



< Back to results | 1 of 1

[Export](#)
[Download](#)
[Print](#)
[E-mail](#)
[Save to PDF](#)
[Add to List](#)
[More... >](#)
[Full Text](#)*Biocell* • Open Access • Volume 46, Issue 3, Pages 677 - 687 • 2022**Document type**

Article • Gold Open Access

Source type

Journal

ISSN

03279545

DOI

10.32604/biocell.2022.016848

Publisher

Tech Science Press

CODEN




BOCEE

Original language

English

View less ^

Curcumin gum Arabic nanoparticles demonstrate potent antioxidant and cytotoxic properties in human cancer cells

 Hassani A.^{a, b, c}, Hussain S.A.^b, Al-Qubaisi M.S.^d, Belfar M.L.^c, Belkhalifa H.^e, Enezei H.H.^f, Zentou H.^b, Ibrahim W.N.^{g, h} , Doolaanea A.A.^a 
 Save all to author list^a Department of Pharmaceutical Technology, Faculty of Pharmacy, International Islamic University Malaysia, Kuantan, Malaysia^b Department of Chemical and Environmental Engineering, University Putra Malaysia, Serdang, 43400, Malaysia^c Department of Chemistry, Faculty of Mathematics and Material Sciences, University of kasdi Murbah, Ouargla, Algeria^d UPM-MAKNA Cancer Research Laboratory, Institute of Bioscience, University Putra Malaysia, Serdang, Malaysia

View additional affiliations ✓

Cited by 0 documents

Inform me when this document is cited in Scopus:

[Set citation alert >](#)**Related documents**

Preparation, antioxidant potential and angiotensin converting enzyme (ACE) inhibitory activity of gum arabic-stabilised magnesium orotate nanoparticles

Hassani, A. , Hussain, S.A. , Abdullah, N. (2020) *International Food Research Journal*

Preparation, characterization and therapeutic properties of gum arabic-stabilized gallic acid nanoparticles

Hassani, A. , Azarian, M.M.S. , Ibrahim, W.N. (2020) *Scientific Reports*

TurboBeads magnetic nanoparticles functionalized with gold as a promising nano-radiosensitizer for potential breast cancer radiotherapy: In vitro study

Darwesh, R. , Aboushoushah, S.F. , Almarhabi, S. (2021) *Inorganic Chemistry Communications*

View all related documents based on references

Find more related documents in Scopus based on:

Authors > Keywords >

Full text options ✓

Abstract

Author keywords

Reaxys Chemistry database information

The main purpose of the study was to enhance the stability and therapeutic effects of Curcumin (Cur) through nanoformulation with gum Arabic (GA) as a coating agent through an efficient synthetic approach. The antioxidant properties of the developed nanoparticles (Cur/GANPs) were assessed through several *in vitro* assays, such as β -carotene bleaching activity, DPPH, and nitric oxide scavenging activities in addition to evaluating its inhibitory activity on angiotensin-converting enzyme (ACE). The cytotoxicity of Cur/GANPs was evaluated *in vitro* using different types of human cancer cells including breast cancer (MCF7, MDA-MB231), liver cancer (HepG2), and colon cancer (HT29) cells. The prepared particles displayed an elliptical shape with a size ranging between 20–260 nm and a potential difference of –15 mV. The Cur/GANPs exhibited significant antioxidant activity compared to free curcumin when using concentrations between 31.5 and 500 $\mu\text{g/mL}$. The Cur/GANPs also had inhibited the growth of all cancer cell lines in a proportional trend with concentrations used. Hence, the encapsulation with gum Arabic has augmented the antioxidant and anti-neoplastic effects of Curcumin. Therefore, Cur/GANPs may have effective therapeutic properties in diseases attributed to oxidative stress like cancer and hypertension. © 2022 Centro Regional de Invest. Cientif. y Tecn.. All rights reserved.

Antioxidants; Cancer cells; Curcumin; Gum arabic; Nanoparticles

[View all substances \(7\)](#)

```
{
  "fill": "red",
  "opacity": 1,
  "color-rendering": "auto",
  "color-interpolation": "auto",
  "text-rendering": "auto",
  "stroke": "none",
  "width": 100,
  "height": 100,
  "shape-miterlimit": 10
}
```

```
{
  "fill": "green",
  "opacity": 1,
  "color-rendering": "auto",
  "color-interpolation": "auto",
  "text-rendering": "auto",
  "stroke": "none",
  "width": 100,
  "height": 100,
  "shape-miterlimit": 10
}
```

```
{
  "fill": "blue",
  "opacity": 1,
  "color-rendering": "auto",
  "color-interpolation": "auto",
  "text-rendering": "auto",
  "stroke": "none",
  "width": 100,
  "height": 100,
  "shape-miterlimit": 10
}
```

```
{
  "fill": "yellow",
  "opacity": 1,
  "color-rendering": "auto",
  "color-interpolation": "auto",
  "text-rendering": "auto",
  "stroke": "none",
  "width": 100,
  "height": 100,
  "shape-miterlimit": 10
}
```

Powered by **Reaxys**[®]

Funding details

[View in search results format >](#)

Create bibliography

- ☐ 1 Abdelwahed, W., Degobert, G., Stainmesse, S., Fessi, H.
Freeze-drying of nanoparticles: Formulation, process and storage considerations
(2006) *Advanced Drug Delivery Reviews*, 58 (15), pp. 1688-1713. Cited 1033 times.
www.elsevier.com/locate/drugdeliv
doi: 10.1016/j.addr.2006.09.017
[View at Publisher](#)
-
- ☐ 2 Ahmad, I., Yanuar, A., Mulia, K., Mun'Im, A.
Review of angiotensin-converting enzyme inhibitory assay: Rapid method in drug discovery of herbal plants ([Open Access](#))
(2017) *Pharmacognosy Reviews*, 11 (21), pp. 1-7. Cited 15 times.
<http://www.phcogrev.com/>
doi: 10.4103/phrev.phrev_45_16
[View at Publisher](#)
-
- ☐ 3 Ahmed, A.A., Fedail, J.S., Musa, H.H., Musa, T.H., Sifaldin, A.Z.
Gum Arabic supplementation improved antioxidant status and alters expression of oxidative stress gene in ovary of mice fed high fat diet ([Open Access](#))
(2016) *Middle East Fertility Society Journal*, 21 (2), pp. 101-108. Cited 17 times.
<http://www.sciencedirect.com/science/journal/11105690>
doi: 10.1016/j.mefs.2015.10.001
[View at Publisher](#)
-
- ☐ 4 Albanese, A., Tang, P.S., Chan, W.C.W.
The effect of nanoparticle size, shape, and surface chemistry on biological systems
(2012) *Annual Review of Biomedical Engineering*, 14, pp. 1-16. Cited 2283 times.
doi: 10.1146/annurev-bioeng-071811-150124
[View at Publisher](#)
-
- ☐ 5 Al-Mosawi, A.J.
The challenge of chronic renal failure in the developing world: Possible use of acacia gum
(2002) *Pediatric Nephrology*, 17 (5), pp. 390-391. Cited 18 times.
doi: 10.1007/s00467-001-0755-4
[View at Publisher](#)
-
- ☐ 6 Al-Qubaisi, M.S., Rasedee, A., Flaifel, M.H., Ahmad, S.H.J., Hussein-Al-Ali, S., Hussein, M.Z., Eid, E.E.M., (...), El Zowalaty, M.E.
Cytotoxicity of nickel zinc ferrite nanoparticles on cancer cells of epithelial origin ([Open Access](#))
(2013) *International Journal of Nanomedicine*, 8, pp. 2497-2508. Cited 67 times.
<http://www.dovepress.com/getfile.php?fileID=16737>
doi: 10.2147/IJN.S42367
[View at Publisher](#)

- ☐ 7 Amalraj, A., Pius, A., Gopi, S., Gopi, S.
Biological activities of curcuminoids, other biomolecules from turmeric and their derivatives – A review ([Open Access](#))

(2017) *Journal of Traditional and Complementary Medicine*, 7 (2), pp. 205-233. Cited 298 times.
www.jtcm.org/
doi: 10.1016/j.jtcm.2016.05.005

[View at Publisher](#)
-
- ☐ 8 Anand, P., Kunnumakkara, A.B., Newman, R.A., Aggarwal, B.B.
Bioavailability of curcumin: Problems and promises

(2007) *Molecular Pharmaceutics*, 4 (6), pp. 807-818. Cited 3411 times.
doi: 10.1021/mp700113r

[View at Publisher](#)
-
- ☐ 9 Shakerian Ardakani, T., Meidanchi, A., Shokri, A., Shakeri-Zadeh, A.
Fe₃O₄@Au/reduced graphene oxide nanostructures: Combinatorial effects of radiotherapy and photothermal therapy on oral squamous carcinoma KB cell line

(2020) *Ceramics International*, Part A 46 (18), pp. 28676-28685. Cited 8 times.
<https://www.journals.elsevier.com/ceramics-international>
doi: 10.1016/j.ceramint.2020.08.027

[View at Publisher](#)
-
- ☐ 10 Bae, I.Y., Oh, I.K., Jung, D.S., Lee, H.G.
Influence of arabic gum on in vitro starch digestibility and noodle-making quality of Segoami

(2019) *International Journal of Biological Macromolecules*, 125, pp. 668-673. Cited 8 times.
www.elsevier.com/locate/ijbiomac
doi: 10.1016/j.ijbiomac.2018.12.027

[View at Publisher](#)
-
- ☐ 11 Bengmark, S.
Curcumin, an atoxic antioxidant and natural NFκB, cyclooxygenase-2, lipooxygenase, and inducible nitric oxide synthase inhibitor: A shield against acute and chronic diseases

(2006) *Journal of Parenteral and Enteral Nutrition*, 30 (1), pp. 45-51. Cited 292 times.
doi: 10.1177/014860710603000145

[View at Publisher](#)
-
- ☐ 12 Bhaumik, S., Jyothi, M.Divya, Khar, A.
Differential modulation of nitric oxide production by curcumin in host macrophages and NK cells

(2000) *FEBS Letters*, 483 (1), pp. 78-82. Cited 110 times.
doi: 10.1016/S0014-5793(00)02089-5

[View at Publisher](#)
-

- ☐ 13 Butstraen, C., Salaün, F.
Preparation of microcapsules by complex coacervation of gum Arabic and chitosan
(2014) *Carbohydrate Polymers*, 99, pp. 608-616. Cited 133 times.
doi: 10.1016/j.carbpol.2013.09.006
[View at Publisher](#)
-
- ☐ 14 Castro, I.A., Rogero, M.M., Junqueira, R.M., Carrapeiro, M.M.
Free radical scavenger and antioxidant capacity correlation of α -tocopherol and Trolox measured by three in vitro methodologies
(2006) *International Journal of Food Sciences and Nutrition*, 57 (1-2), pp. 75-82. Cited 35 times.
doi: 10.1080/09637480600656199
[View at Publisher](#)
-
- ☐ 15 Chidambaram, M., Krishnasamy, K.
Drug-drug/drug-excipient compatibility studies on curcumin using non-thermal methods
(2014) *Advanced Pharmaceutical Bulletin*, 4 (3), pp. 309-312. Cited 28 times.
<http://apb.tbzmed.ac.ir/Portals/0/Archive/Vol4No3/15-Chidambaram.pdf>
doi: 10.5681/apb.2014.045
[View at Publisher](#)
-
- ☐ 16 Chung, S.S., Vadgama, J.V.
Curcumin and epigallocatechin gallate inhibit the cancer stem cell phenotype via down-regulation of STAT3-NFkB signaling
(2015) *Anticancer Research*, 35 (1), pp. 39-46. Cited 140 times.
<http://ar.iiarjournals.org/content/35/1/39.full.pdf+html>
[View at Publisher](#)
-
- ☐ 17 Deguchi, A.
Curcumin targets in inflammation and cancer
(2015) *Endocrine, Metabolic and Immune Disorders - Drug Targets*, 15 (2), pp. 88-96. Cited 78 times.
http://www.benthamdirect.org/pages/all_b_bypublication.php
doi: 10.2174/1871530315666150316120458
[View at Publisher](#)
-
- ☐ 18 Dowding, J.M., Dosani, T., Kumar, A., Seal, S., Self, W.T.
Cerium oxide nanoparticles scavenge nitric oxide radical (-NO)
(2012) *Chemical Communications*, 48 (40), pp. 4896-4898. Cited 179 times.
doi: 10.1039/c2cc30485f
[View at Publisher](#)
-

- 19 Fadus, M.C., Lau, C., Bikhchandani, J., Lynch, H.T.
Curcumin: An age-old anti-inflammatory and anti-neoplastic agent (Open Access)
(2017) *Journal of Traditional and Complementary Medicine*, 7 (3), pp. 339-346. Cited 140 times.
www.jtcm.org/
doi: 10.1016/j.jtcm.2016.08.002
View at Publisher
-
- 20 Gamal El-din, A.M., Mostafa, A.M., Al-Shabanah, O.A., Al-Bekairi, A.M., Nagi, M.N.
Protective effect of arabic gum against acetaminophen-induced hepatotoxicity in mice
(2003) *Pharmacological Research*, 48 (6), pp. 631-635. Cited 97 times.
doi: 10.1016/S1043-6618(03)00226-3
View at Publisher
-
- 21 Gamal-Eldeen, A.M., Moustafa, D., El-Daly, S.M., El-Hussieny, E.A., Saleh, S., Khoobchandani, M., Bacon, K.L., (...), Katti, K.V.
Photothermal therapy mediated by gum Arabic-conjugated gold nanoparticles suppresses liver preneoplastic lesions in mice
(2016) *Journal of Photochemistry and Photobiology B: Biology*, 163, pp. 47-56. Cited 24 times.
www.elsevier.com/locate/jphotobiol
doi: 10.1016/j.jphotobiol.2016.08.009
View at Publisher
-
- 22 Gangwar, R.K., Tomar, G.B., Dhumale, V.A., Zinjarde, S., Sharma, R.B., Datar, S.
Curcumin conjugated silica nanoparticles for improving bioavailability and its anticancer applications
(2013) *Journal of Agricultural and Food Chemistry*, 61 (40), pp. 9632-9637. Cited 84 times.
doi: 10.1021/jf402894x
View at Publisher
-
- 23 García-Martínez, E., Andújar, I., Yuste del Carmen, A., Prohens, J., Martínez-Navarrete, N.
Antioxidant and anti-inflammatory activities of freeze-dried grapefruit phenolics as affected by gum arabic and bamboo fibre addition and microwave pretreatment (Open Access)
(2018) *Journal of the Science of Food and Agriculture*, 98 (8), pp. 3076-3083. Cited 6 times.
[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1097-0010](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1097-0010)
doi: 10.1002/jsfa.8807
View at Publisher
-

- ☐ 24 Gupta, A., Mahajan, S., Sharma, R.
Evaluation of antimicrobial activity of *Curcuma longa* rhizome extract against *Staphylococcus aureus* ([Open Access](#))

(2015) *Biotechnology Reports*, 6, pp. 51-55. Cited 85 times.
<http://www.journals.elsevier.com/biotechnology-reports/>
doi: 10.1016/j.btre.2015.02.001

[View at Publisher](#)
-
- ☐ 25 Hanahan, D., Weinberg, R.A.
Hallmarks of cancer: The next generation ([Open Access](#))

(2011) *Cell*, 144 (5), pp. 646-674. Cited 36675 times.
doi: 10.1016/j.cell.2011.02.013

[View at Publisher](#)
-
- ☐ 26 Hassani, A., Hussain, S.A., Abdullah, N., Kamarudin, S., Rosli, R.
Antioxidant Potential and Angiotensin-Converting Enzyme (ACE) Inhibitory Activity of Orotic Acid-Loaded Gum Arabic Nanoparticles ([Open Access](#))

(2019) *AAPS PharmSciTech*, 20 (2), art. no. 53. Cited 9 times.
<http://www.springerlink.com/content/1530-9932/>
doi: 10.1208/s12249-018-1238-2

[View at Publisher](#)
-
- ☐ 27 Hassani, A., Mahmood, S., Enezei, H.H., Hussain, S.A., Hamad, H.A., Aldoghachi, A.F., Hagar, A., (...), Ibrahim, W.N.
Formulation, characterization and biological activity screening of sodium alginate-gum Arabic nanoparticles loaded with curcumin ([Open Access](#))

(2020) *Molecules*, 25 (9), art. no. 2244. Cited 9 times.
<https://www.mdpi.com/1420-3049/25/9/2244/pdf>
doi: 10.3390/molecules25092244

[View at Publisher](#)
-
- ☐ 28 Al Ali, S.H.H., Al-Qubaisi, M., Hussein, M.Z., Ismail, M., Zainal, Z., Hakim, M.N.
Controlled release and angiotensin-converting enzyme inhibition properties of an antihypertensive drug based on a perindopril erbumine-layered double hydroxide nanocomposite ([Open Access](#))

(2012) *International Journal of Nanomedicine*, 7, pp. 2129-2141. Cited 40 times.
<http://www.dovepress.com/getfile.php?fileID=12591>
doi: 10.2147/IJN.S30461

[View at Publisher](#)
-

- ☐ 29 Ibrahim, W.N., Rosli, L.M.B.M., Doolaanea, A.A.
Formulation, cellular uptake and cytotoxicity of thymoquinone-loaded plga nanoparticles in malignant melanoma cancer cells ([Open Access](#))

(2020) *International Journal of Nanomedicine*, 15, pp. 8059-8074. Cited 4 times.
<https://www.dovepress.com/getfile.php?fileID=62749>
doi: 10.2147/IJN.S269340

[View at Publisher](#)
-
- ☐ 30 Jaafar, N.S.
Clinical effects of Gum Arabic (Acacia): A mini review ([Open Access](#))

(2019) *Iraqi Journal of Pharmaceutical Sciences*, 28 (2), pp. 9-16. Cited 4 times.
<http://bijps.uobaghdad.edu.iq/index.php/bijps/article/view/896/792>
doi: 10.31351/vol28iss2pp9-16

[View at Publisher](#)
-
- ☐ 31 Jafarzadeh, N., Nadafan, M., Malekfar, R., Shakeri-Zadeh, A., Meidanchi, A., Eynali, S.
Structural, optical and dielectric studies of Ag nanoparticles decorated by herceptin

(2019) *Physica E: Low-Dimensional Systems and Nanostructures*, 114, art. no. 113562. Cited 14 times.
doi: 10.1016/j.physe.2019.113562

[View at Publisher](#)
-
- ☐ 32 Jiang, J., Jin, H., Liu, L., Pi, J., Yang, F., Cai, J.
Curcumin disturbed cell-cycle distribution of HepG2 cells via cytoskeletal arrangement

(2013) *Scanning*, 35 (4), pp. 253-260. Cited 19 times.
doi: 10.1002/sca.21058

[View at Publisher](#)
-
- ☐ 33 Kong, H., Yang, J., Zhang, Y., Fang, Y., Nishinari, K., Phillips, G.O.
Synthesis and antioxidant properties of gum arabic-stabilized selenium nanoparticles

(2014) *International Journal of Biological Macromolecules*, 65, pp. 155-162. Cited 151 times.
doi: 10.1016/j.ijbiomac.2014.01.011

[View at Publisher](#)
-
- ☐ 34 Lelli, D., Pedone, C., Majeed, M., Sahebkar, A.
Curcumin and lung cancer: the role of microRNAs

(2017) *Current Pharmaceutical Design*, 23 (23), pp. 3440-3444. Cited 26 times.
<http://www.eurekaselect.com/606/journal/current-pharmaceutical-design>
doi: 10.2174/1381612823666170109144818

[View at Publisher](#)
-

- ☐ 35 Lin, Y.G., Kunnumakkara, A.B., Nair, A., Merritt, W.M., Han, L.Y., Armaiz-Pena, G.N., Kamat, A.A., (...), Sood, A.K.
Curcumin inhibits tumor growth and angiogenesis in ovarian carcinoma by targeting the nuclear factor- κ B pathway
([Open Access](#))
(2007) *Clinical Cancer Research*, 13 (11), pp. 3423-3430. Cited 343 times.
<http://clincancerres.aacrjournals.org/cgi/reprint/13/11/3423.pdf>
doi: 10.1158/1078-0432.CCR-06-3072
[View at Publisher](#)
-
- ☐ 36 Majumder, P., Bhunia, S., Bhattacharyya, J., Chaudhuri, A.
Inhibiting tumor growth by targeting liposomally encapsulated CDC20siRNA to tumor vasculature: Therapeutic RNA interference
(2014) *Journal of Controlled Release*, 180 (1), pp. 100-108. Cited 38 times.
doi: 10.1016/j.jconrel.2014.02.012
[View at Publisher](#)
-
- ☐ 37 Meidanchi, A.
 $\text{Mg}_{(1-x)}\text{Cu}_x\text{Fe}_2\text{O}_4$ superparamagnetic nanoparticles as nano-radiosensitizer agents in radiotherapy of MCF-7 human breast cancer cells
(2020) *Nanotechnology*, 31 (32), art. no. 325706. Cited 15 times.
<https://iopscience.iop.org/article/10.1088/1361-6528/ab8cf2>
doi: 10.1088/1361-6528/ab8cf2
[View at Publisher](#)
-
- ☐ 38 Meidanchi, A.
Cobalt ferrite nanoparticles supported on reduced graphene oxide sheets: Optical, magnetic and magneto-antibacterial studies
(2020) *Nanotechnology*, 31 (44), art. no. 445704. Cited 13 times.
<https://iopscience.iop.org/article/10.1088/1361-6528/aba7e2>
doi: 10.1088/1361-6528/aba7e2
[View at Publisher](#)
-
- ☐ 39 Meidanchi, A., Motamed, A.
Preparation, characterization and in vitro evaluation of magnesium ferrite superparamagnetic nanoparticles as a novel radiosensitizer of breast cancer cells
(2020) *Ceramics International*, Part A 46 (11), pp. 17577-17583. Cited 16 times.
<https://www.journals.elsevier.com/ceramics-international>
doi: 10.1016/j.ceramint.2020.04.057
[View at Publisher](#)
-
- ☐ 40 Meidanchi, A., Ansari, H.
Copper Spinel Ferrite Superparamagnetic Nanoparticles as a Novel Radiotherapy Enhancer Effect in Cancer Treatment
(2021) *Journal of Cluster Science*, 32 (3), pp. 657-663. Cited 5 times.
<https://www.springer.com/journal/10876>
doi: 10.1007/s10876-020-01832-5
[View at Publisher](#)

- 41 Meiyanto, E., Putri, D.D.P., Susidarti, R.A., Murwanti, R., Sardjiman, Fitriasisari, A., Husnaa, U., (...), Kawaichi, M.

Curcumin and its analogues (PGV-0 and PGV-1) enhance sensitivity of resistant MCF-7 cells to doxorubicin through inhibition of HER2 and NF- κ B activation ([Open Access](#))

(2014) *Asian Pacific Journal of Cancer Prevention*, 15 (1), pp. 179-184. Cited 87 times.

http://www.apocpcontrol.org/paper_file/issue_abs/Volume15_No1/179-184%209.30%20Edy%20Meiyanto.pdf

doi: 10.7314/APJCP.2014.15.1.179

[View at Publisher](#)

-
- 42 Mikkelsen, R.B., Wardman, P.

Biological chemistry of reactive oxygen and nitrogen and radiation-induced signal transduction mechanisms ([Open Access](#))

(2003) *Oncogene*, 22 (37 REV. ISS. 3), pp. 5734-5754. Cited 450 times.

doi: 10.1038/sj.onc.1206663

[View at Publisher](#)

-
- 43 Mondal, G., Barui, S., Saha, S., Chaudhuri, A.

Tumor growth inhibition through targeting liposomally bound curcumin to tumor vasculature

(2013) *Journal of Controlled Release*, 172 (3), pp. 832-840. Cited 28 times.

doi: 10.1016/j.jconrel.2013.08.302

[View at Publisher](#)

-
- 44 Nagaraju, G.P., Benton, L., Bethi, S.R., Shoji, M., El-Rayes, B.F.

Curcumin analogs: Their roles in pancreatic cancer growth and metastasis ([Open Access](#))

(2019) *International Journal of Cancer*, 145 (1), pp. 10-19. Cited 16 times.

[http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1097-0215](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1097-0215)

doi: 10.1002/ijc.31867

[View at Publisher](#)

-
- 45 Notarbartolo, M., Poma, P., Perri, D., Dusonchet, L., Cervello, M., D'Alessandro, N.

Antitumor effects of curcumin, alone or in combination with cisplatin or doxorubicin, on human hepatic cancer cells. Analysis of their possible relationship to changes in NF- κ B activation levels and in IAP gene expression

(2005) *Cancer Letters*, 224 (1), pp. 53-65. Cited 269 times.

doi: 10.1016/j.canlet.2004.10.051

[View at Publisher](#)

-
- 46 Obulesu, M., Dowlathabad, M.R., Bramhachari, P.V.

Carotenoids and Alzheimer's Disease: An insight into therapeutic role of retinoids in animal models

(2011) *Neurochemistry International*, 59 (5), pp. 535-541. Cited 83 times.

www.elsevier.com/locate/neuint

doi: 10.1016/j.neuint.2011.04.004

[View at Publisher](#)

- 47 Pieczykolan, E., Kurek, M.A.
Use of guar gum, gum arabic, pectin, beta-glucan and inulin for microencapsulation of anthocyanins from chokeberry
(2019) *International Journal of Biological Macromolecules*, 129, pp. 665-671. Cited 45 times.
www.elsevier.com/locate/ijbiomac
doi: 10.1016/j.ijbiomac.2019.02.073
View at Publisher
-
- 48 Pitalua, E., Jimenez, M., Vernon-Carter, E.J., Beristain, C.I.
Antioxidative activity of microcapsules with beetroot juice using gum Arabic as wall material
(2010) *Food and Bioproducts Processing*, 88 (2-3), pp. 253-258. Cited 102 times.
doi: 10.1016/j.fbp.2010.01.002
View at Publisher
-
- 49 Prajakta, D., Ratnesh, J., Chandan, K., Suresh, S., Grace, S., Meera, V., Vandana, P.
Curcumin loaded pH-sensitive nanoparticles for the treatment of colon cancer
(2009) *Journal of Biomedical Nanotechnology*, 5 (5), pp. 445-455. Cited 112 times.
doi: 10.1166/jbn.2009.1038
View at Publisher
-
- 50 Prasad, S., Gupta, S.C., Tyagi, A.K.
Reactive oxygen species (ROS) and cancer: Role of antioxidative nutraceuticals
(2017) *Cancer Letters*, 387, pp. 95-105. Cited 360 times.
www.elsevier.com/locate/canlet
doi: 10.1016/j.canlet.2016.03.042
View at Publisher
-
- 51 Prieto, M.A., Rodríguez-Amado, I., Vázquez, J.A., Murado, M.A.
β-Carotene assay revisited. Application to characterize and quantify antioxidant and prooxidant activities in a microplate (Open Access)
(2012) *Journal of Agricultural and Food Chemistry*, 60 (36), pp. 8983-8993. Cited 52 times.
doi: 10.1021/jf302218g
View at Publisher
-
- 52 Rachmawati, H., Soraya, I.S., Kurniati, N.F., Rahma, A.
In vitro study on antihypertensive and antihypercholesterolemic effects of a curcumin nanoemulsion (Open Access)
(2016) *Scientia Pharmaceutica*, 84 (1), pp. 131-140. Cited 22 times.
<http://www.scipharm.at/download.asp?id=1806>
doi: 10.3797/scipharm.ISP.2015.05
View at Publisher

- 53 Raikos, V., McDonagh, A., Ranawana, V., Duthie, G.
Processed beetroot (*Beta vulgaris* L.) as a natural antioxidant in mayonnaise: Effects on physical stability, texture and sensory attributes ([Open Access](#))

(2016) *Food Science and Human Wellness*, 5 (4), pp. 191-198. Cited 30 times.
www.keaipublishing.com/en/journals/food-science-and-human-wellness/
doi: 10.1016/j.fshw.2016.10.002

View at Publisher
-
- 54 Ranneh, Y., Ali, F., Al-Qubaisi, M., Esa, N.M., Ismail, A.
The inhibitory activity of cocoa phenolic extract against pro-inflammatory mediators secretion induced by lipopolysaccharide in RAW 264.7 cells ([Open Access](#))

(2016) *SpringerPlus*, 5 (1), art. no. 547. Cited 11 times.
<http://www.springerplus.com/archive>
doi: 10.1186/s40064-016-2138-0

View at Publisher
-
- 55 Reckziegel, P., Dias, V.T., Benvegnú, D.M., Bouffleur, N., Barcelos, R.C.S., Segat, H.J., Pase, C.S., (...), Bürger, M.E.
Antioxidant protection of gallic acid against toxicity induced by Pb in blood, liver and kidney of rats ([Open Access](#))

(2016) *Toxicology Reports*, 3, pp. 351-356. Cited 48 times.
<http://www.journals.elsevier.com/toxicology-reports/>
doi: 10.1016/j.toxrep.2016.02.005

View at Publisher
-
- 56 Sarika, P.R., James, N.R., Kumar, P.R.A., Raj, D.K., Kumary, T.V.
Gum arabic-curcumin conjugate micelles with enhanced loading for curcumin delivery to hepatocarcinoma cells

(2015) *Carbohydrate Polymers*, 134, art. no. 10170, pp. 167-174. Cited 70 times.
http://www.elsevier.com/wps/find/journaldescription.cws_home/405871/description#description
doi: 10.1016/j.carbpol.2015.07.068

View at Publisher
-
- 57 Sarika, P.R., Cinthya, K., Jayakrishnan, A., Anilkumar, P.R., James, N.R.
Modified gum arabic cross-linked gelatin scaffold for biomedical applications

(2014) *Materials Science and Engineering C*, 43, pp. 272-279. Cited 40 times.
doi: 10.1016/j.msec.2014.06.042

View at Publisher
-
- 58 Sarmadi, B., Ismail, A., Hamid, M.
Antioxidant and angiotensin converting enzyme (ACE) inhibitory activities of cocoa (*Theobroma cacao* L.) autolysates ([Open Access](#))

(2011) *Food Research International*, 44 (1), pp. 290-296. Cited 38 times.
doi: 10.1016/j.foodres.2010.10.017

View at Publisher

- 59 Selvam, C., Prabu, S.L., Jordan, B.C., Purushothaman, Y., Umamaheswari, A., Hosseini Zare, M.S., Thilagavathi, R.
Molecular mechanisms of curcumin and its analogs in colon cancer prevention and treatment
(2019) *Life Sciences*, 239, art. no. 117032. Cited 38 times.
www.elsevier.com/locate/lifescie
doi: 10.1016/j.lfs.2019.117032
View at Publisher
-
- 60 Shome, S., Talukdar, A.D., Choudhury, M.D., Bhattacharya, M.K., Upadhyaya, H.
Curcumin as potential therapeutic natural product: a nanobiotechnological perspective
(2016) *Journal of Pharmacy and Pharmacology*, 68 (12), pp. 1481-1500. Cited 74 times.
<http://www.interscience.wiley.com/jpages/0022-3573>
doi: 10.1111/jphp.12611
View at Publisher
-
- 61 Wang, Q., Zhuang, X., Mu, J., Deng, Z.-B., Jiang, H., Xiang, X., Wang, B., (...), Zhang, H.-G.
Delivery of therapeutic agents by nanoparticles made of grapefruit-derived lipids (Open Access)
(2013) *Nature Communications*, 4, art. no. 1867. Cited 158 times.
<http://www.nature.com/ncomms/index.html>
doi: 10.1038/ncomms2886
View at Publisher
-
- 62 Wu, C.-C., Chen, D.-H.
Facile green synthesis of gold nanoparticles with gum arabic as a stabilizing agent and reducing agent (Open Access)
(2010) *Gold Bulletin*, 43 (4), pp. 234-240. Cited 78 times.
http://www.goldbulletin.org/assets/file/goldbulletin/downloads/Chen_Wu_4_43.pdf
doi: 10.1007/BF03214993
View at Publisher
-
- 63 Yin, H.-T., Zhang, D.-G., Wu, X.-L., Huang, X.-E., Chen, G.
In vivo evaluation of curcumin-loaded nanoparticles in a A549 xenograft mice model (Open Access)
(2013) *Asian Pacific Journal of Cancer Prevention*, 14 (1), pp. 409-412. Cited 64 times.
http://www.apocpcontrol.org/paper_file/issue_abs/Volume14_No1/409-412%2012.21%20Hai-Tao%20Yin.pdf
doi: 10.7314/APJCP.2013.14.1.409
View at Publisher
-

□ 64 Yusuf, M., Khan, R.A., Khan, M., Ahmed, B.

Plausible antioxidant biomechanics and anticonvulsant pharmacological activity of brain-targeted β -carotene nanoparticles ([Open Access](#))

(2012) *International Journal of Nanomedicine*, 7, pp. 4311-4322. Cited 30 times.

<http://www.dovepress.com/getfile.php?fileID=13575>

doi: 10.2147/IJN.S34588

[View at Publisher](#)

✎ Ibrahim, W.N.; Department of Biomedical Sciences, College of Health Sciences, QU Health, Qatar University, Doha, Qatar; email:w.ibrahim@qu.edu.qa

✎ Doolaanea, A.A.; Department of Pharmaceutical Technology, Faculty of Pharmacy, International Islamic University Malaysia, Kuantan, Malaysia; email:monem@iiium.edu.my

© Copyright 2021 Elsevier B.V., All rights reserved.

[Back to results](#) | 1 of 1

[Top of page](#)

About Scopus

[What is Scopus](#)
[Content coverage](#)
[Scopus blog](#)
[Scopus API](#)
[Privacy matters](#)

Language

[日本語に切り替える](#)
[切换到简体中文](#)
[切换到繁體中文](#)
[Русский язык](#)

Customer Service

[Help](#)
[Contact us](#)

ELSEVIER

[Terms and conditions](#) ↗ [Privacy policy](#) ↗

Copyright © Elsevier B.V. ↗. All rights reserved. Scopus® is a registered trademark of Elsevier B.V.

We use cookies to help provide and enhance our service and tailor content. By continuing, you agree to the use of cookies.

RELX