

Illuminating cross talk between signalling factors

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(Medical Xpress) -- Hypoxia and inflammation are environmental features occurring simultaneously in a variety of diseases such as growing tumours and critically inflamed tissues. UCD scientists investigating the relative contributions of the signalling pathways in each process have shown there is a synergistic response that is measurably greater than that expected from the individual contributions.

Transcription factors, NFkappaB and HIF (hypoxia inducible factor) are key regulators of the signalling pathways activated during the processes of inflammation and [hypoxia](#) respectively. The [research findings](#), recently published in *Cellular & Molecular Life Sciences*, showed that both NFkappaB and HIF bind independently of each other to the promoter region of the pro-inflammatory human COX-2 gene.

Describing the research findings, co-lead author Dr. Alex Cheong said, “In a similar manner to how an individual section of an orchestra contributes to the fullness and beauty of the complete score, we found that the activation of [transcription factors](#) NFkappaB and HIF produced a synergistic or ‘greater-than-additive’ response in hypoxic [inflammation](#)”.

The UCD team, from the Science Foundation Ireland funded Systems Biology Ireland, used a combination of experimental data and mathematical modelling to show that NFkappaB and HIF display synergistic behaviours in transcriptional regulation under dual hypoxic and inflammatory conditions.

This research project used a more efficient experimental technique based on the naturally secreted Gaussia luciferase as their 'reporter system'. Luciferases are enzymes that produce light as a by-product of the chemical reaction, oxidation. Previously, the reporter system necessitated the lysis or bursting of cell to make a measurement. New cells were needed every time a new experiment was done. Gaussia luciferase is a 'green' alternative that allows researchers to reduce the use of cells while benefiting from being able to monitor activity levels over time.

The research team, led by Conway Fellow Professor Cormac Taylor, now plan to further investigate the relative contributions of the two transcription factors in an effort to understand the cross talk between the signalling processes.

More information: Bruning U, et al. NFkappaB and HIF display synergistic behaviour during hypoxic inflammation. *Cell.Mol.Life Sci.* (2011) [doi: 10.1007/s00018-011-0876-2](https://doi.org/10.1007/s00018-011-0876-2)

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