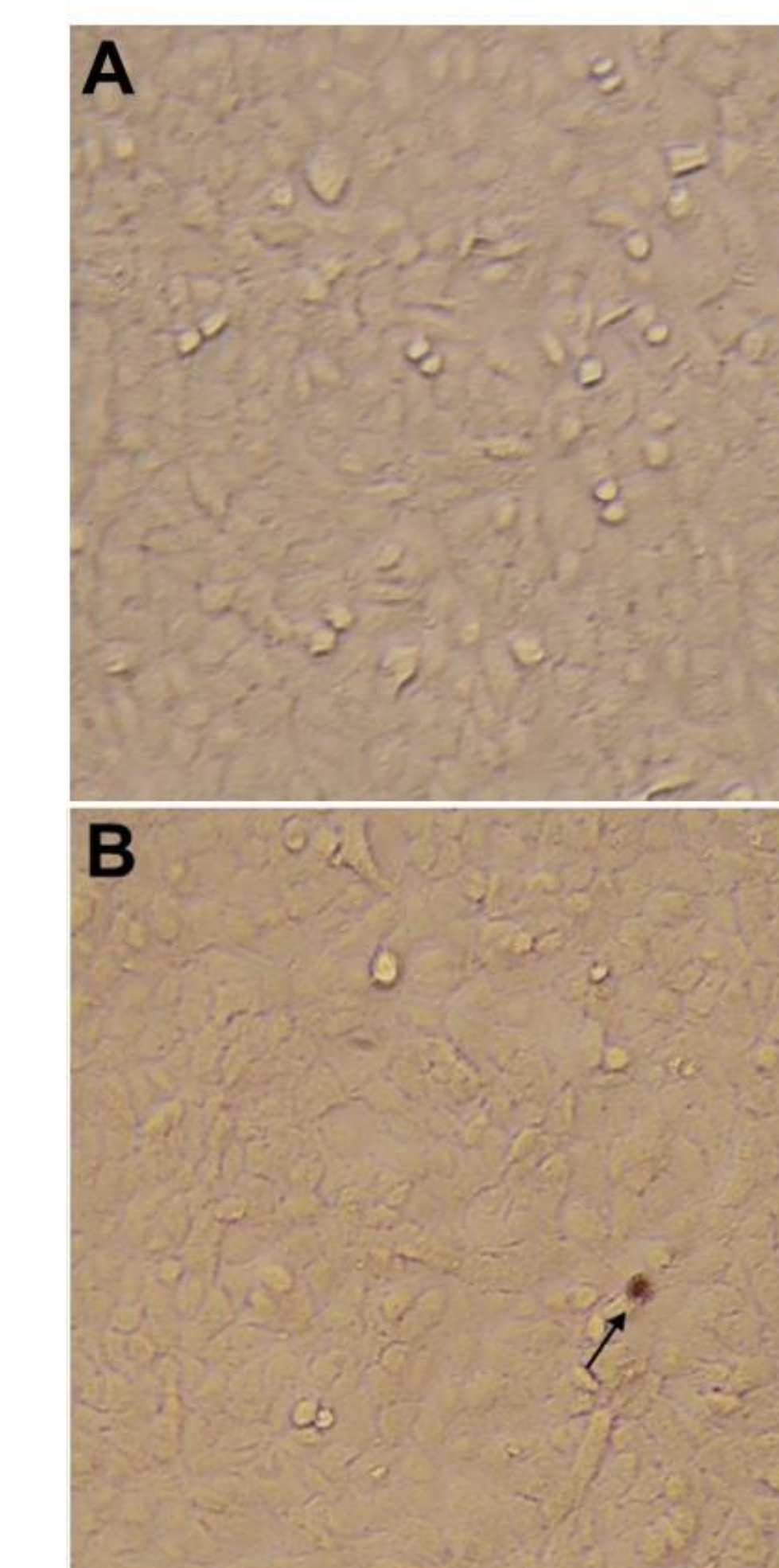


Figure 7: (A) Untreated and (B) complex dosed A549 cells.

Conclusions

- No cytotoxicity detected after 15 minute exposure to 420 nm light source
- Ruthenium complex was not associating with the A549 cells
- Ruthenium complex has potential as PDT mediator but work needed to improve delivery to target tumor site