Document details

Back to results | 1 of 1

Export Download Print E-mail Save to PDF Add to List More...

Journal of Sustainability Science and Management
Volume 12, Issue 2, 1 December 2017, Pages 96-102

Wound healing properties of biotransformed asiaticoside by Aspergillus niger (Article)

Omar, M.N.[a], Alfarra, H.Y.[ab], Ichwan, S.J.A.[c]

[a]Faculty of Science, International Islamic University Malaysia (IIUM), Kuantan, Pahang, Malaysia
[b]Department of Microbiology and Immunology, Dalhousie University, Halifax, NS, Canada
[c]Faculty of Dentistry, International Islamic University Malaysia (IIUM), Kuantan, Pahang, Malaysia

Abstract

View references (21)

Biotransformation is extensively used to create useful metabolites from various natural products and as an alternative to chemical synthesis for the preparation of pharmacologically-active compounds. This study investigated the effects of asiaticoside and its biotransformed product on wound healing activities. Asiaticoside, the bioactive constituent of Centella asiatica has been reported to possess wound healing properties. Microbial transformation of asiaticoside using Aspergillus niger was carried out to produce an asiaticoside biotransformed product and the wound healing activities of asiaticoside and its biotransformed product were investigated. Their effects on transforming growth factor-beta 1 (TGFβ1) and tissue inhibitor of metalloproteinase 1 (TIMP1) gene expression were examined to understand the mode of action and on the cell proliferation and wound healing using human keratinocytes. Results of in vitro study showed that asiaticoside concentrations between 7.5 and 120 μg/mL gave higher value of cell proliferation than the negative control. On the other hand, the biotransformed product concentrations between 0.058 and 3.75 μg/mL exhibited high cell viability but the viability was lowest at 15.0 μg/mL, suggesting cytotoxic effects on the cells. In wound healing assays, there were significant differences on wound closure in comparison to the negative control ($P < 0.05$). Both asiaticoside and the biotransformed product increased the expression of TGFβ1 and TIMP1 respectively, with the latter showing more enhanced expressions of both genes. The biotransformed product also showed faster migration and healing rate under microscopic observation. © Penerbit UMT.

Reaxys Database Information

View Compounds

Author keywords

Asiaticoside Biotransformation Centella asiatica Wound healing

Funding details

Funding number	Funding sponsor	Acronym	Funding opportunities
EDW B14-109-0994	International Islamic University Malaysia	IIUM	See opportunities by IIUM
	International Islamic University Malaysia	IIUM	See opportunities by IIUM

Funding text

This research was supported by International Islamic University Malaysia (IIUM) under EDW B14-109-0994.

ISSN: 18238556
Source Type: Journal
Original language: English
Document Type: Article
Publisher: Universiti Malaysia Terengganu

References (21)

View in search results format

All Export Print E-mail Save to PDF Create bibliography

1 Alfarra, H.Y., Omar, M.N.
Centella asiatica: From Folk Remedy to the Medicinal Biotechnology-A State Revision
(2013) *International Journal of Biosciences*, 3, pp. 49-67. Cited 5 times.

2 Alfarra, H.Y., Omar, M.N.
HPLC Separation and Isolation of Asiaticoside from Centella asiatica and Its Biotransformation by Aspergillus niger
(2014) *International Journal of Pharma Medicine and Biological Sciences*, 3, pp. 2278-5221.

3 Andriani, Y., Effendy, A.W.M., Habsah, M., Sifzizul, T.M.T.
Antibacterial, Radical Scavenging Activities and Cytotoxicity Properties of Phaleria macrocarpa (Scheff.) Boerl
(2011) *Leaves in HepG2 Cell Lines. International Journal of Pharmaceutical Sciences and Research*, 2 (7), pp. 1700-1706. Cited 14 times.

4 Chen, G., Chen, J.
A novel cell modification method used in biotransformation of glycerol to 3-HPA by Lactobacillus reuteri
(2013) *Applied Microbiology and Biotechnology*, 97 (10), pp. 4325-4332. Cited 8 times.
doi: 10.1007/s00253-013-4723-2
View at Publisher

5 Chomczynski, P., Mackey, K.
Modification of the TRI Reagent(TM) procedure for isolation of RNA from polysaccharide- and proteoglycan-rich sources
(1995) *BioTechniques*, 19 (6), pp. 942-945. Cited 344 times.

6 Diegelmann, R.F., Evans, M.C.
Wound healing: An overview of acute, fibrotic and delayed healing
(2004) *Frontiers in Bioscience*, 9, pp. 283-289. Cited 916 times.
View at Publisher

7 De Oliveira, C.B., Comunello, L.N., Maciel, É.S., Giubel, S.R., Bruno, A.N., Chiela, E.C.F., Lenz, G., (...), Gosmann, G.
The inhibitory effects of phenolic and terpenoid compounds from Baccharis trimera in SiHa cells: Differences in their activity and mechanism of action
(2013) *Molecules*, 18 (9), pp. 11022-11032. Cited 11 times.
http://www.mdpi.com/1420-3049/18/9/11022/pdf
doi: 10.3390/molecules180911022
View at Publisher

8 Grimaldi, R., De Ponti, F., D'Angelo, L., Caravaggi, M., Guidi, G., Lecchini, S., Frigo, G.M., (...), Crema, A.
Pharmacokinetics of the total triterpenic fraction of Centella asiatica after single and multiple administrations to healthy volunteers. A new assay for asiatic acid
(1990) *Journal of Ethnopharmacology*, 28 (2), pp. 235-241. Cited 37 times.
doi: 10.1016/0378-8741(90)90033-P
View at Publisher

9 Kimura, Y., Sumiyoshi, M., Samukawa, K.-i., Satake, N., Sakanaka, M.
Facilitating action of asiaticoside at low doses on burn wound repair and its mechanism
(2008) *European Journal of Pharmacology*, 584 (2-3), pp. 415-423. Cited 51 times.
doi: 10.1016/j.ejphar.2008.02.036
View at Publisher

10 Leask, A., Abraham, D.J.
TGF-β signaling and the fibrotic response
(2004) *FASEB Journal*, 18 (7), pp. 816-827. Cited 1438 times.
doi: 10.1096/fj.03-1273rev
View at Publisher

11 Lee, J.-H., Kim, H.-L., Lee, M.H., You, K.E., Kwon, B.-J., Seo, H.J., Park, J.-C.
Asiaticoside enhances normal human skin cell migration, attachment and growth in vitro wound healing model
(2012) *Phytomedicine*, 19 (13), pp. 1223-1227. Cited 29 times.
doi: 10.1016/j.phymed.2012.08.002
View at Publisher

12 Lopez-García, J., Lehocký, M., Humpolícek, P., Sáha, P.
HaCaT Keratinocytes Response on Antimicrobial Atelocollagen Substrates: Extent of Cytotoxicity, Cell Viability and Proliferation
(2014) *Journal of Functional Biomaterials*, 5, pp. 43-57. Cited 23 times.

13 Monti, D., Candido, A., Cruz Silva, M.M., Křen, V., Riva, S., Danieli, B.
Biocatalyzed generation of molecular diversity: Selective modification of the saponin asiaticoside
(2005) *Advanced Synthesis and Catalysis*, 347 (7-8), pp. 1168-1174. Cited 34 times.
doi: 10.1002/adsc.200505047
View at Publisher

14 Mosmann, T.
Rapid colorimetric assay for cellular growth and survival: Application to proliferation and cytotoxicity assays
(1983) *Journal of Immunological Methods*, 65 (1-2), pp. 55-63. Cited 34150 times.
doi: 10.1016/0022-1759(83)90303-4
View at Publisher

15 O'Connor, J.W., Gomez, E.W.
Cell adhesion and shape regulate TGF-beta1-induced epithelial-myofibroblast transition via MRTF-A signaling
(2013) *PLoS ONE*, 8 (12), art. no. e83188. Cited 33 times.
http://www.plosone.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0083188&representation=PDF
doi: 10.1371/journal.pone.0083188
View at Publisher

16 Omar, M.N., Khan, N.T., Hasali, N.H.M., Moin, S.F., Alfarra, H.Y.
Microbial Transformations of Artemisinin-anti-malaria drug
(2012) *Advances in Bioresearch*, 3, pp. 27-31. Cited 3 times.

17 Roy, N., Saha, N., Humpolicek, P., Saha, P.
Permeability and biocompatibility of novel medicated hydrogel wound dressings

(2010) *Soft Materials*, 8 (4), pp. 338-357. Cited 24 times.
doi: 10.1080/1539445X.2010.502955

View at Publisher

18 Tang, B., Zhu, B., Liang, Y., Bi, L., Hu, Z., Chen, B., Zhang, K., (...), Zhu, J.
Asiaticoside suppresses collagen expression and TGF-β/Smad signaling through inducing Smad7 and inhibiting TGF-βRI and TGF-βRII in keloid fibroblasts

(2011) *Archives of Dermatological Research*, 303 (8), pp. 563-572. Cited 56 times.
doi: 10.1007/s00403-010-1114-8

View at Publisher

19 Tomasek, J.J., Gabbiani, G., Hinz, B., Chaponnier, C., Brown, R.A.
Myofibroblasts and mechano: Regulation of connective tissue remodelling

(2002) *Nature Reviews Molecular Cell Biology*, 3 (5), pp. 349-363. Cited 2098 times.
doi: 10.1038/nrm809

View at Publisher

20 Wu, F., Bian, D., Xia, Y., Gong, Z., Tan, Q., Chen, J., Dai, Y.
Identification of major active ingredients responsible for burn wound healing of Centella asiatica herbs

(2012) *Evidence-based Complementary and Alternative Medicine*, 2012, art. no. 848093. Cited 22 times.
doi: 10.1155/2012/848093

View at Publisher

21 Yang, X., Wang, J., Guo, S.-L., Fan, K.-J., Li, J., Wang, Y.-L., Teng, Y., (...), Yang, X.
miR-21 promotes keratinocyte migration and re-epithelialization during wound healing

(2011) *International Journal of Biological Sciences*, 7 (5), pp. 685-690. Cited 59 times.
http://www.biolsci.org/v07p0685.pdf
doi: 10.7150/ijbs.7.685

View at Publisher

Alfarra, H.Y.; Faculty of Science, International Islamic University Malaysia (IIUM), Kuantan, Pahang, Malaysia;
email:helmi.alfarra@dal.ca

Back to results | 1 of 1

Top of page