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Cytotoxicity of Commercial Tattoo Inks

Michael Xiao

Binghamton University--SUNY

Alyssa Libonati

Binghamton University--SUNY

Kelli Moseman

Binghamton University--SUNY

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Cytotoxicity of Commercial Tattoo Inks

Michael Xiao, Alyssa Libonati, Kelli Moseman, Laura Rhoads, John R. Swierk
Department of Chemistry, Binghamton University, Vestal, NY

There are Different Molecular Structures of the Same Color Pigments

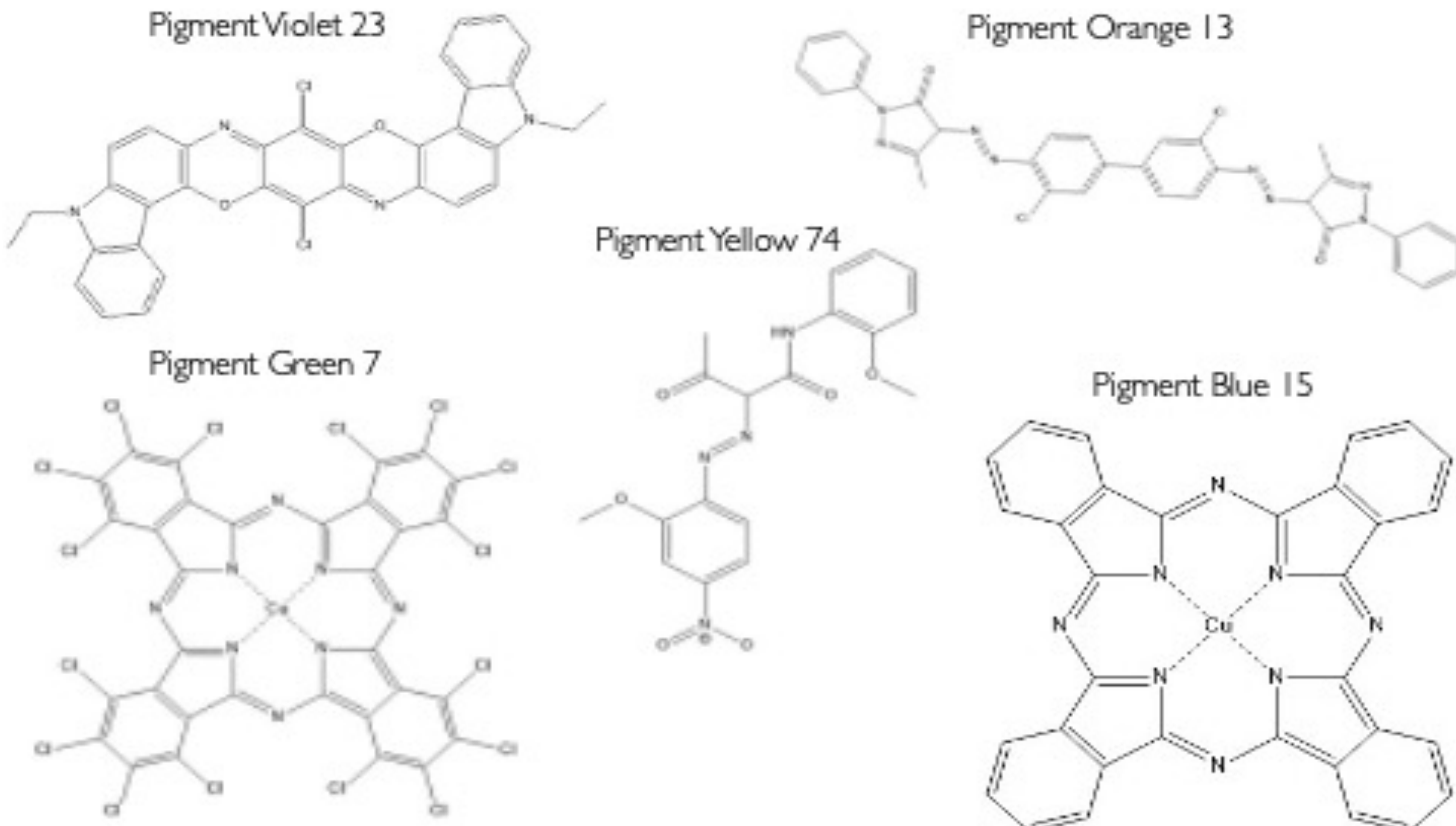
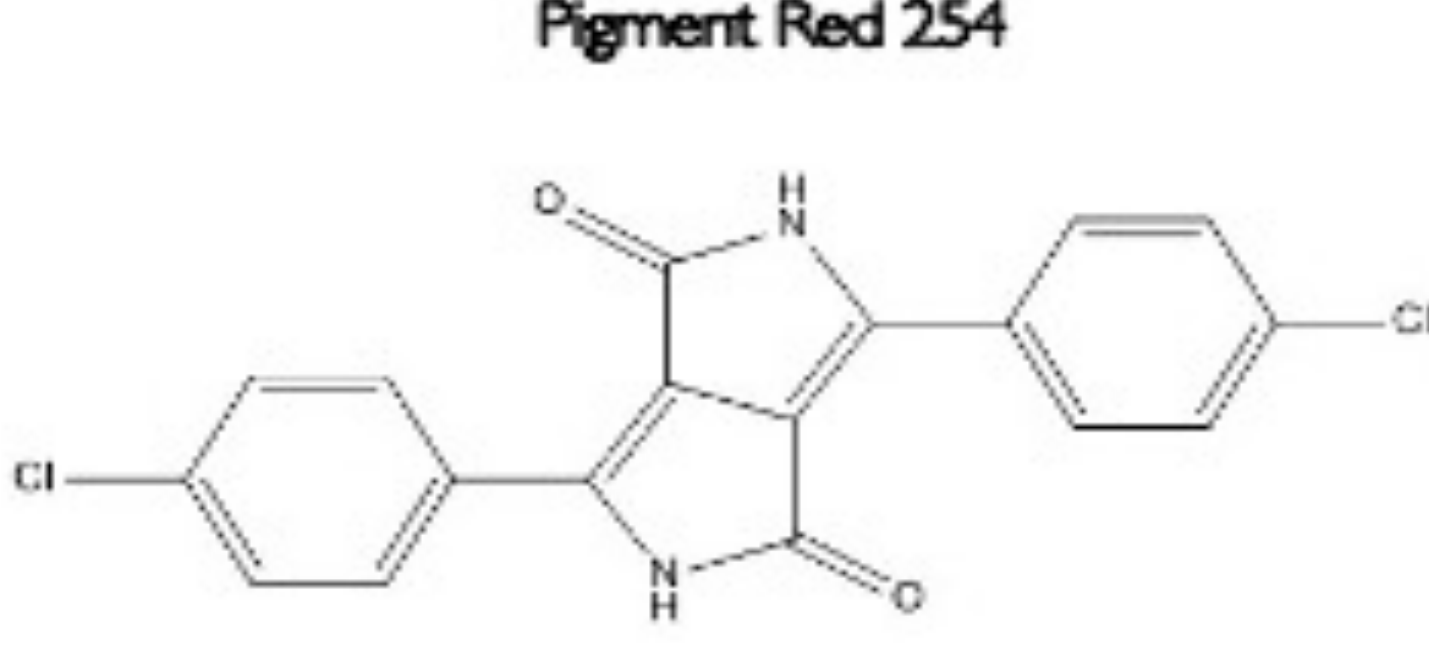
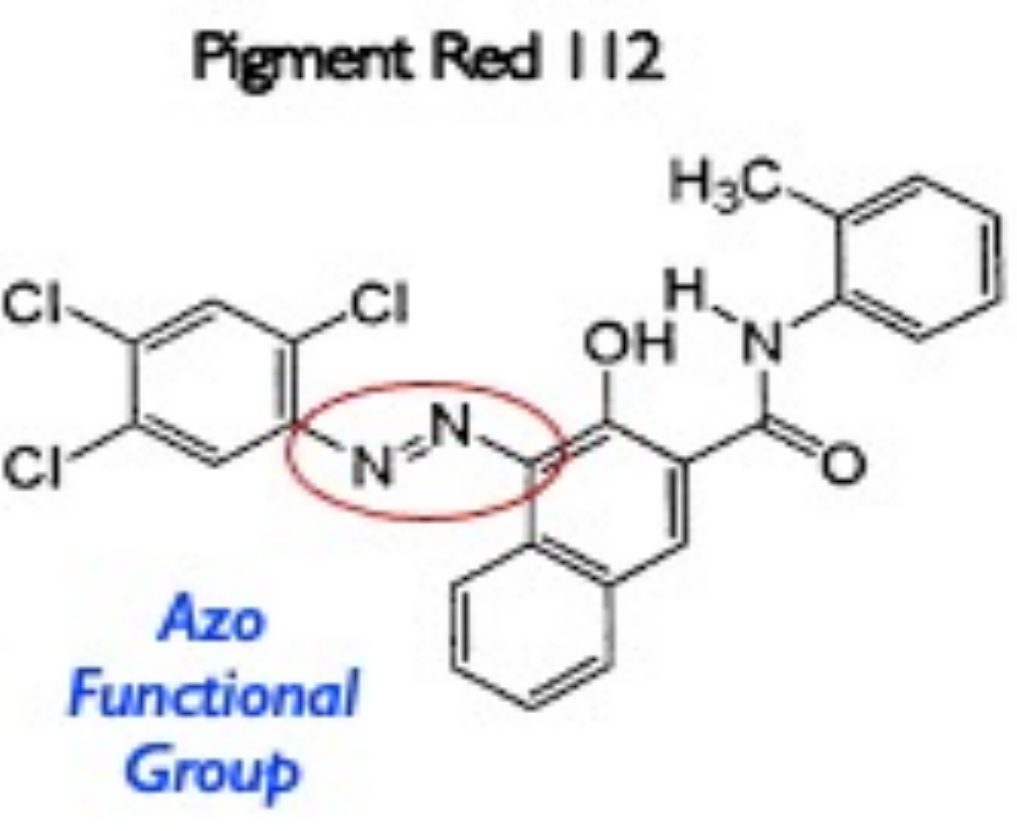


Figure 1 Identification of each pigment. Many different pigments resemble the same color, but their different molecular structure and functional group lead to different effects when injected into humans.

Cytotoxicity Analysis



Increasing concentrations of red pigments lead to a decrease in cell viability and vitality

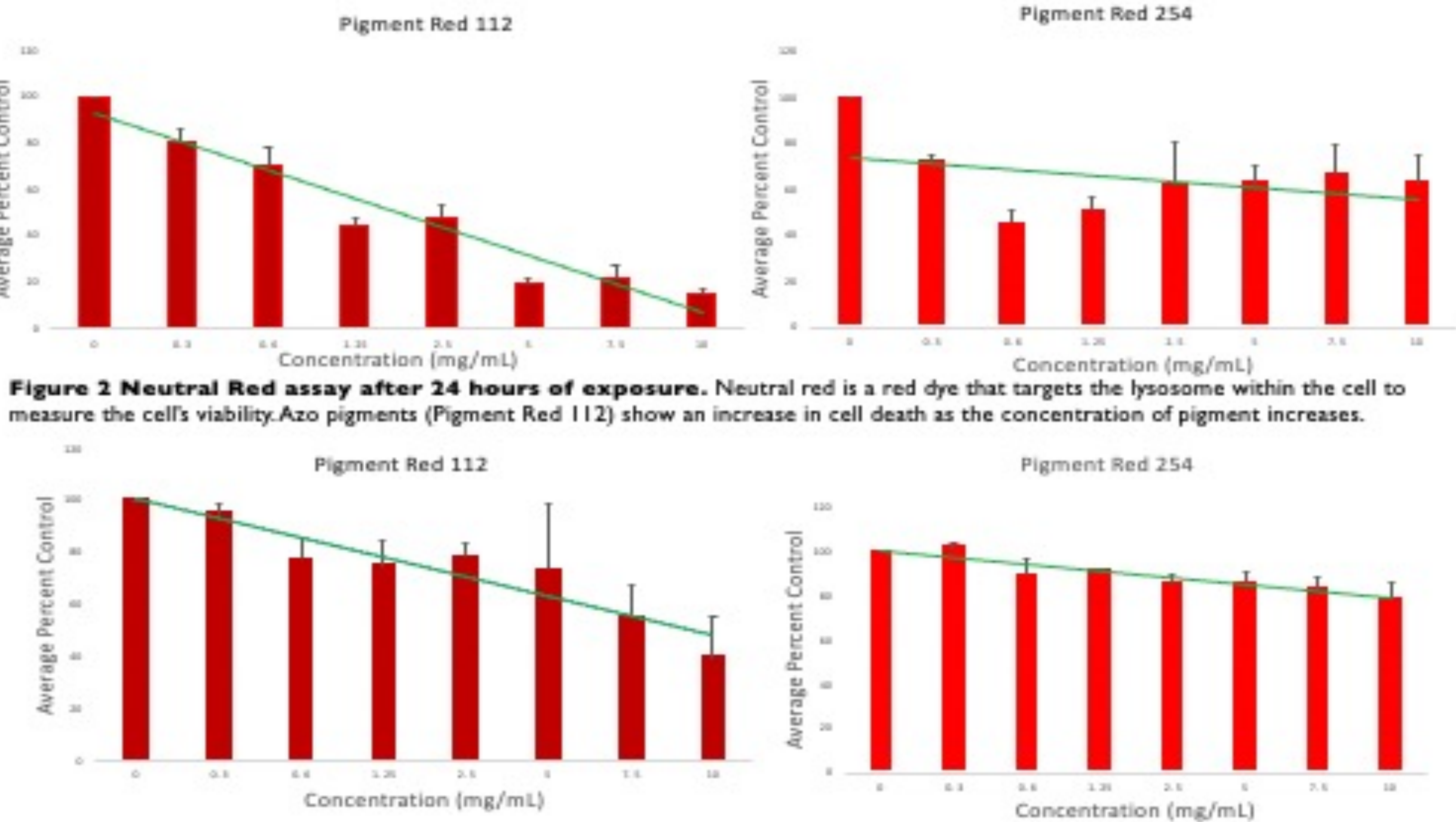


Figure 2 Neutral Red assay after 24 hours of exposure. Neutral red is a red dye that targets the lysosome within the cell to measure the cell's viability. Azo pigments (Pigment Red 112) show an increase in cell death as the concentration of pigment increases.

Figure 3 Alamar Blue assay after 24 hours of exposure. Alamar blue is a blue dye that targets the mitochondria within the cell to measure the cell's vitality. Azo pigments (Pigment Red 112) show a decrease in cell metabolic rate as the concentration of pigment increases.

Cell Viability Decreases while Metabolic Activity Increases Over Time in Both Red Pigments

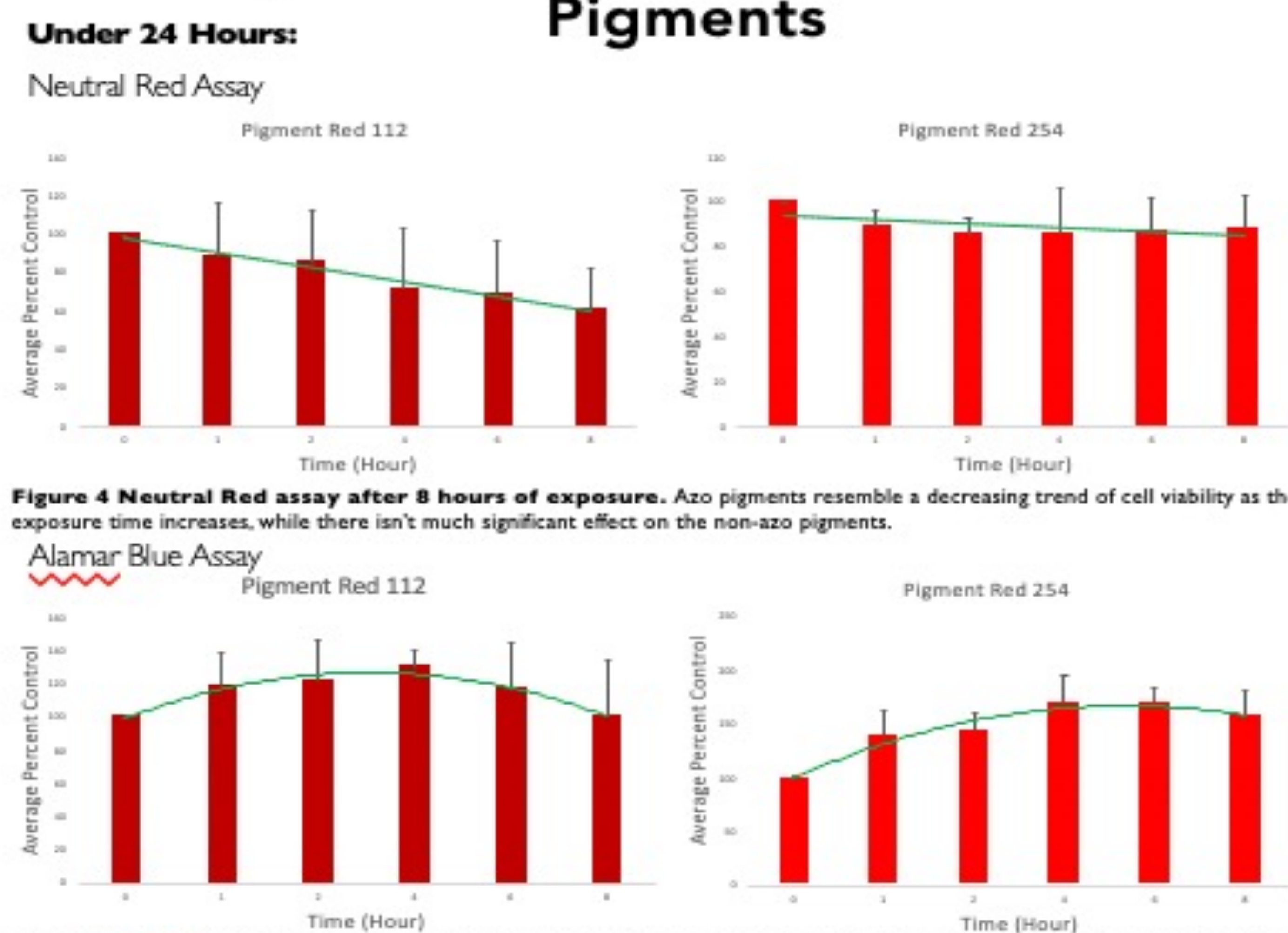


Figure 4 Neutral Red assay after 8 hours of exposure. Azo pigments resemble a decreasing trend of cell viability as the exposure time increases, while there isn't much significant effect on the non-azo pigments.

Figure 5 Alamar Blue assay after 8 hours of exposure. The cells metabolic both increased in azo and non-azo pigments with increasing exposure to the cells.

Azo pigments seem to cause the most damage to cells under 24 hours of exposure, but the cell's metabolic function is increasing

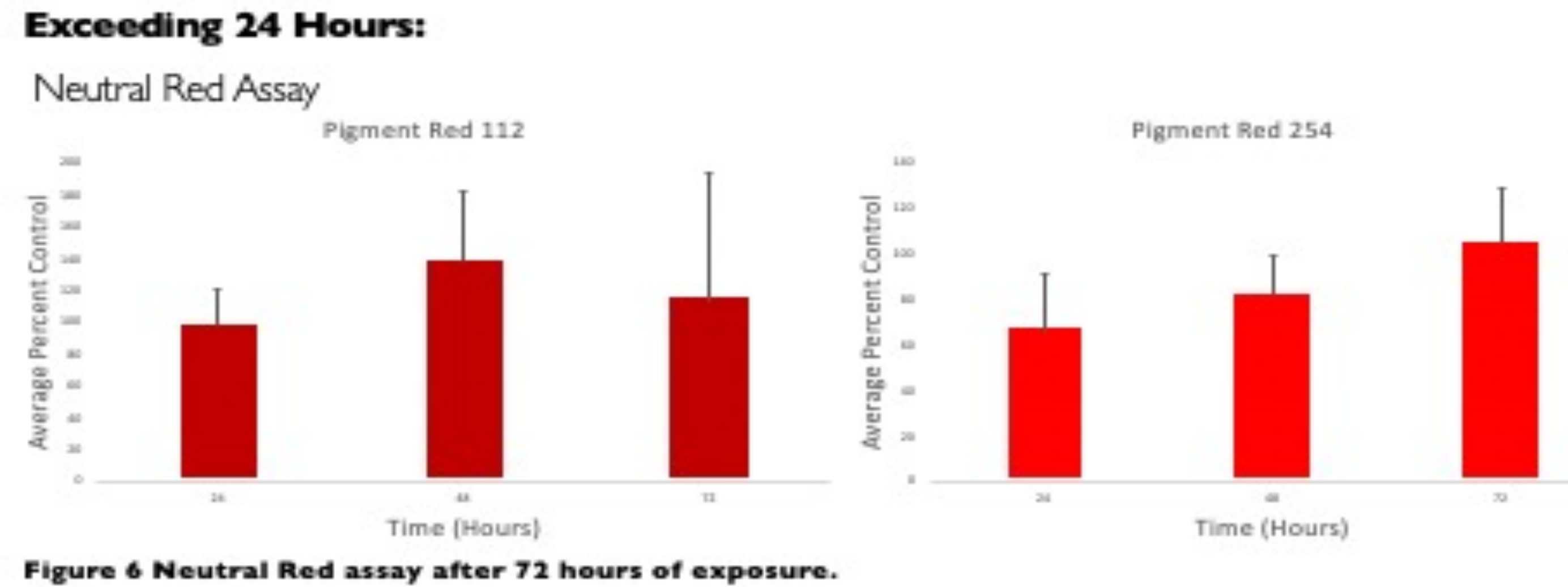


Figure 6 Neutral Red assay after 72 hours of exposure.

An Exception Found in Pigment Yellow 74

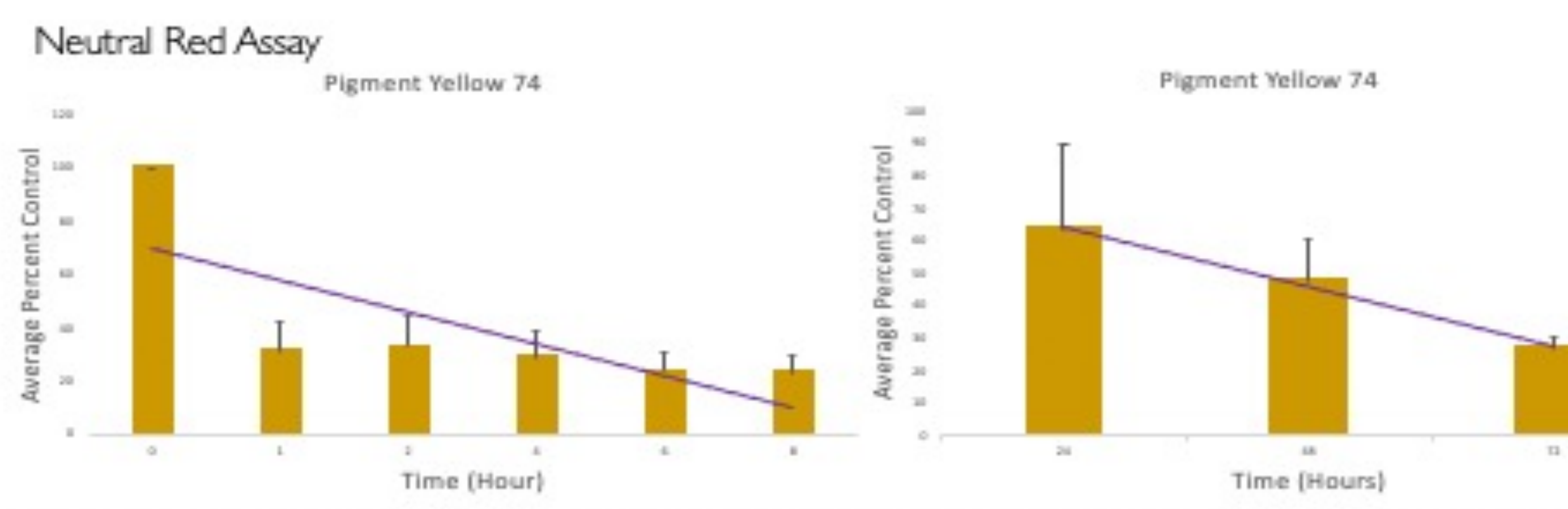


Figure 7 Neutral Red assay after 8 & 72 hours of exposure. Pigment Yellow 74 demonstrates decreasing cell viability within 8 hours of exposure and in a longer duration of exposure.

Pigment Yellow 74 seems to be causing a decrease in both cell death and function over shorter and longer time frames of exposure

Varying Rates of Decreasing Cell Viability Caused by Azo Pigments

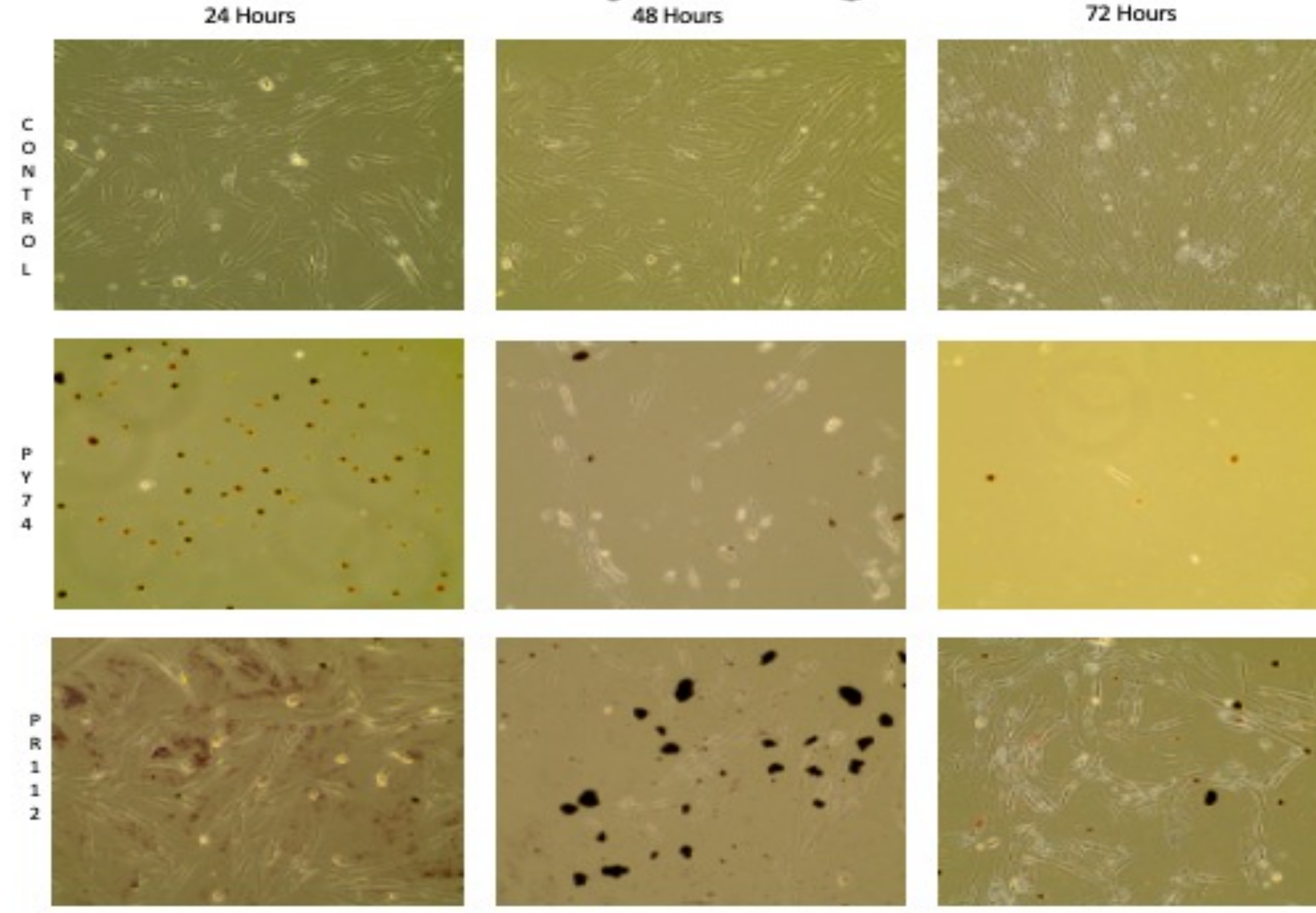


Figure 8 Microscopy. Images captured of cells without applied pigment and after exposure to PY74 and PR112 azo pigments.

Cells that are exposed to Pigment Yellow 74 resemble fewer cells within the wells after 24 hours and almost completely vanish after 48 hours.

Future Work: Potential Breakdown Products Inciting Cell Death

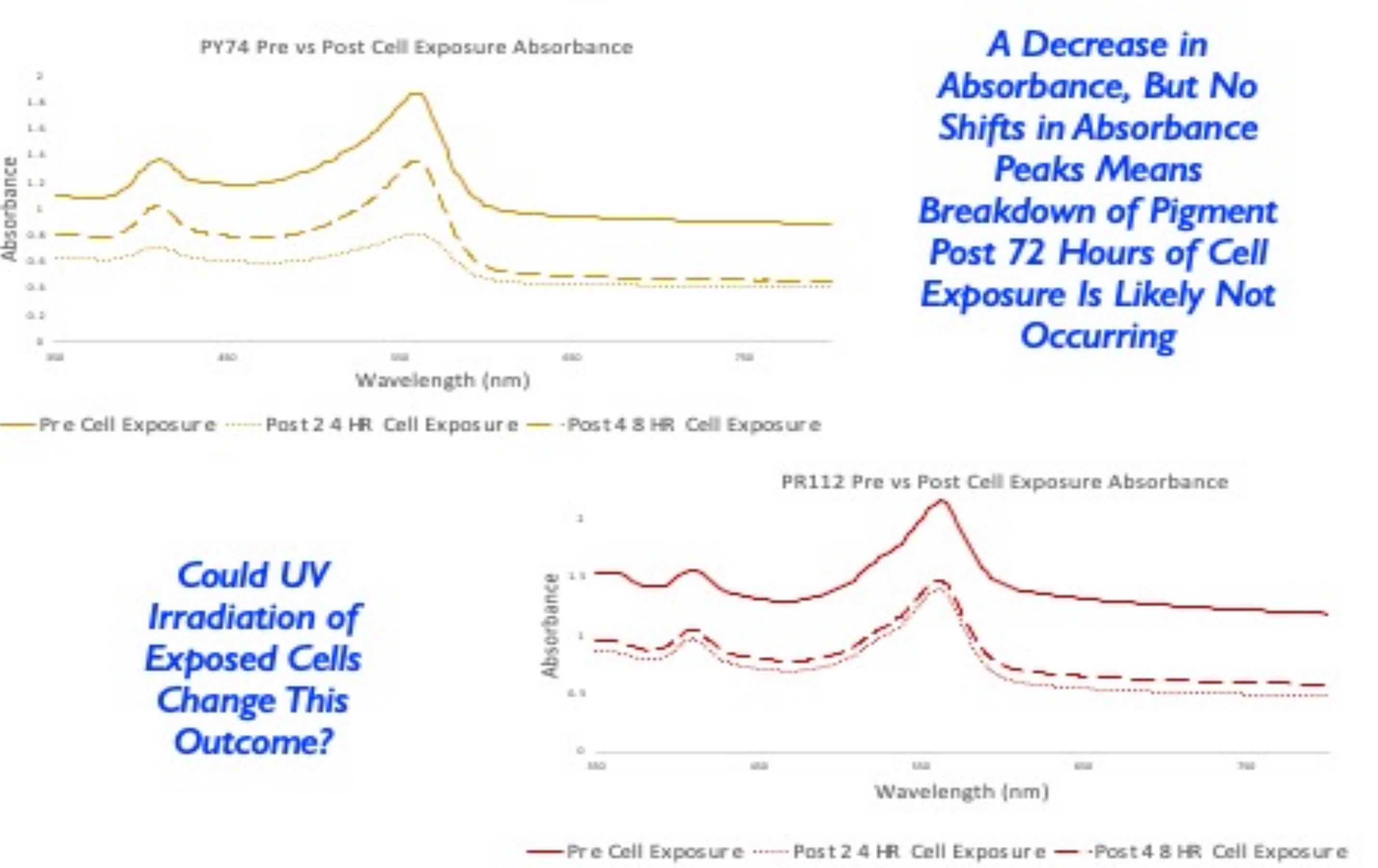


Figure 9 UV-Vis Spectroscopy. Absorbance values of pigments PY74 and PR112 in solution (2.5 mg/mL) pre- vs post-cell exposure.

Acknowledgments

NIH

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