

IMPACT OF CIGARETTE SMOKE ON VASCULAR SMOOTH MUSCLE CELL SENESCENCE

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INTRODUCTION

Aging and smoking are major risk factors for cardiovascular diseases. One characteristic of aging is the accumulation of senescent cells¹ (e.g. cells that permanently lose the ability to divide). Senescent vascular smooth muscle cells (VSMCs) are present in atherosclerotic plaques, inducing an inflammatory environment and contributing to plaque instability and atherosclerotic complications².

Traditional cigarette (TC) smoke is a known exacerbator of age-related diseases and the combustion of tobacco releases thousands of toxic chemicals³. To reduce the harm associated with TC, alternative products, such as tobacco heating-not-burning products (THPs), have been developed.

AIM OF THE STUDY

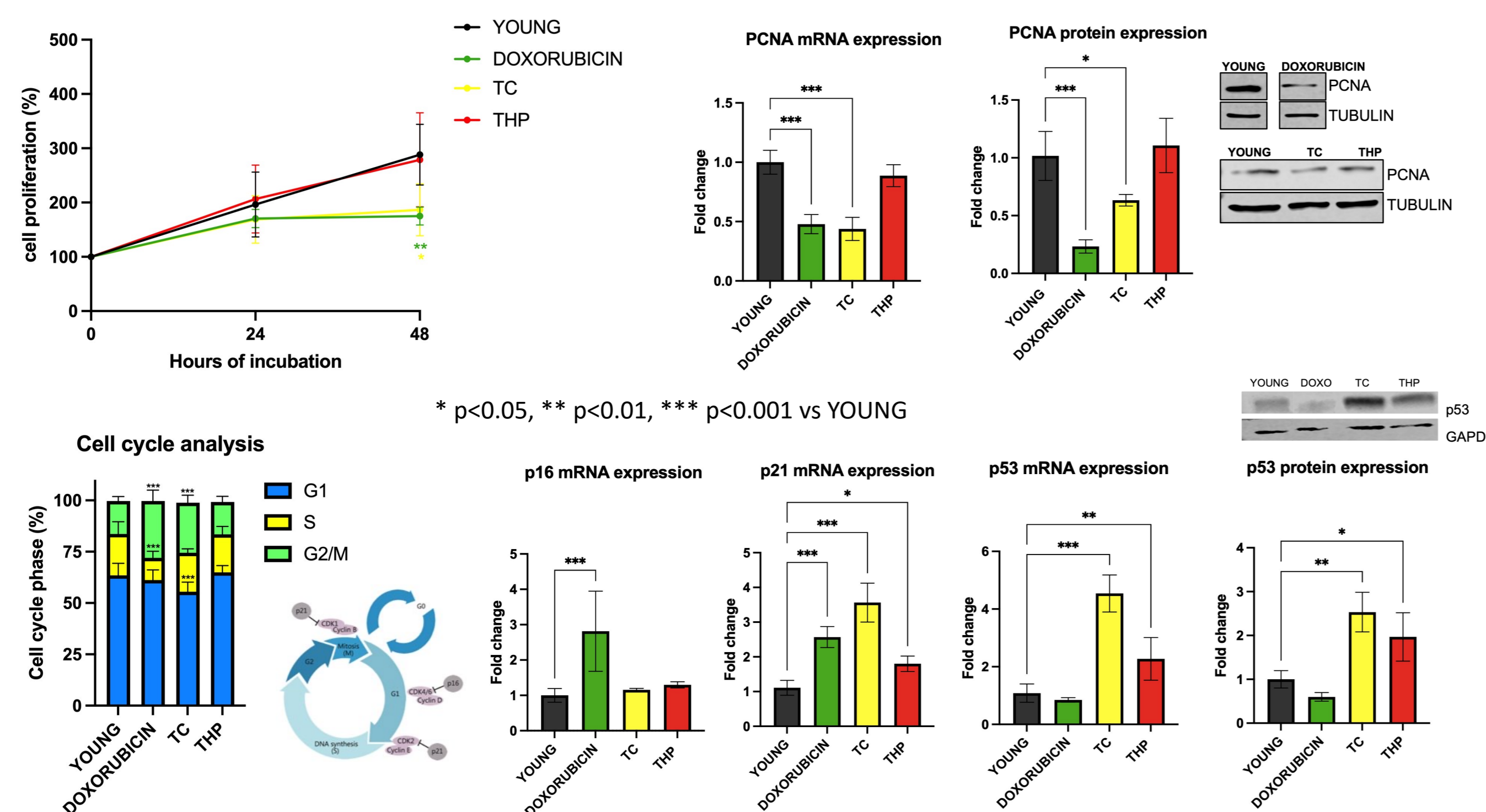
We compared the effects of aqueous extracts from TC and THP on doxorubicin-treated VSMCs, used as positive controls for induced senescence.

MATERIALS AND METHODS

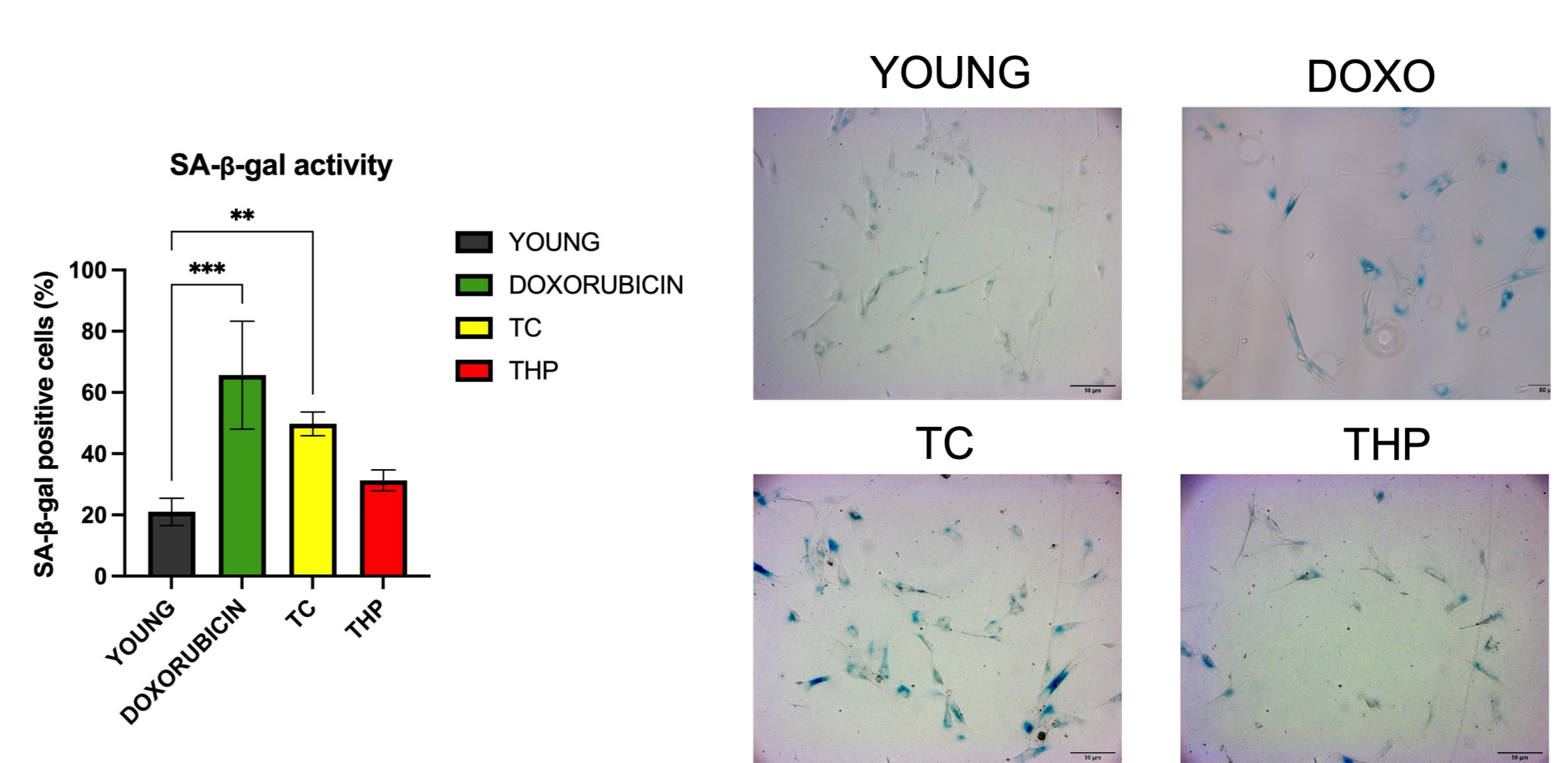
Human aortic VSMCs at low passages (5-7, young or non-senescent cells) were incubated for 48 hours either with 10% of TC or THP, or with doxorubicin 100nM. Next, to assess cellular senescence, we measured SA-β-gal activity, gene and protein expression by qPCR and western blot analysis, cell proliferation by cell counting, cell cycle and reactive oxygen species (ROS) by flow cytometry, morphological and nuclear changes by immunofluorescence.

RESULTS

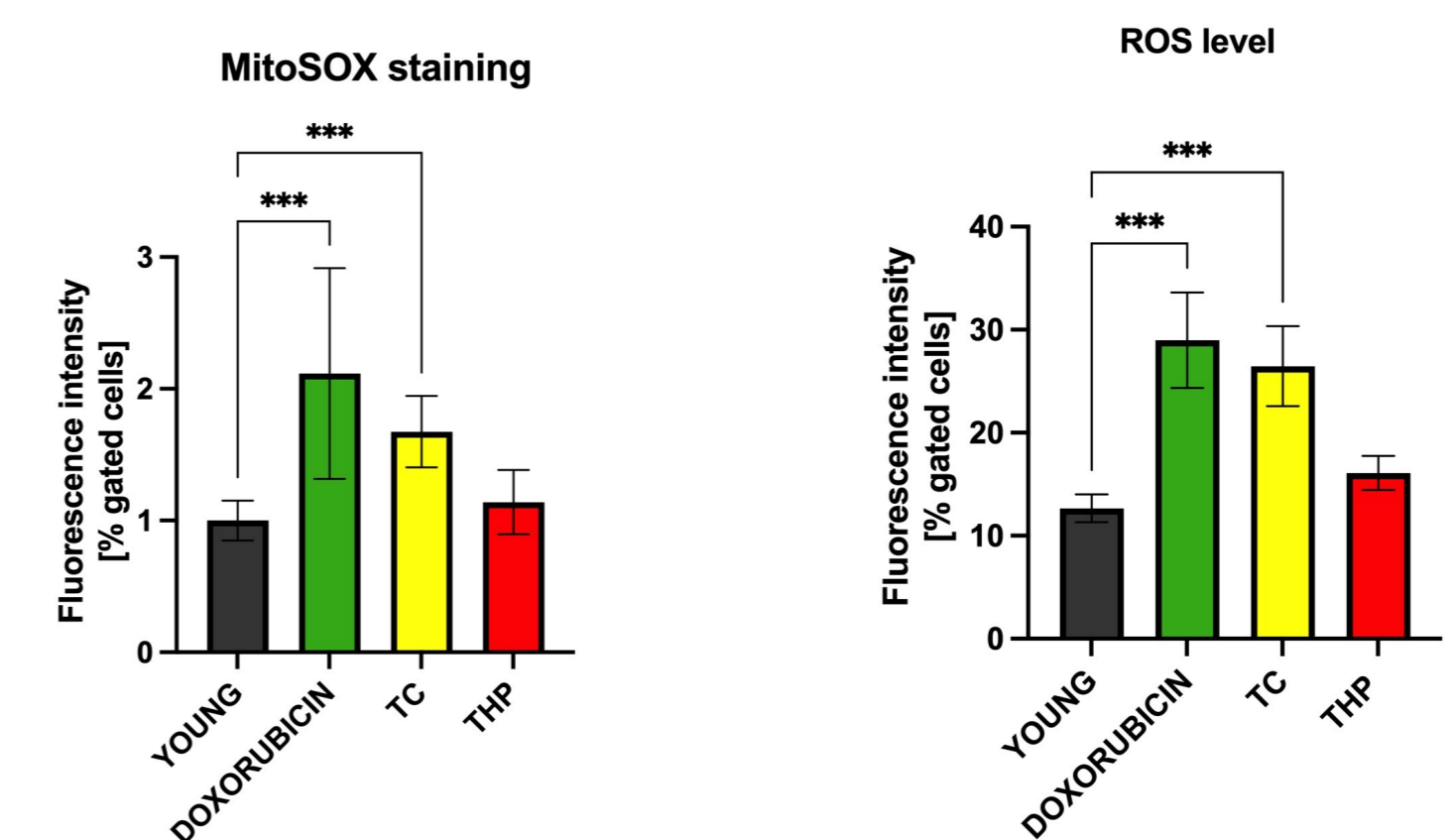
Differential effects of TC and THP on cell proliferation and cell cycle



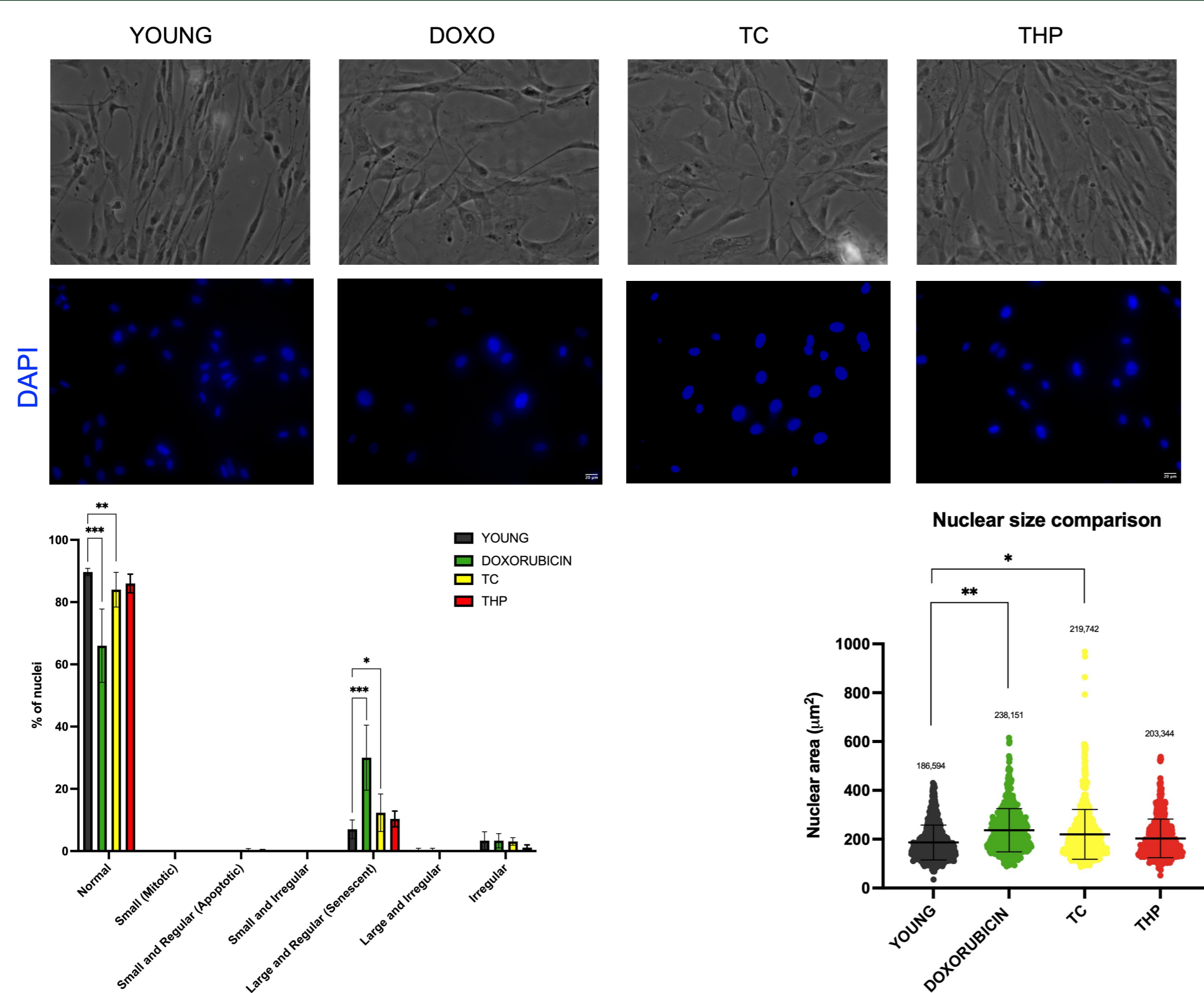
Differential effects of TC and THP on SA-β-GAL activity



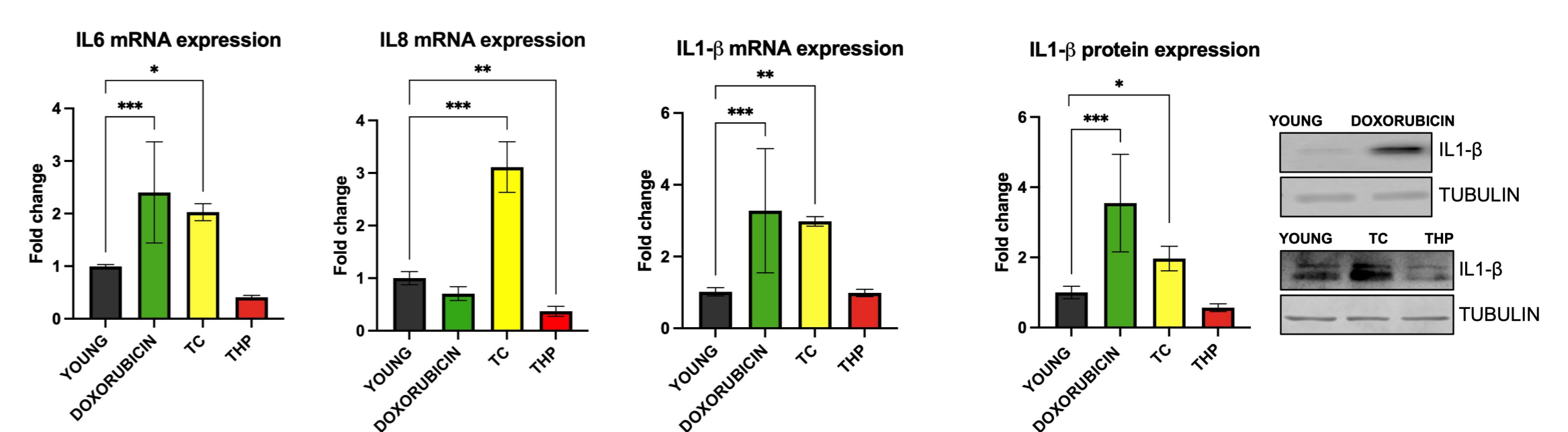
TC and THP differently affect ROS production



TC and THP differently affect cellular and nuclear morphology



TC stimulates SASP, THP does not



CONCLUSIONS AND FUTURE PERSPECTIVES

In conclusion, TC induced premature senescence in VSMCs at a level similar to doxorubicin-treated cells. On the contrary, THP lacked most of the TC and doxorubicin-related functional, structural, and molecular effects on VSMCs senescence. The real long-term health effects of these tobacco alternative products will have to be further assessed.

REFERENCES

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