



P2.026: Environmental Nanoplastics Promote Macrophage-Mediated Tumor Progression and Osimertinib Resistance in Lung Cancer

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INTRODUCTION

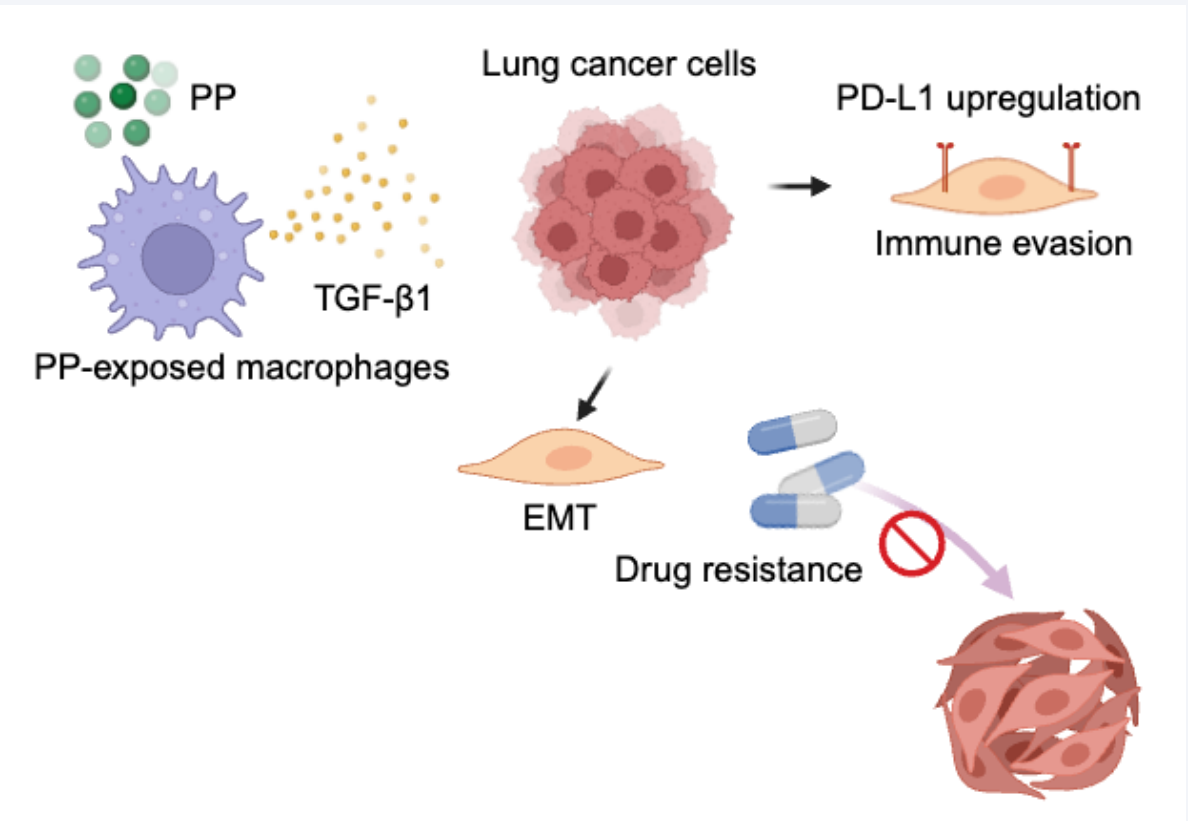
Nanoplastics (NPs), produced by environmental degradation of plastic waste, are increasingly recognized as potential health hazards. Although NPs have been detected in human tissues, their biological impact remains insufficiently understood, largely due to the absence of standardized materials. Previous biological studies have relied predominantly on polystyrene particles, which may contain impurities that induce artificial toxicity and proinflammatory responses. To address this issue, contaminant-free nanoparticles with uniform size and morphology have recently been generated by the National Institute for Environmental Studies. In this study, we investigated the effects of standardized polypropylene (PP) nanoparticles on macrophage polarization and examined how PP-exposed macrophages influence tumor progression and drug sensitivity in lung cancer cells.

METHODS

Standardized PP nanoparticles were exposed to ultraviolet irradiation to mimic environmental aging and dispersed in distilled deionized water by sonication. Particle size distribution was confirmed by dynamic light scattering. THP-1 cells (a human monocytic cell line) were differentiated into unstimulated macrophages by treatment with phorbol 12-myristate 13-acetate for 24 h. H1975 cells (EGFR L858R/T790M mutant human lung adenocarcinoma cells) and unstimulated macrophages were exposed to PP-NPs. Co-culture experiments with PP-exposed macrophages and H1975 cells were conducted using a six-well Transwell system for 48 h. Cell viability and osimertinib sensitivity were assessed by MTT assay. Protein expression was analyzed by Western blotting. Secreted TGF- β 1 levels in culture supernatants were quantified using ELISA. Filopodia formation was evaluated by F-actin immunofluorescence staining.

DISCUSSION AND CONCLUSION

Actionable Takeaway Message



Future Direction for Research

- Validate the NP-macrophage-tumor axis in primary human cells and in vivo models
- Standardize NP detection in tissues to assess clinical risk

REFERENCES & ACKNOWLEDGEMENTS

References

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2. Halimu G, Zhang Q, Liu L, et al. Toxic effects of nanoplastics with different sizes and surface charges on epithelial-to-mesenchymal transition in A549 cells and the potential toxicological mechanism. *J Hazard Mater*. 2022;430:128485. <https://doi.org/10.1016/j.jhazmat.2022.128485>.

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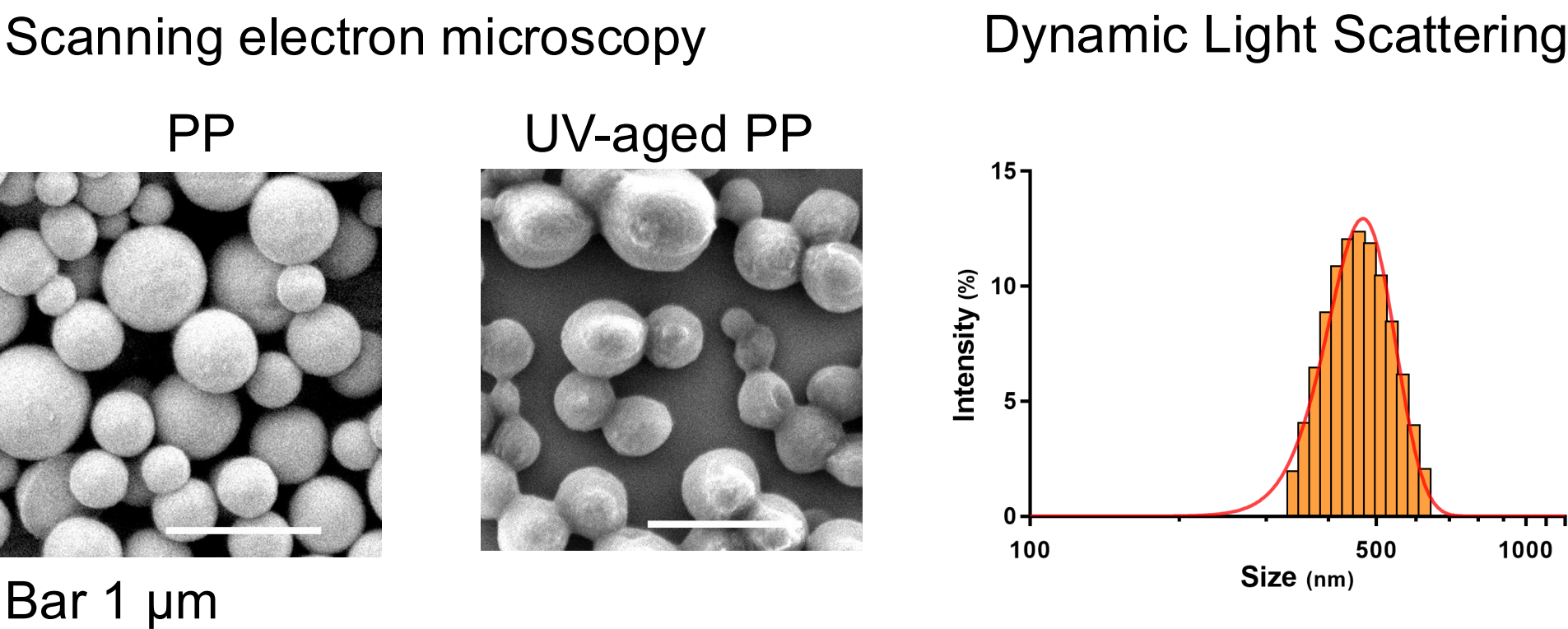
The authors declare no conflicts of interest.

Artificial Intelligence (AI) Use Disclaimer

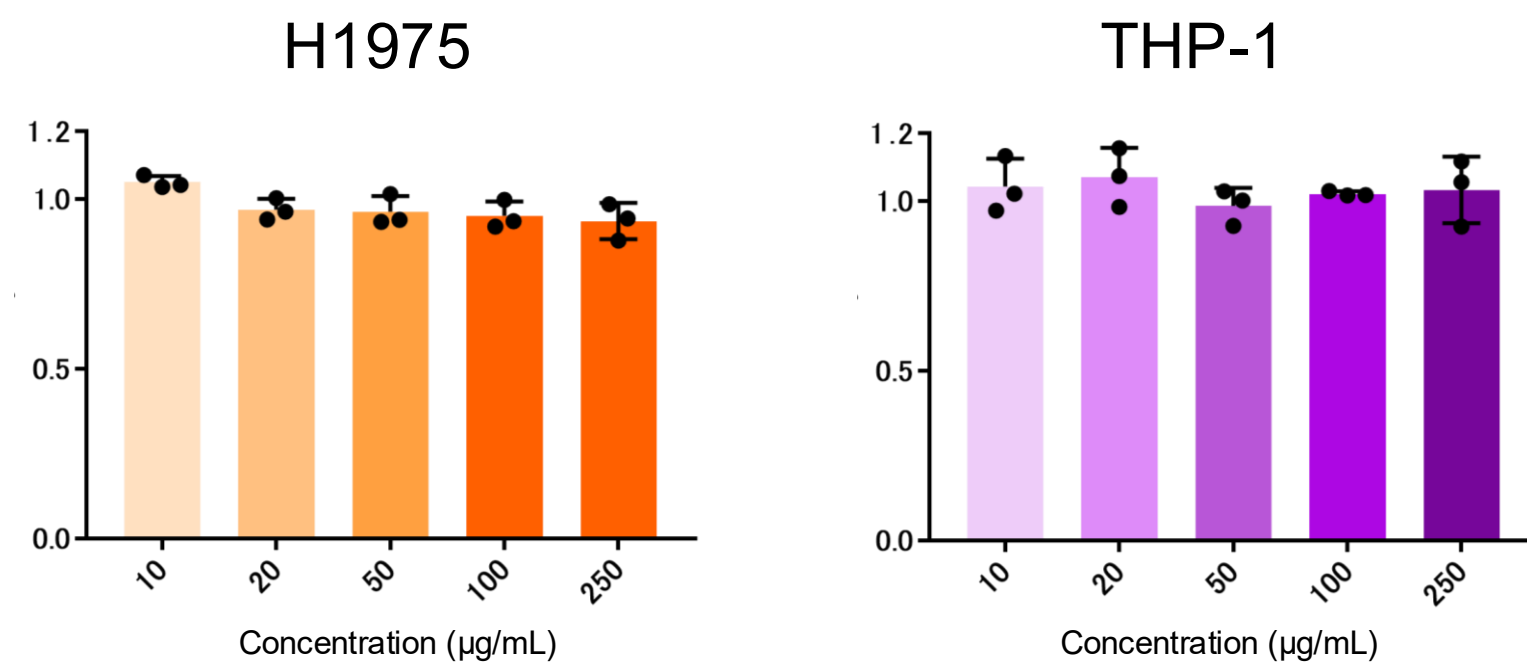
No generative AI tools were used in the development of this poster or its scientific content.

RESULTS

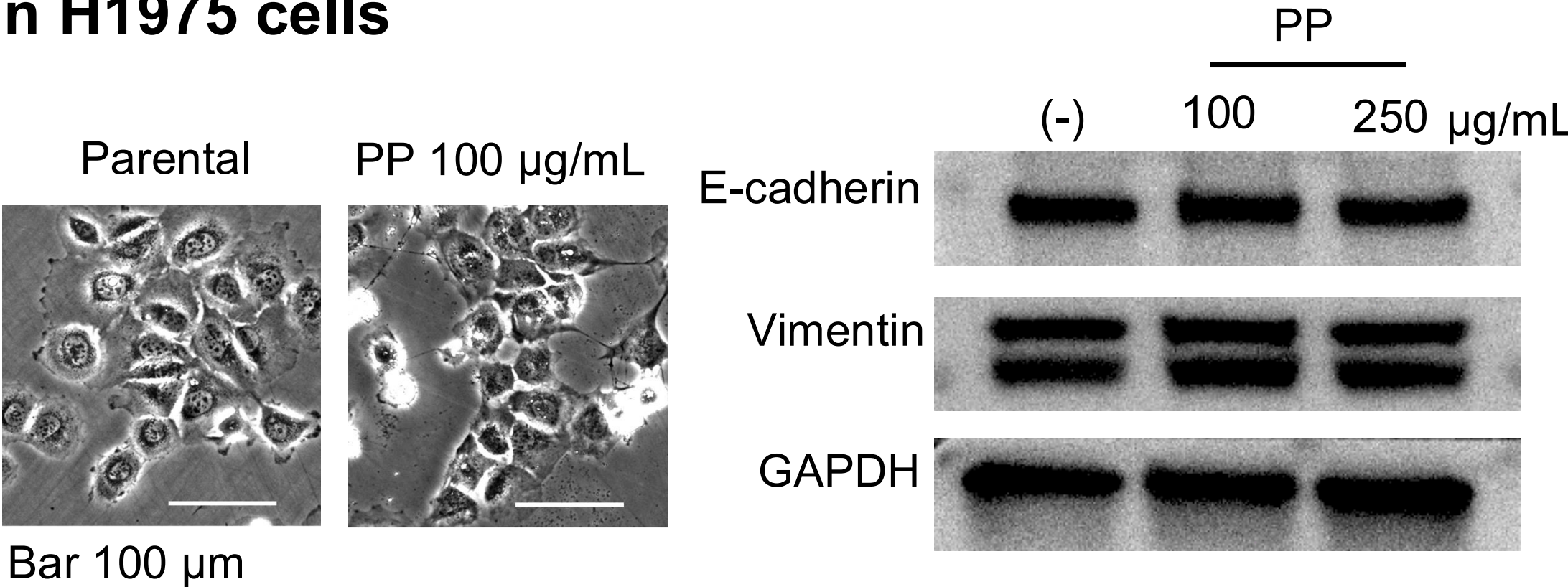
UV-aged PP particles maintained a uniform spherical morphology and stable dispersion



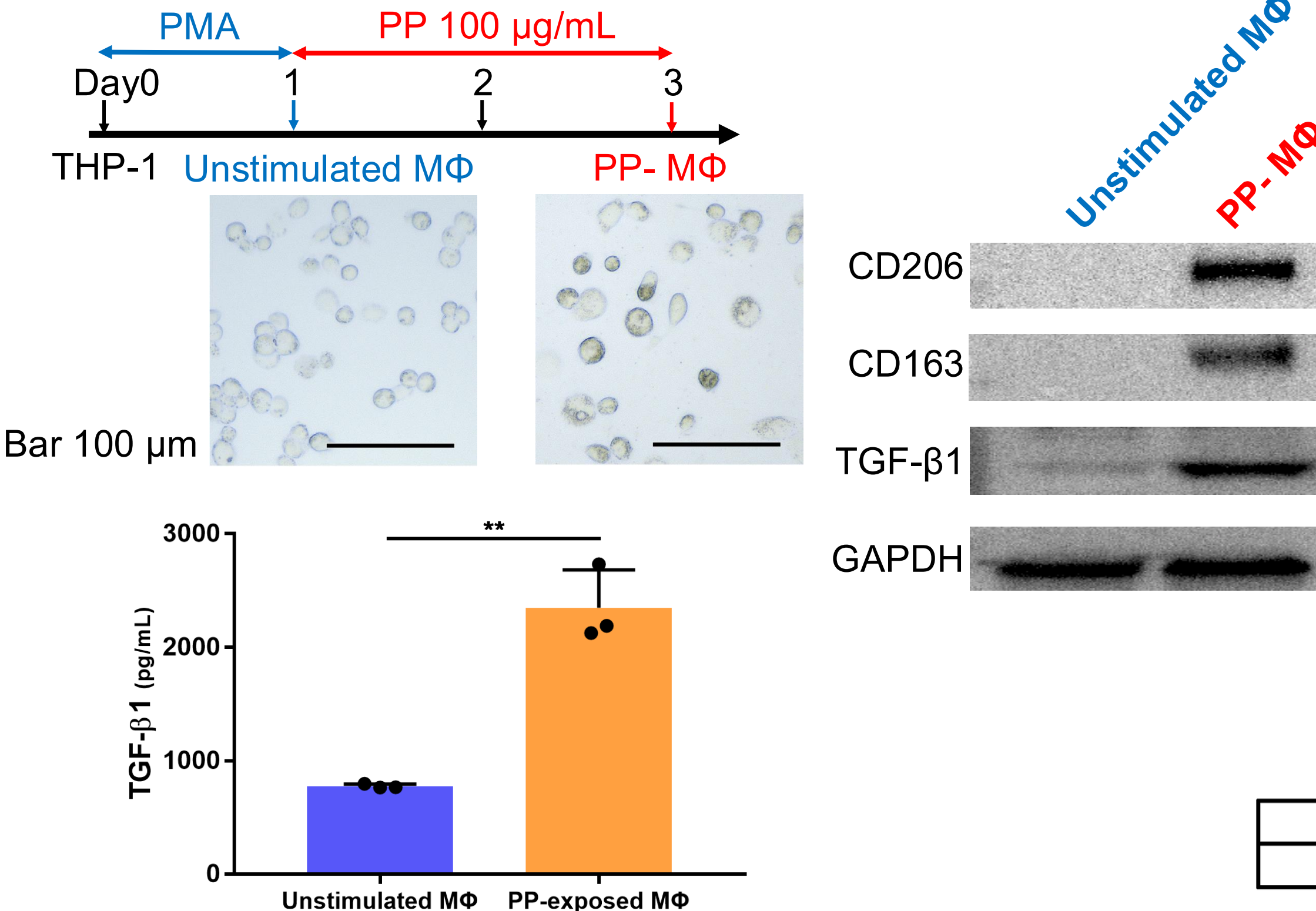
PP particles showed no significant dose-dependent cytotoxicity



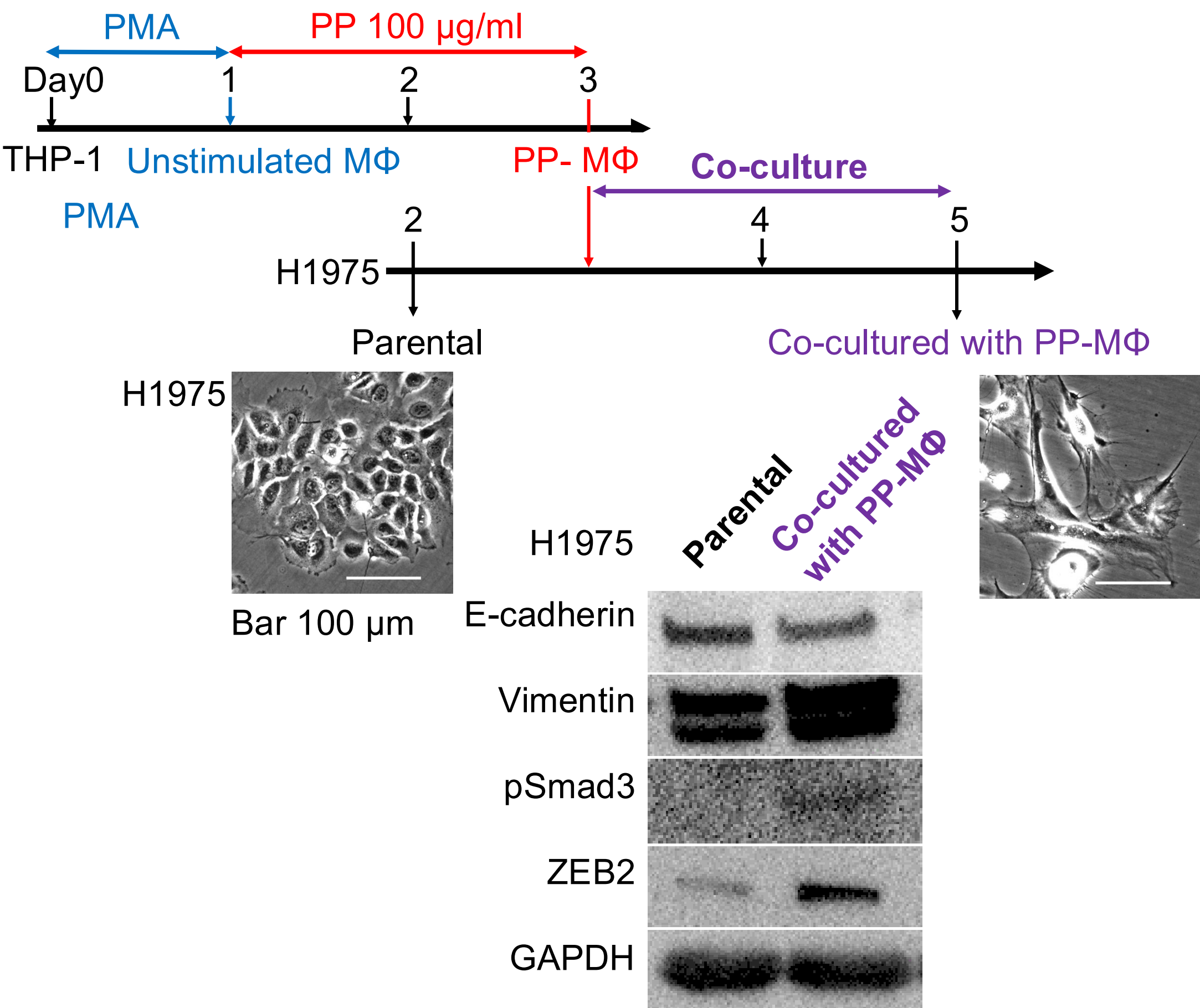
Direct exposure to PP particles did not induce EMT in H1975 cells



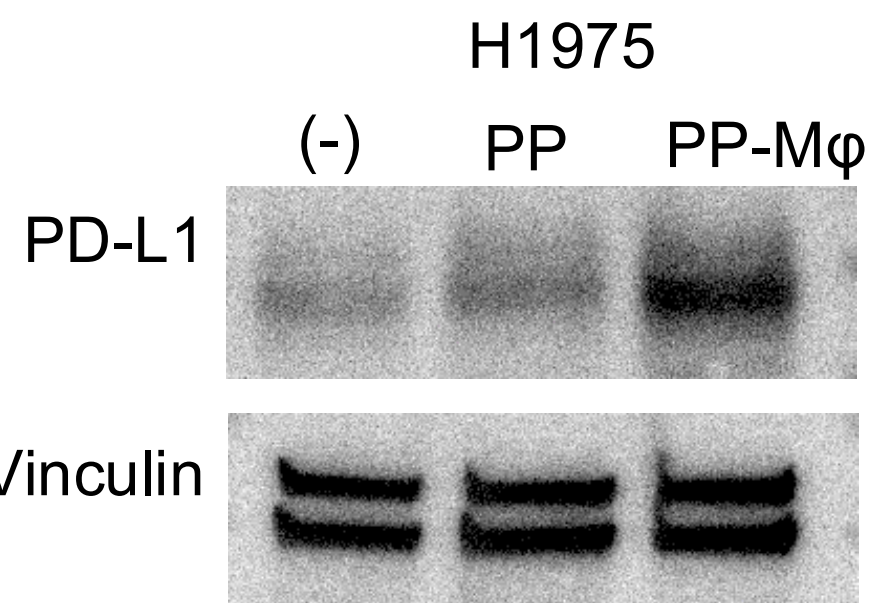
PP exposure induced tumor-promoting polarization in THP-1-derived macrophages



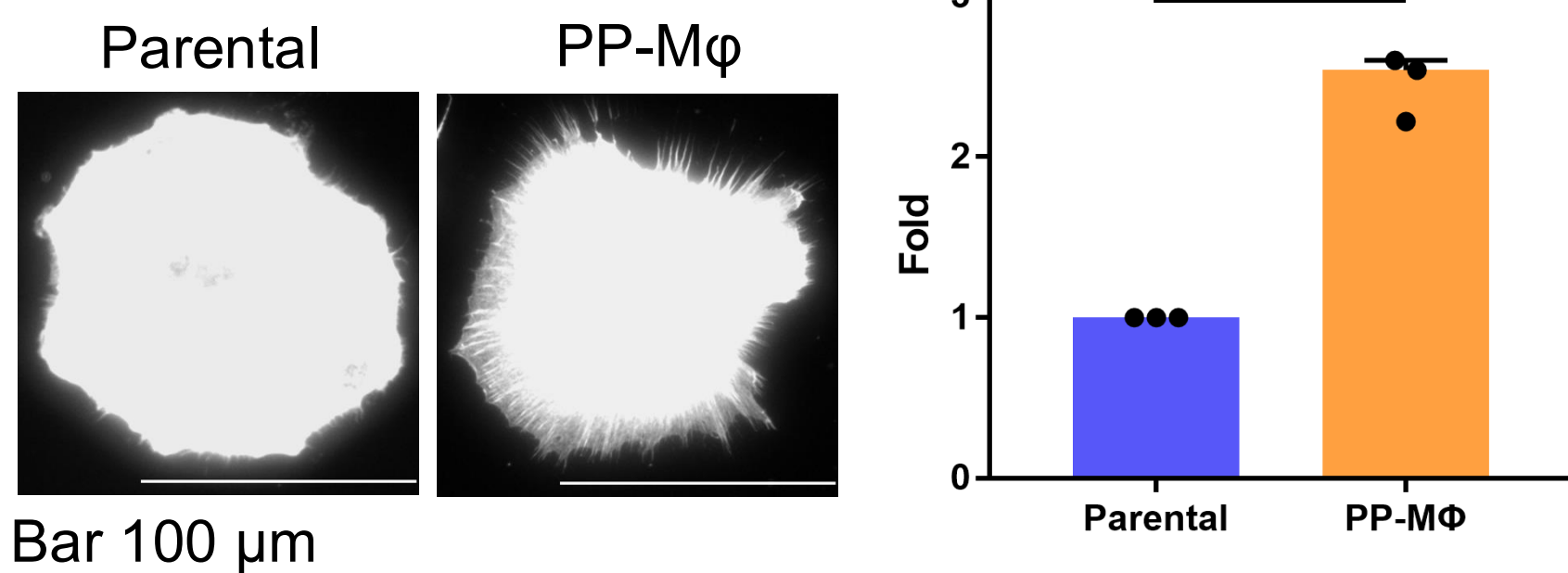
PP-exposed macrophages induced EMT in H1975 cells via TGF- β /Smad pathway



PP-exposed macrophages promoted PD-L1 expression in H1975 cells



PP-exposed macrophages increased filopodia formation in H1975 cells



PP-exposed macrophages induce resistance to osimertinib in H1975 cells

