How to repair your gut

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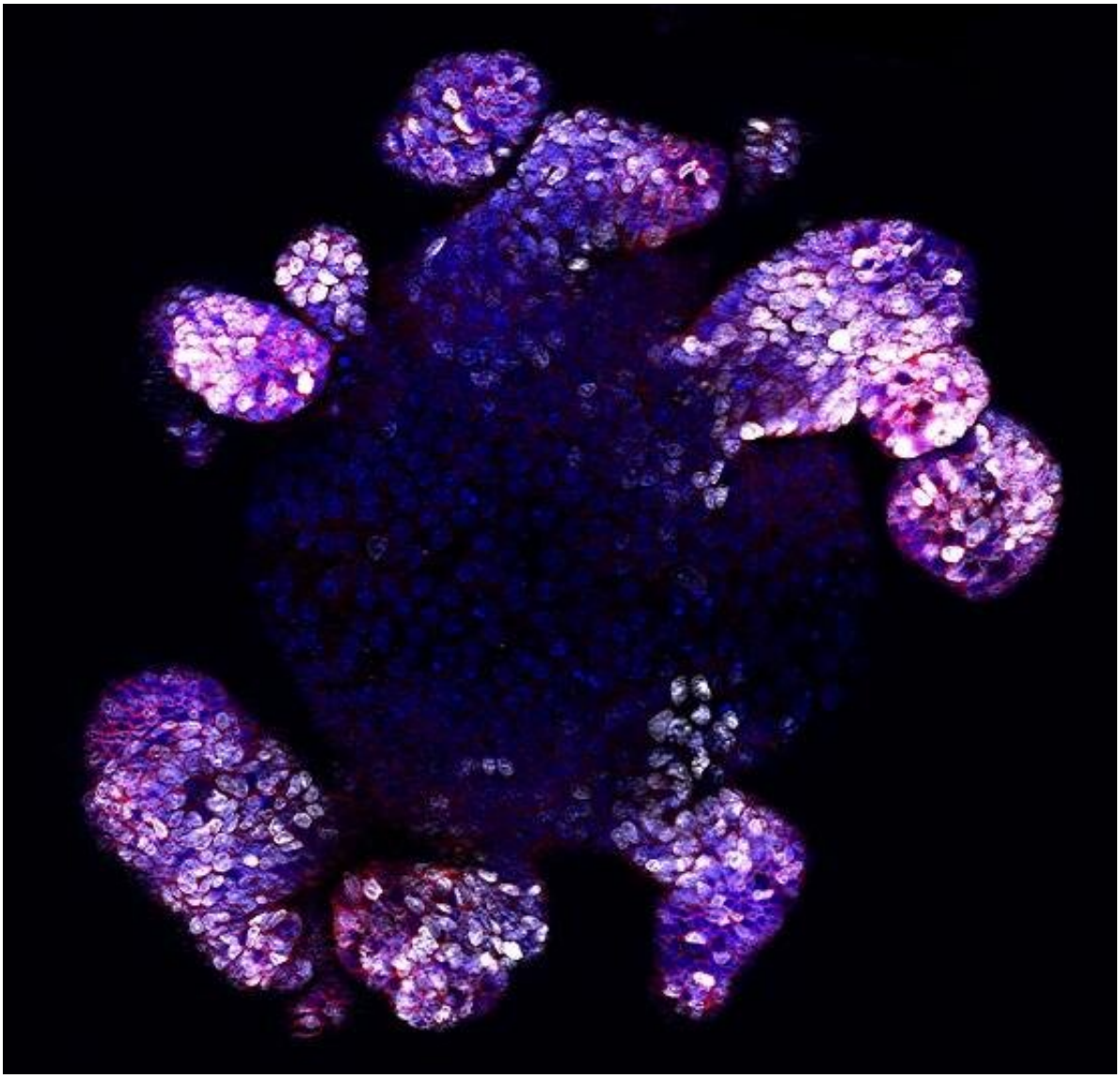

Fluorescent picture of an intestinal organoid (stained for the proliferation marker Ki-67 (white), the stem cell marker Ephb2 (red) and DNA (blue). Credit: (C) Monash BDI

In a world first, Monash University researchers have identified a key biomolecule that enhances the repair of your gut lining by prompting stem cells to regenerate damaged tissue.

A strong cellular lining is essential for a healthy gut as it provides a barrier to the billions of microbes and harmful toxins present in our intestinal tract. This barrier is often damaged by infection and inflammation, which causes many painful symptoms.

The study, published in *Cell Stem Cell* and led by Professor Helen Abud and Dr. Thierry Jardé from Monash Biomedicine Discovery Institute, investigated the environment that surrounds gut stem cells and used "mini gut" organoid methodology where tiny replicas of gut tissue were grown in a dish. The study defined key cells that reside in close proximity to stem cells in the gut that produce the biomolecule Neuregulin-1 that acts directly on stem cells to kick-start the repair process.

"Our really important discovery is that supplementation with additional Neuregulin-1 accelerates repair of the gut lining by activation of key growth pathways," Professor Abud said.

"Our findings open new avenues for the development of Neuregulin 1-based therapies for enhancing intestinal repair and supporting rapid restoration of the critical gut function."

Gastrointestinal disease, such as Crohn's disease and ulcerative colitis, is a major health issue worldwide and results in severe damage to the epithelial cell layer lining the gut. Under these conditions, the intestine has a limited capacity to repair efficiently to restore its main absorptive function and is associated with symptoms including diarrhoea, dehydration, loss of weight and malnutrition. Developing ways to support intestinal tissue repair will dramatically improve patient

recovery.

"It was very exciting to observe that Neuregulin 1 can not only drive cells to divide but enhances stem cell properties which supercharges these cells into a repair program," Dr. Jardé said.

"This shortens the period of damage. The gut lining is injured during common chemotherapy treatment for cancer and we were also able to show recovery is significantly improved with application of Neuregulin-1 following chemotherapy.

More information: Thierry Jardé et al, Mesenchymal Niche-Derived Neuregulin-1 Drives Intestinal Stem Cell Proliferation and Regeneration of Damaged Epithelium, *Cell Stem Cell* (2020). DOI: 10.1016/j.stem.2020.06.021

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