

# Holographic microscopy: Macrophage-uptake of SA-MIPs

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## Introduction

Sialic acid (SA) is a cell surface glycan, which has been found to be upregulated on more aggressive cancers. Therefore, there is a great interest in developing methods for detection of SA on cancer cells. We are screening SA on cancer cell lines by fluorescent molecularly imprinted polymers, SA-MIPs<sup>1,2</sup>.

Quantitative phase imaging (QPI) is a digital holographic imaging technique<sup>3</sup>. Various cellular parameters can be visualized and calculated from the particular hologram, including individual cell area, thickness, volume and population confluence and cell counts<sup>3</sup>. The aim was to investigate the possible uptake of SA-MIPs in macrophage cell lines in *in vitro* cultures and if they affected the cell.



## SA-MIP uptake in RAW 264.7 cells detected by fluorescence microscopy

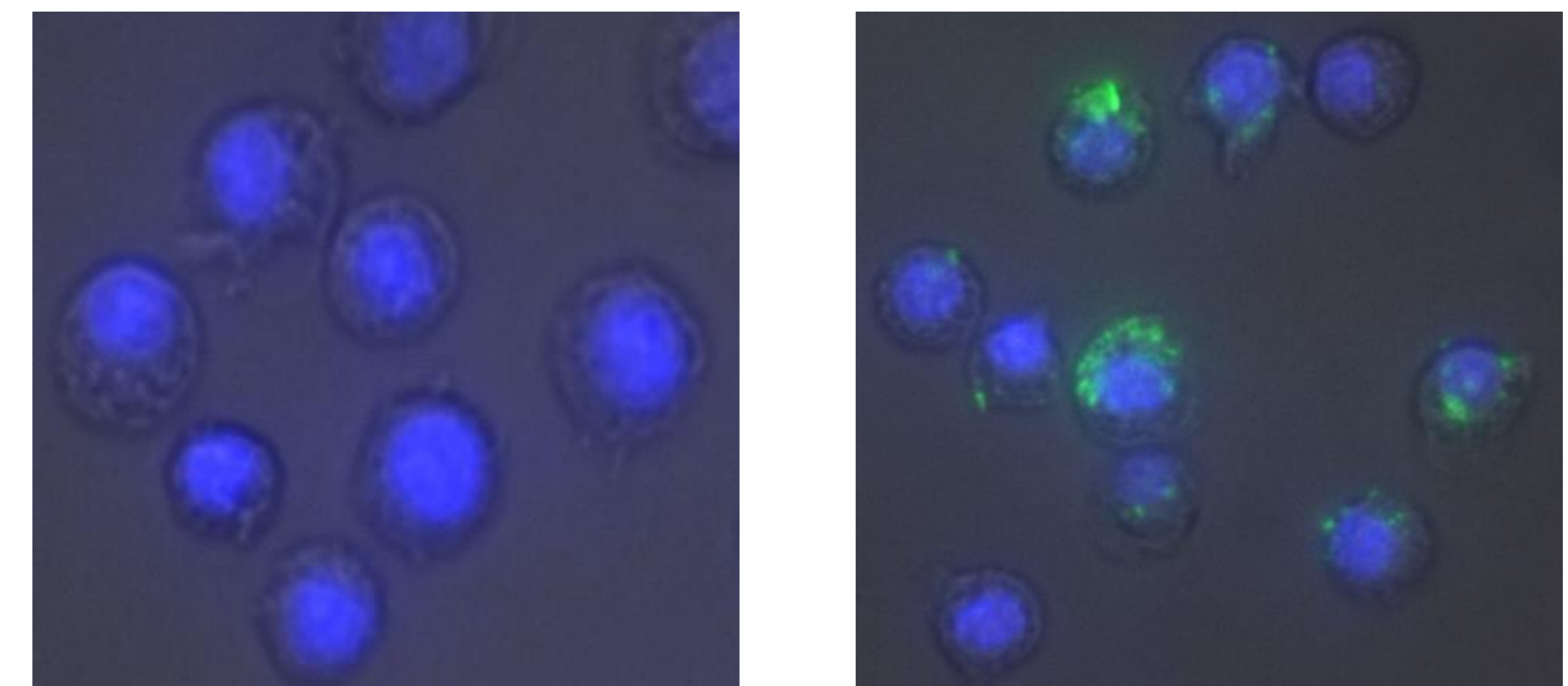


Fig. 2 Fluorescence microscopy images of RAW 264.7 cells only (left) and stained with SA-MIP (right) for 6h. DAPI staining was used as a nuclear marker.

## Technique

QPI builds on red coherent laser light. The laser beam is split into two, one illuminating the sample and the other providing a reference beam. Laser light passing through the sample is affected by intra-cellular structures causing a phase shift of the illuminating light<sup>3</sup>. Cell images are reconstructed based on the phase shift.

## Material & Methods

**Cell line:** RAW 264.7 macrophages, Abelson murine leukemia virus transformed **Methods:** fluorescent microscopy, digital holographic microscopy.

## SA-MIP uptake in RAW 264.7 detected by QPI

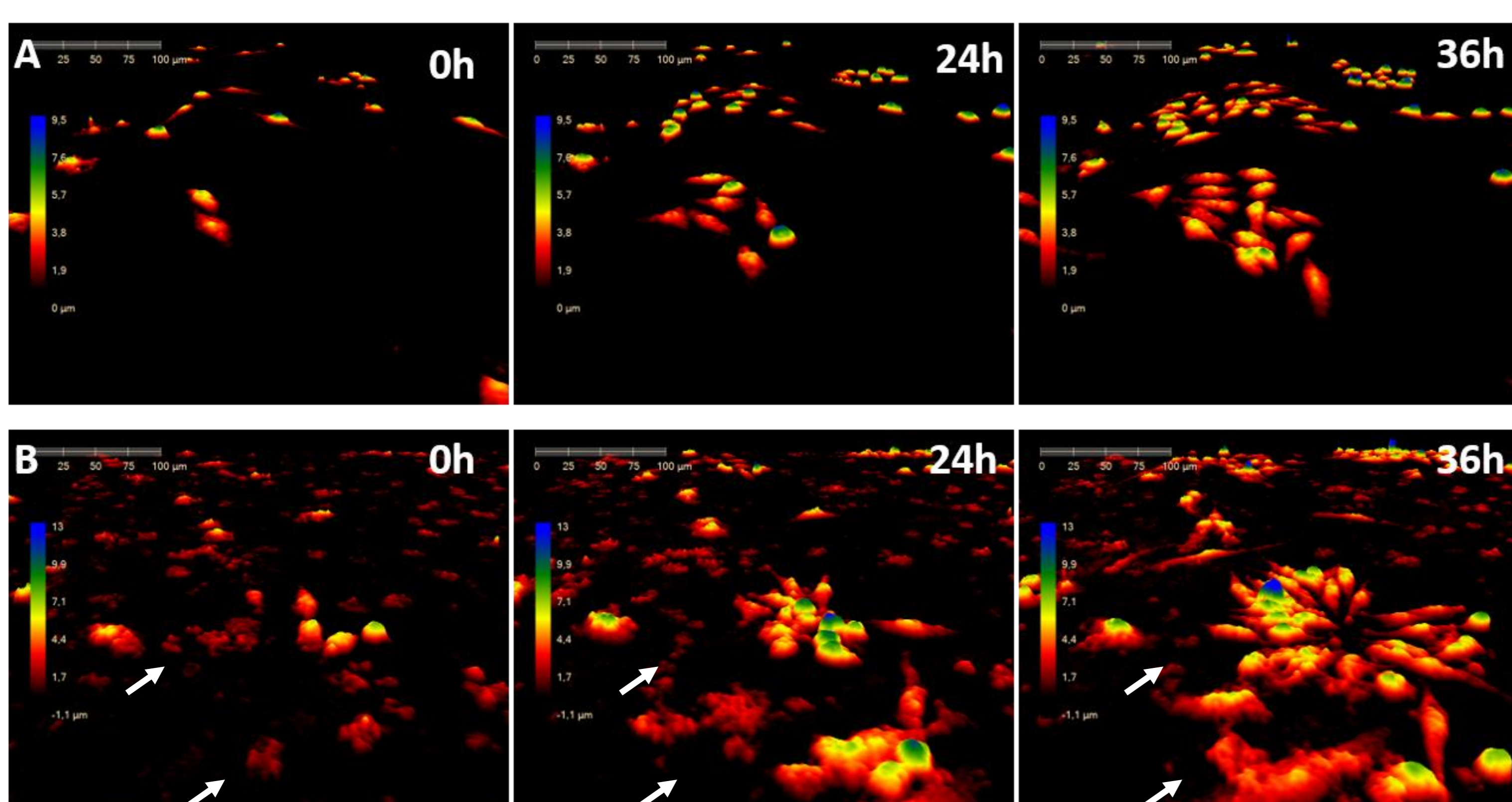


Fig. 1 QPI images of RAW 264.7 cells only (A) and RAW cells with 0.04 mg/ml SA-MIPs (B). Colors represent cell thickness.

## Morphological parameters and cell count

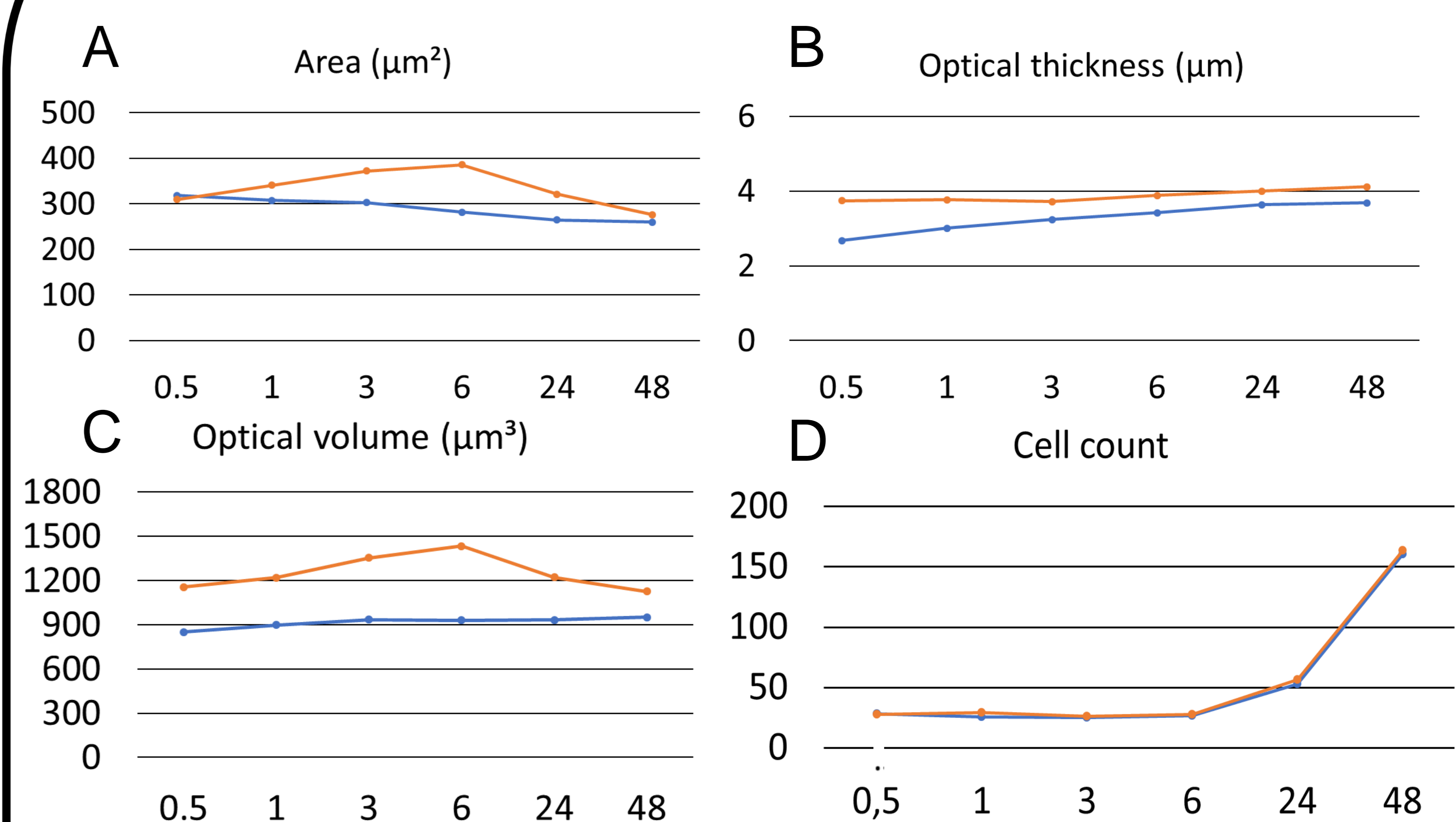


Fig. 3 Three morphological parameters and cell count of RAW 264.7 cells with (orange) and without (blue) SA-MIPs treatment (0.04 mg/mL), hours on x-axis. SA-MIPs treatment increased the values for area, optical volume, and optical thickness.

## Conclusion

- SA-MIPs can be detected using QPI after uptake in RAW 264.7 cells as cell morphology is affected.
- SA-MIPs seem to cause no toxic effect.
- The microscopy analysis shows that the RAW 264.7 cells ingest the SA-MIP particles.

## Acknowledgements

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## References

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