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The use of Novel Natural Treatments for Inflammatory Bowel Diseases

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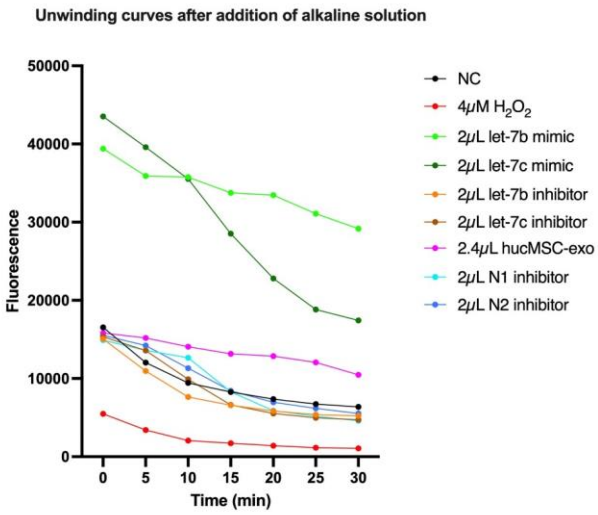
Abstract

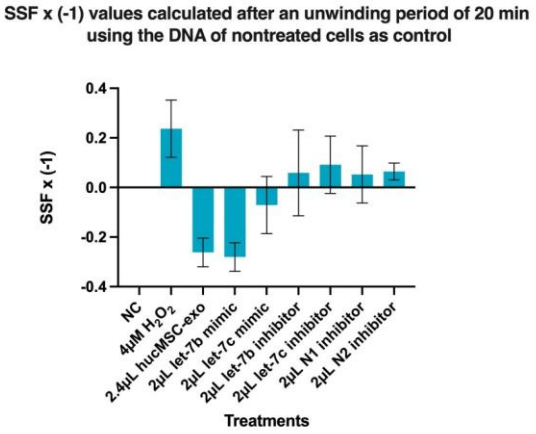
Background: Free radicals and reduced antioxidant levels lead to oxidative stress, which plays a role in causing Inflammatory Bowel Disease (IBD). IBD is a chronic gastrointestinal autoimmune condition that involves an abnormal immune response. This includes Crohn's disease (CD) and ulcerative colitis (UC). In the previous studies, we demonstrated the antioxidant effect of *Inonotus obliquus* (IO) and flavonoids such as quercetin and epicatechin on lymphocytes from IBD patients. *In vitro* studies have shown that Chaga extract is effective in reducing oxidative stress in lymphocytes of both healthy individuals and those with IBD. This suggests that Chaga extract may be a useful supplement for anyone looking to inhibit oxidative stress.

Methods: In our current study, Cord Blood Stem Cells -derived Exosomes (CBSC Exo) and their synthesised miRNAs were investigated as antioxidant/anti-inflammatory elements on lymphocytes and 3D intestinal epithelial model. There were seven miRNAs found in CBSCs Exo, and among them were two miRNAs that were identified as novel. The Peripheral Blood Monocyte Cells (PBMCs) from IBD patients and healthy individuals after challenging with H_2O_2 or Interleukin 6 were treated with CBSCs Exo, transfected with miRNA novels or both. The treatment method also was applied to the Epiltestinal^{TK} 3D model from Mattek. Various techniques were utilised, including the Comet assay, Fast Microplate DNA damage assay, and CCK8.

Results: The findings of the study indicate that the administration of CBSC-derived Exo, Let-7c-mimic miRNA, Let7bSb miRNA, as well as Novel 1 and Novel 2 miRNAs on the 3D model intestine, significantly decreased the level of DNA damage when compared to the positive control H2O2 and IL6, as well as the untreated samples.

Conclusions: In conclusion, certain natural substances like flavonoids, *Inonotus obliquus*, and exosomes derived from CBSCs may have an advantage in decreasing significantly oxidative stress and DNA damage in IBD Peripheral Blood Mononuclear Cells (PBMCs) and inflamed intestinal 3D models.


Unwinding curves after addition of alkaline solution
Fluorescence
50000
40000
30000
20000
10000
0
0
5
10
15
20
25
30
Time (min)
NC
4μM H2O2
2μL let-7b mimic
2μL let-7c mimic
2μL let-7b inhibitor
2μL let-7c inhibitor
2.4μL hucMSC-exo
2μL N1 inhibitor
2μL N2 inhibitor


SSF x (-1) values calculated after an unwinding period of 20 min using the DNA of nontreated cells as control
SSF x (-1)
0.4
0.2
0.0
-0.2
-0.4
NC
4μM H2O2
2.4μL hucMSC-exo
2μL let-7b mimic
2μL let-7c mimic
2μL let-7b inhibitor
2μL let-7c inhibitor
2μL N1 inhibitor
2μL N2 inhibitor
Treatments