ROS-Activated Nanocarriers: A Novel Approach to Targeted Cancer Chemotherapy

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CONTROLLED RELEASE SOCIETY
CRS 2024 Annual Meeting AND Exposition
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Head and neck cancer (HNC)

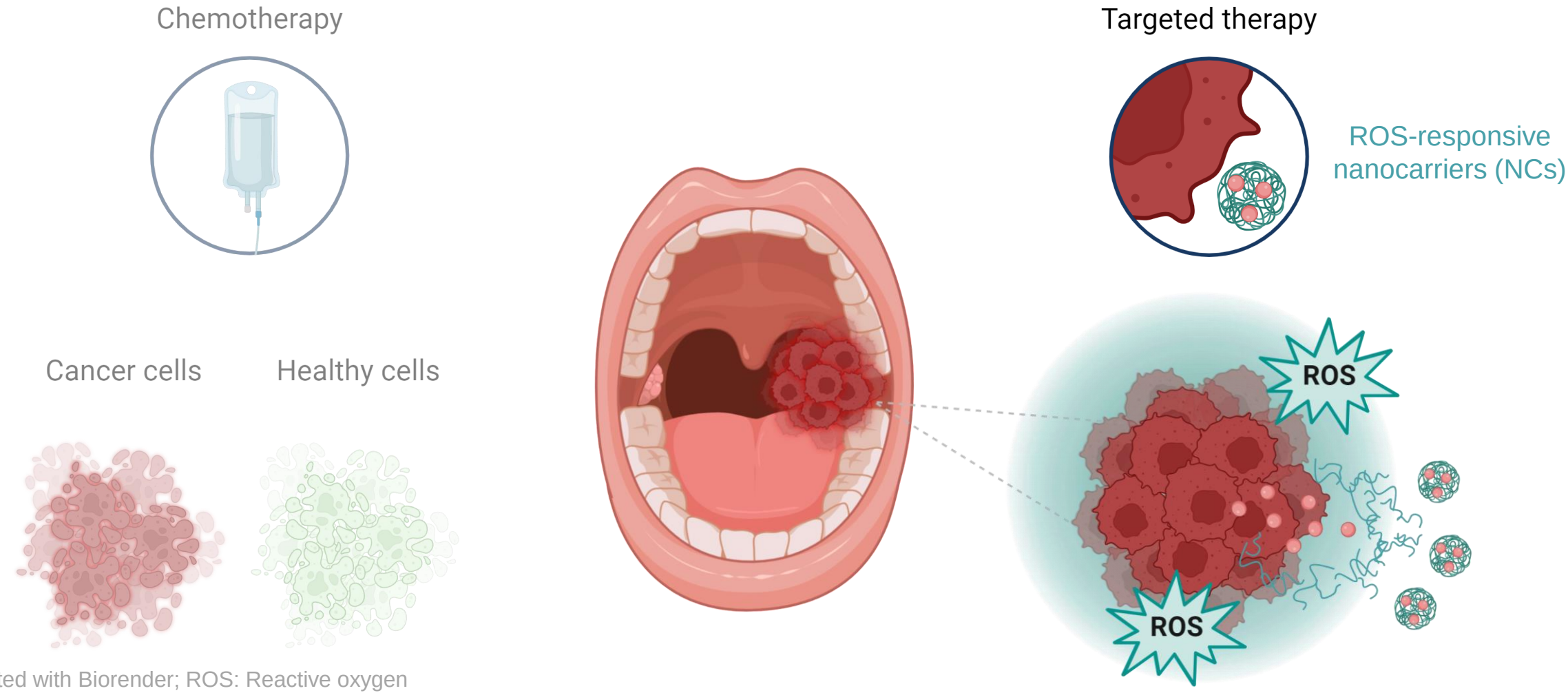
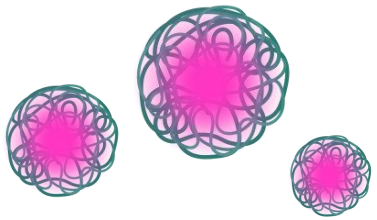
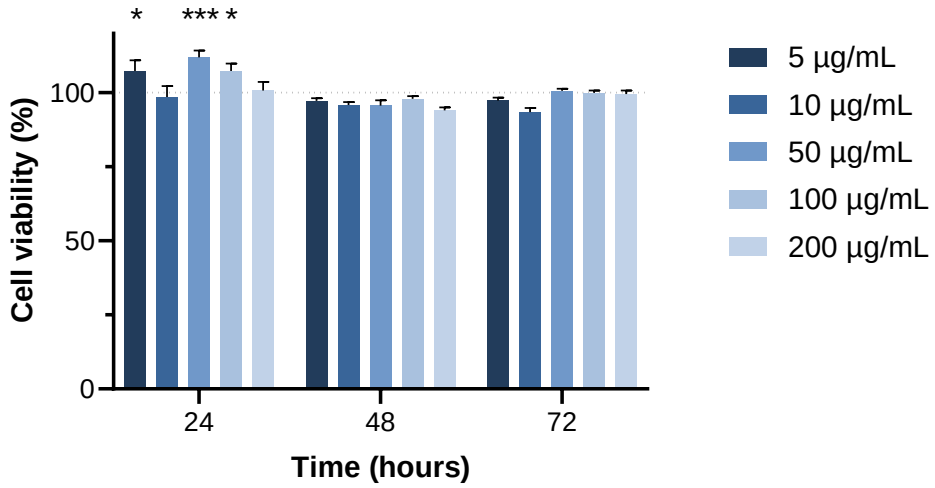
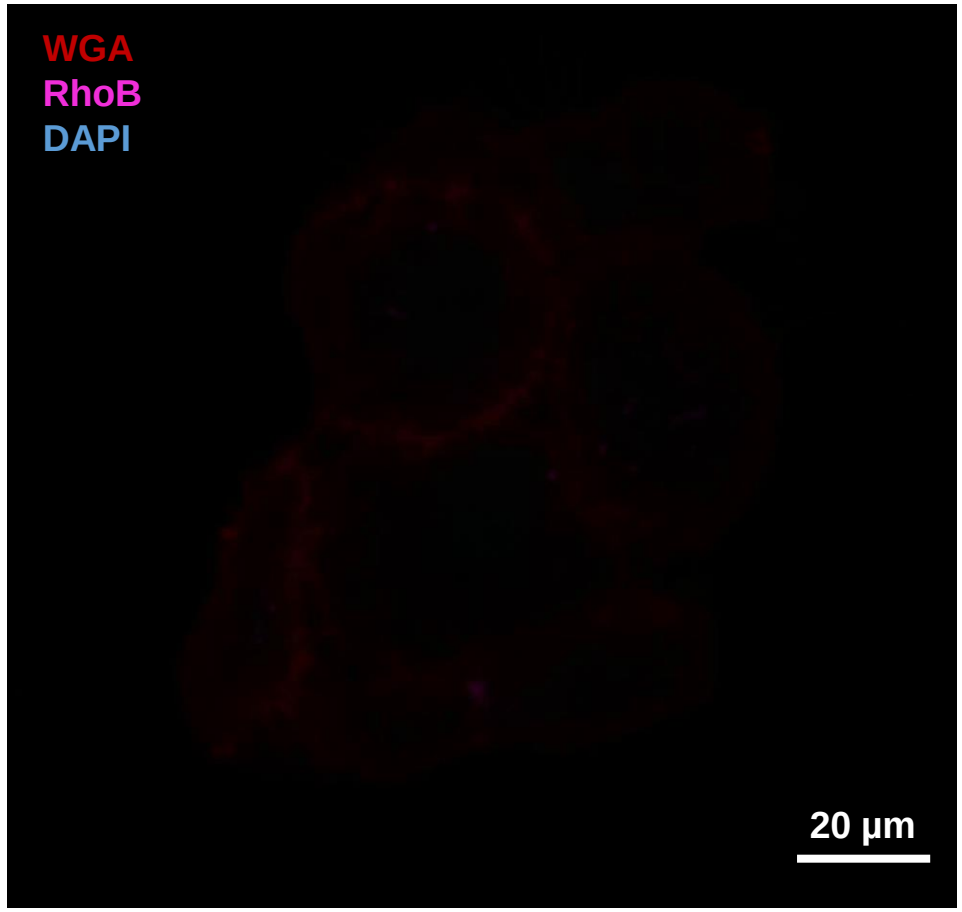


Figure created with Biorender; ROS: Reactive oxygen species

NCs are biocompatible and taken up by HNC cells



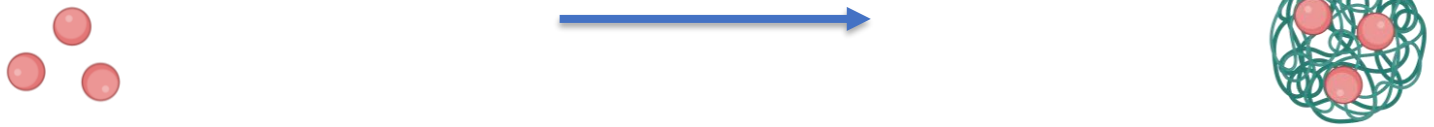


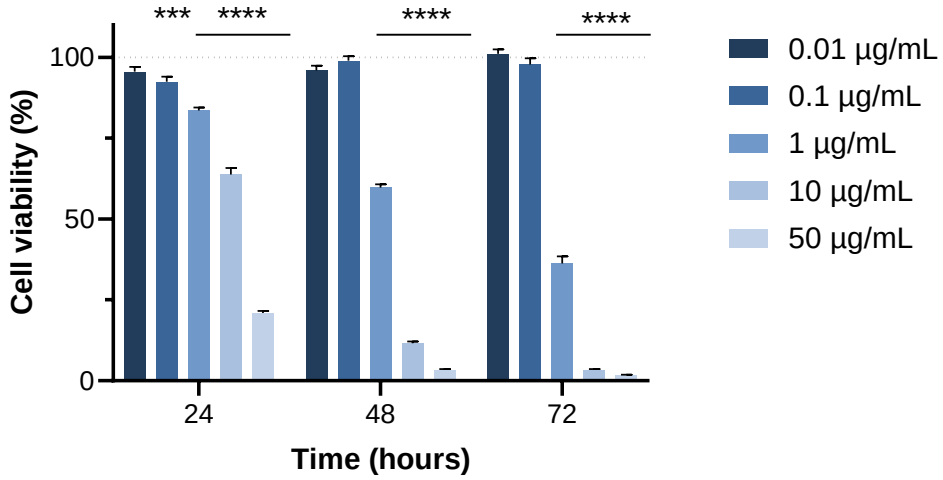


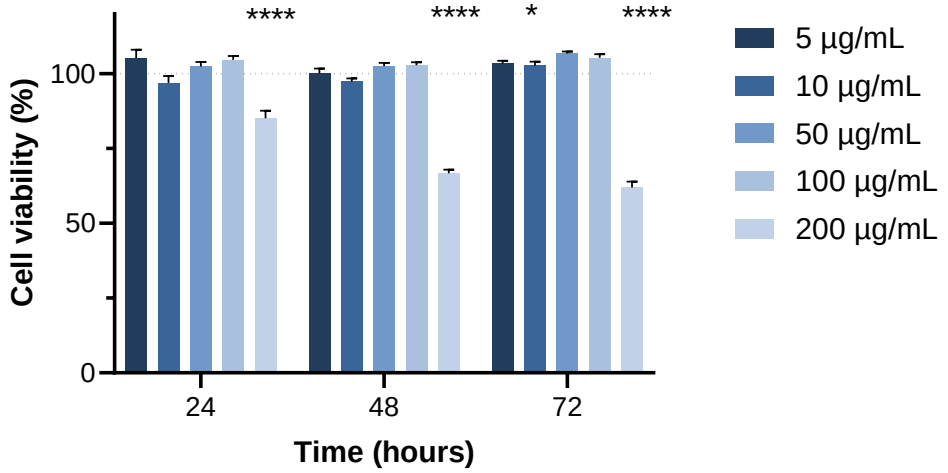
n=3; 2-way ANOVA – Dunnet's test; *p<0.05; ***p<0.001

NCs: nanocarriers; HNC: head and neck cancer; RhoB: rhodamine B

Cisplatin-loaded NC cause HNC cell death



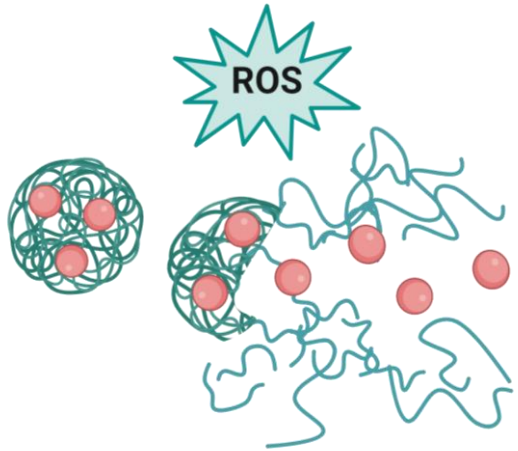




n=3; 2-way ANOVA – Dunnet's test; *p<0.05; ***p<0.001; ****p<0.0001

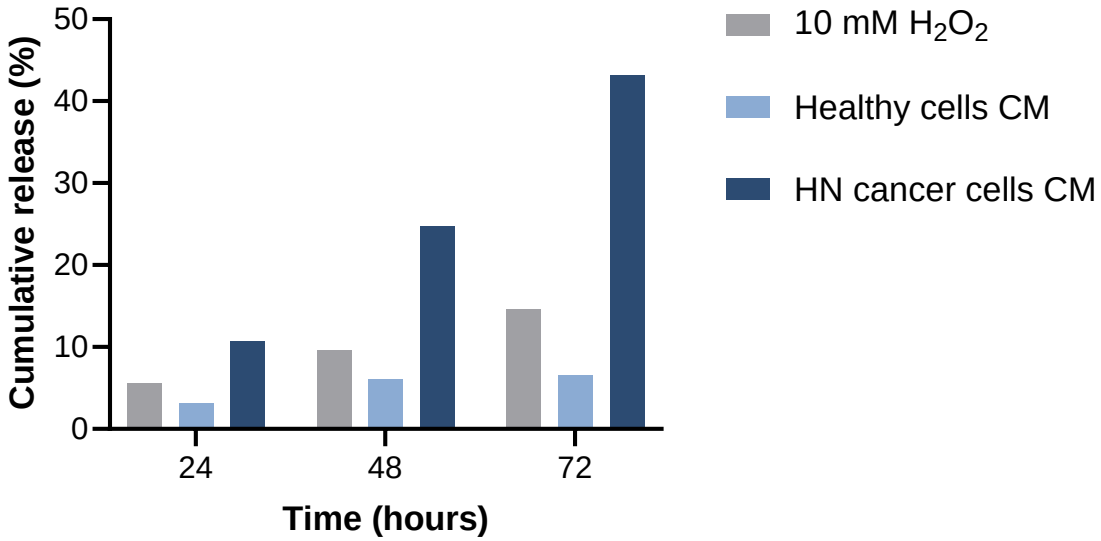
NCs: nanocarriers; HNC: head and neck cancer

Cisplatin-loaded NCs release cargo in tumour environment



ROS responsiveness of NCs

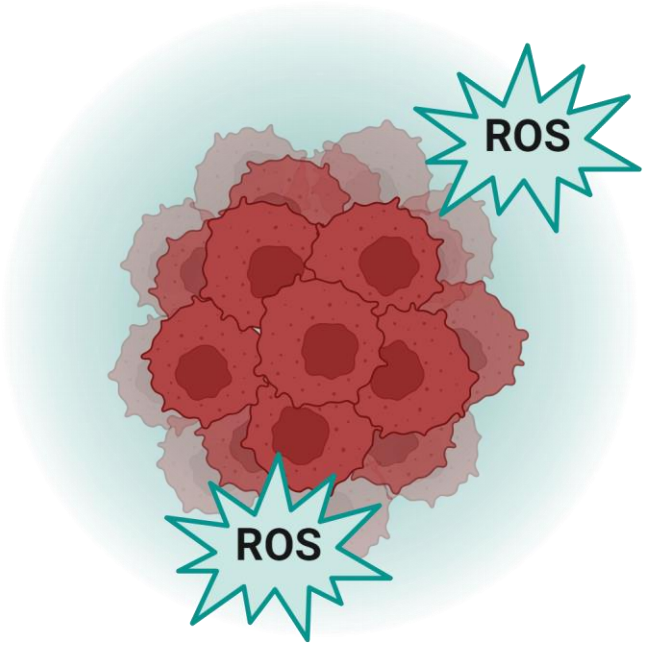
Higher ROS levels in tumour environment compared to healthy condition

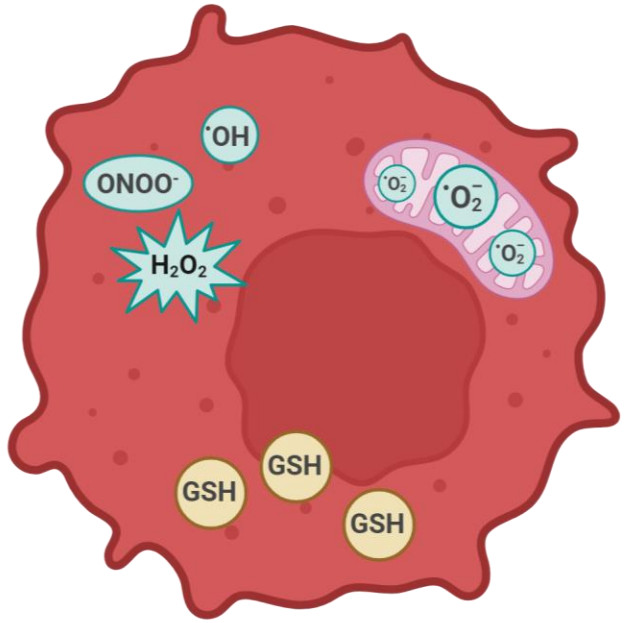


NCs: nanocarriers; ROS: reactive oxygen species; CM: conditioned medium

Experiments performed by Sourav Nayak; n=1

How is the redox balance altered in HNC cells?



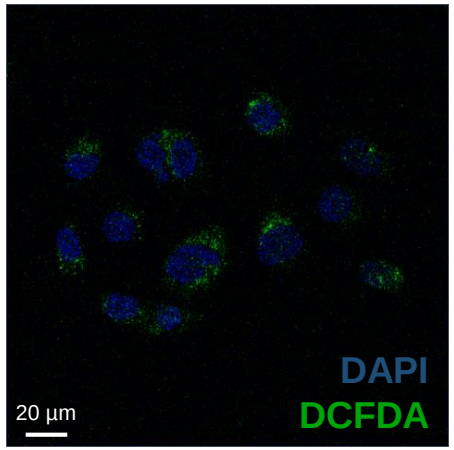


n=2; 1-way ANOVA – Dunnet's test;
**p<0.005; ***p<0.001

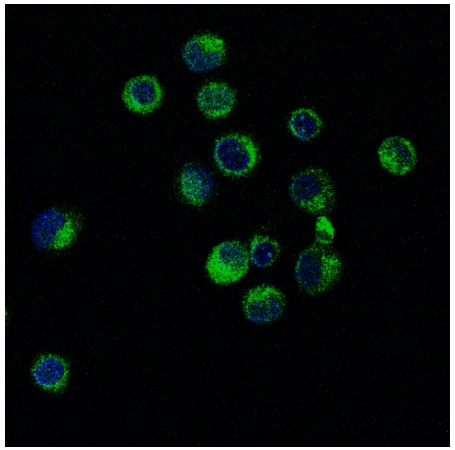
tbHP: tert-butylhydroperoxide; NAC: N-acetyl cysteine

ROS generation in HNC cells is detected

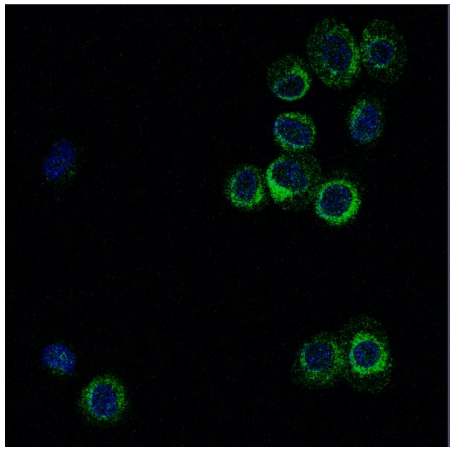
Untreated

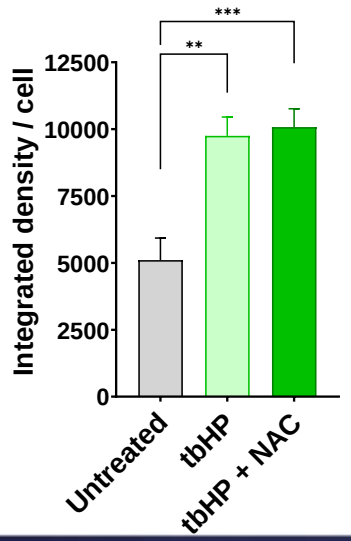


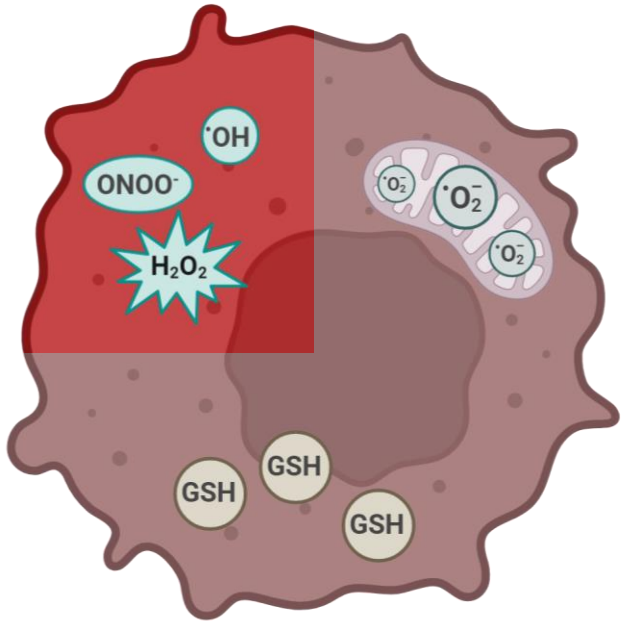
tbHP



tbHP+NAC



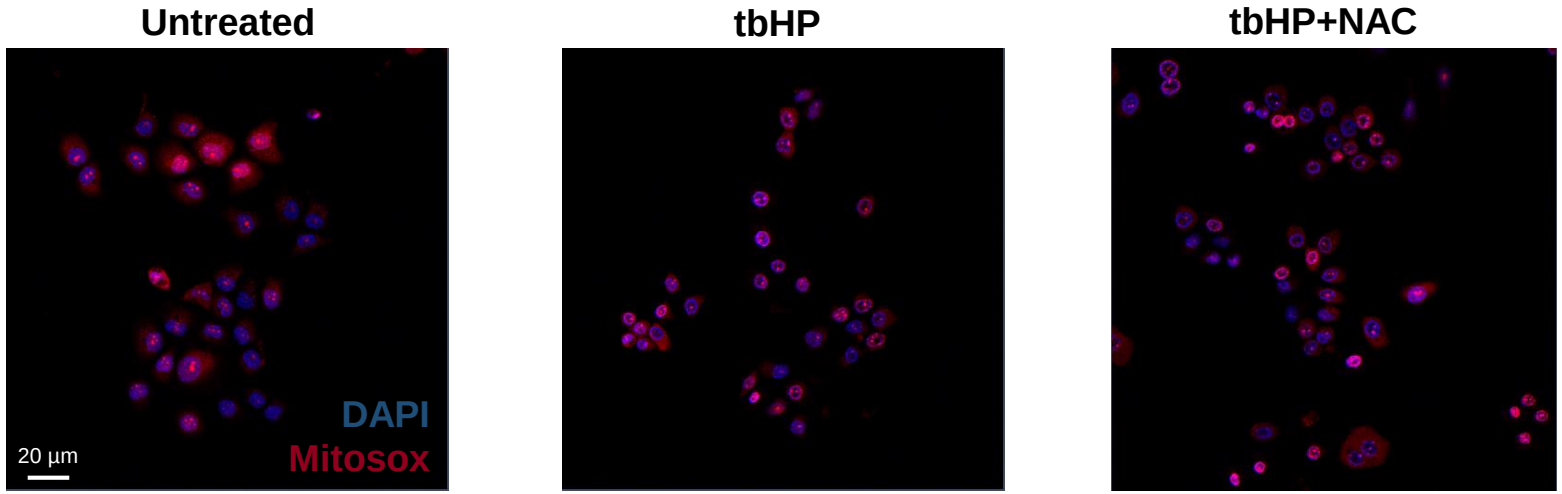


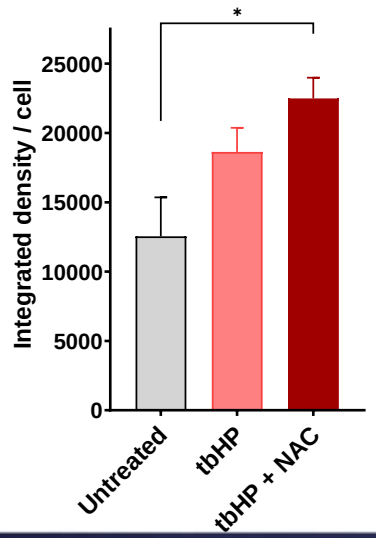


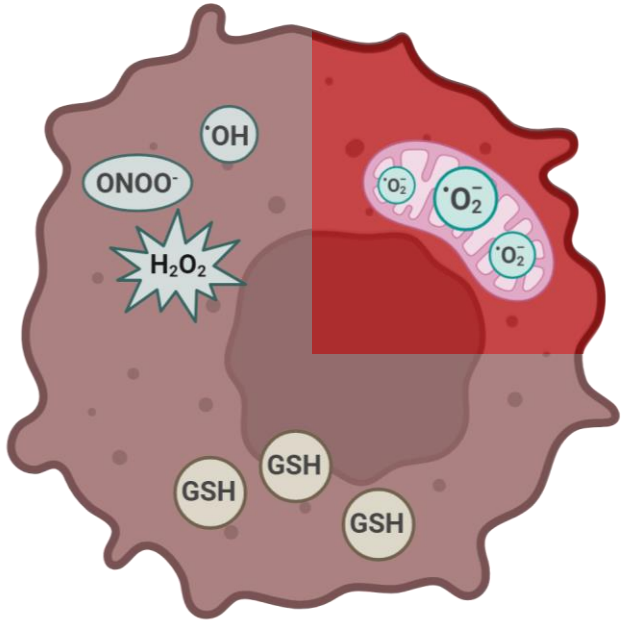
n=2; 1-way ANOVA – Dunnet's test;
**p<0.005; ***p<0.001

tbHP: tert-butylhydroperoxide; NAC: N-acetyl cysteine

Mitochondrial superoxide in HNC cells is detected



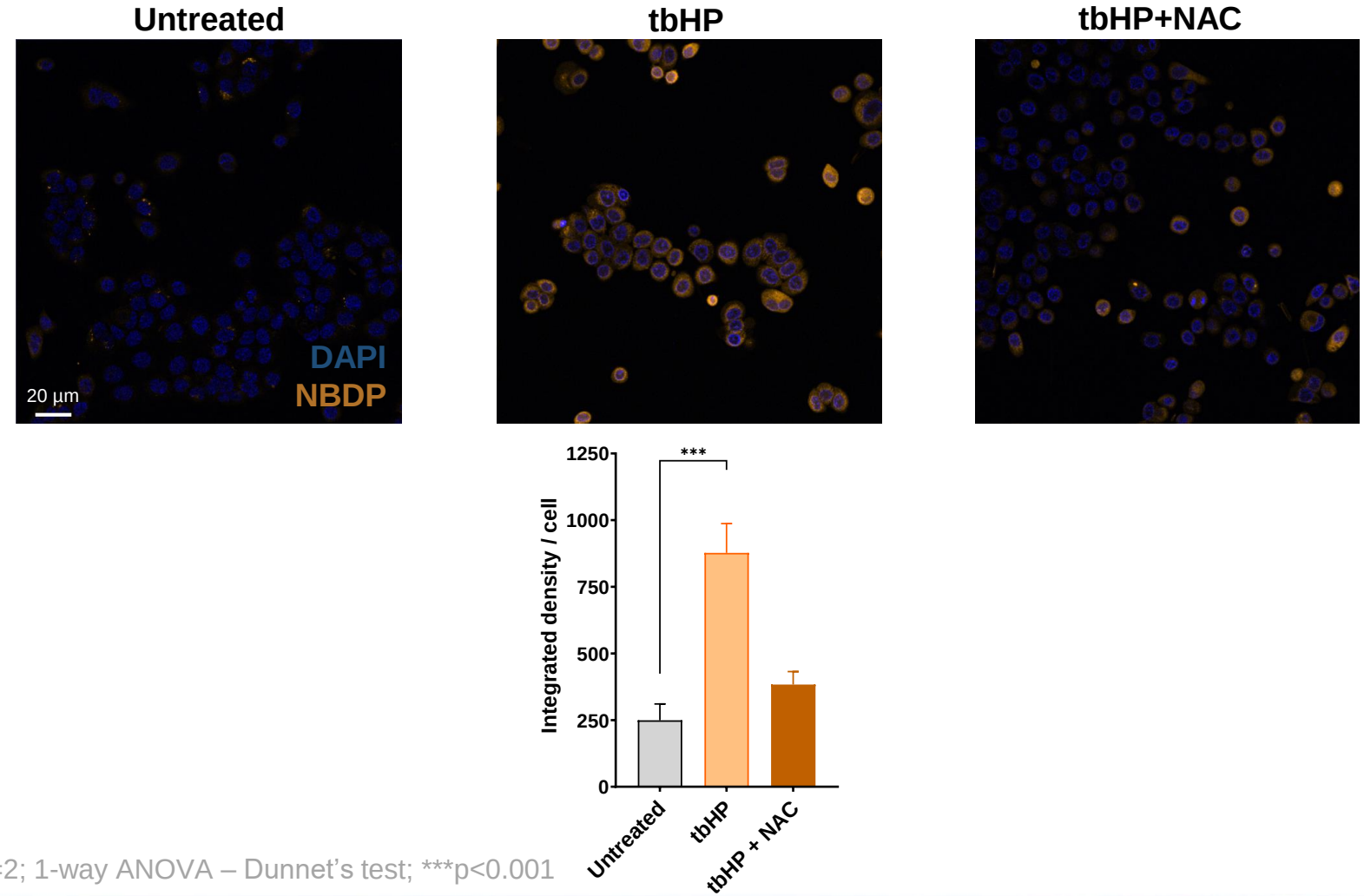


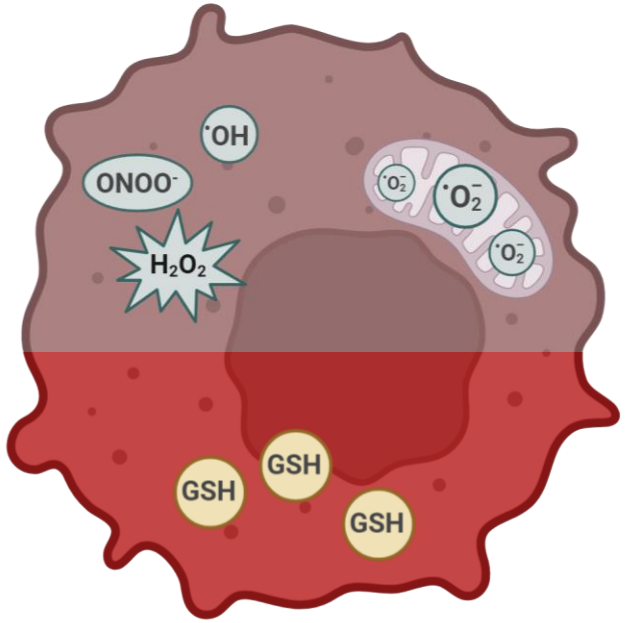


n=2; 1-way ANOVA – Dunnet's test; *p<0.05

tbHP: tert-butylhydroperoxide; NAC: N-acetyl cysteine

Glutathione is detected in HNC cells





n=2; 1-way ANOVA – Dunnet's test; ***p<0.001

tbHP: tert-butylhydroperoxide; NAC: N-acetyl cysteine

Conclusion

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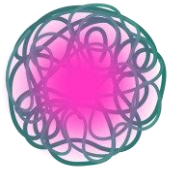
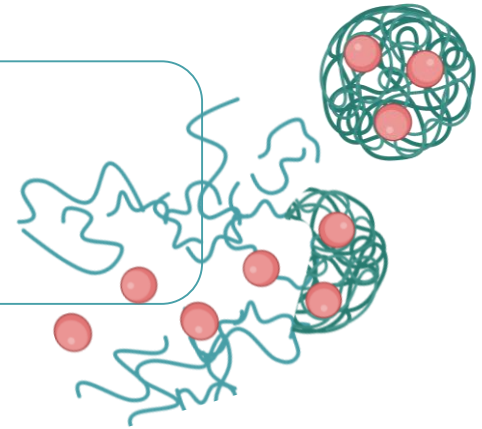
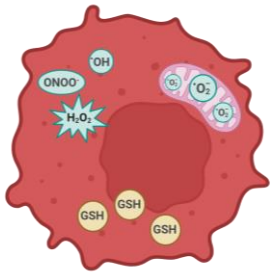


Biocompatible ROS-responsive NCs with succesfull uptake by HNC cells

Generation of cisplatin-loaded NCs

Cisplatin release in tumour environment





Finetuning NC responsiveness to HNC redox balance

Acknowledgements

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FIERCE Lab
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