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Anticancer, anti-inflammatory, antioxidant and anti-Angiogenic activities of diosgenin isolated from *Costus* (kust)

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Team work

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- **Costus or kust or qust in Arabic is a perennial rhizomatous herb with erect or spreading stems commonly called as spiral flag in English.**
- **It is usually found at elevations of 2,500 to 3,000 m in India; including the Himalayas and Kashmir.**

- **kust is an important medicinal plant widely used in several indigenous medicinal formulations.**
- **The root of the plant is the key part used for medicinal or homeopathic purposes.**
- **Essential oils extracted from the root have been used in traditional medicine and in perfumes since ancient times.**



- There are two types of **kust** Root. Both come in the form of a dried root and both provide amazing medicinal benefits:
- **kust al-Bahri** which is lighter in color and more mild.
- **kust al-Hindi** which is darker in color and has a stronger flavor.

- قال رسول الله صلى الله عليه وسلم : " إِنَّ أَمَثَلَ مَا تَدَاوَيْتُمْ بِهِ الْحِجَامَةُ وَالْقِسْطُ الْبَحْرِي " . رواه البخاري (5696) كتاب الطب .

In a Hadeeth narrated by Anas he صلى الله عليه وسلم said:

“The best thing to cure yourselves with is Hijaamah and **al Kust al Bahree.**”

- وقال رسول الله صلى الله عليه وسلم : " لَا تَعْذِبُوا صَبِيَانَكُمْ بِالْغَمَزِ مِنَ الذَّرَّةِ ، وَ عَلَيْكُمْ بِالْقِسْطِ " رواه البخاري (56966) كتاب الطب .

- “I approached the Prophet – صلى الله عليه وسلم – with a son of mine while pressing his tonsils due to tonsillitis, so he said: “You should use **al Kust al Hindee.**” [Collected by Bukharee and Muslim.]

- Messenger of Allaah – صلى الله عليه وسلم – said:

“If a child is inflicted with tonsillitis or a headache, then let his mother take **Kust al Hindee**, scrub it with water and let him inhale it as droplets through his nostrils.”

The Prophet Mohammad ﷺ taught us that **kust** is a cure for:

- Sore throat and tonsillitis
- Headache

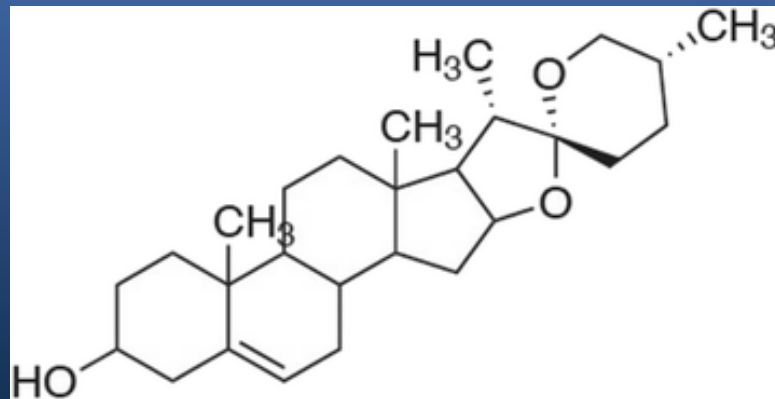
• HOW TO USE Kust ROOT

- **For painful joints:** Make into a paste by mixing **Kust** powder with olive oil until smooth. Then this paste can be massaged into areas of pain in the evening before bed.
- **For unwanted skin spots, skin discolouration, scars, and burns:** Mix **Kust** powder in equal parts with raw honey and add a very small amount of clean water to make a paste. Apply to the area once per day, for 20-30 minutes, and then wash off.
- **For tonsillitis, runny nose, colds and flu:** **Kust** should be ground to a powder and gently snuffed in the nose. You should be lying down with your head and shoulders slightly raised and your head tilted back. You can also inhale it by mixing with olive oil and putting droplets of it in the nostrils.
- **For chest infections, asthma, and pleurisy:** Mix a teaspoon of **Kust** with raw honey and smear on the inside of the right cheek, three times a day.
- **For digestive problems, IBS, Crohn's or intestinal parasites:** Crush it into a powder (I use a cheap coffee grinder) and mix a teaspoon of **Kust** with raw honey, water or other liquids. Drink this twice a day.
- <https://www.drlauraskitchen.com/natural-remedies-of-the-middle-east-costus-root/>

Aim of the work

- In the present study, we evaluated the activity of **Diosgenin** extracted from **Kust** by HPTLC analysis *as* :
 - **Anticancer compounds**
 - **Apoptotic and inhibitory effects on cell Proliferation**
 - **Anti-inflammatory**
 - **Antioxidant**
 - **Anti-Angiogenic**

- **Diosgenin** is a bioactive steroidal sapogenin belonging to the triterpene group and is of great interest to the pharmaceutical industry.
- It serves as an important starting material for the production of corticosteroids, sexual hormones as well as other steroidal drugs via hemisynthesis.



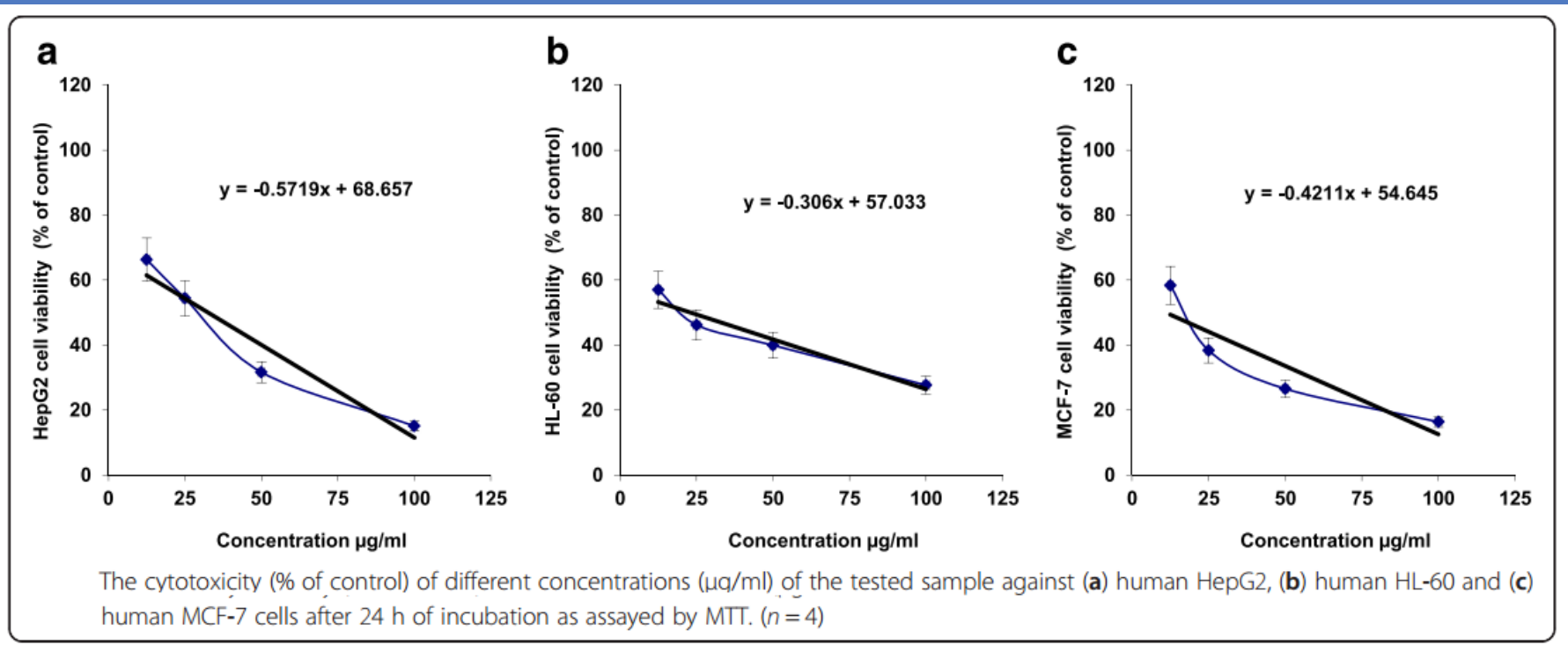
Chemical structure of diosgenin

Results

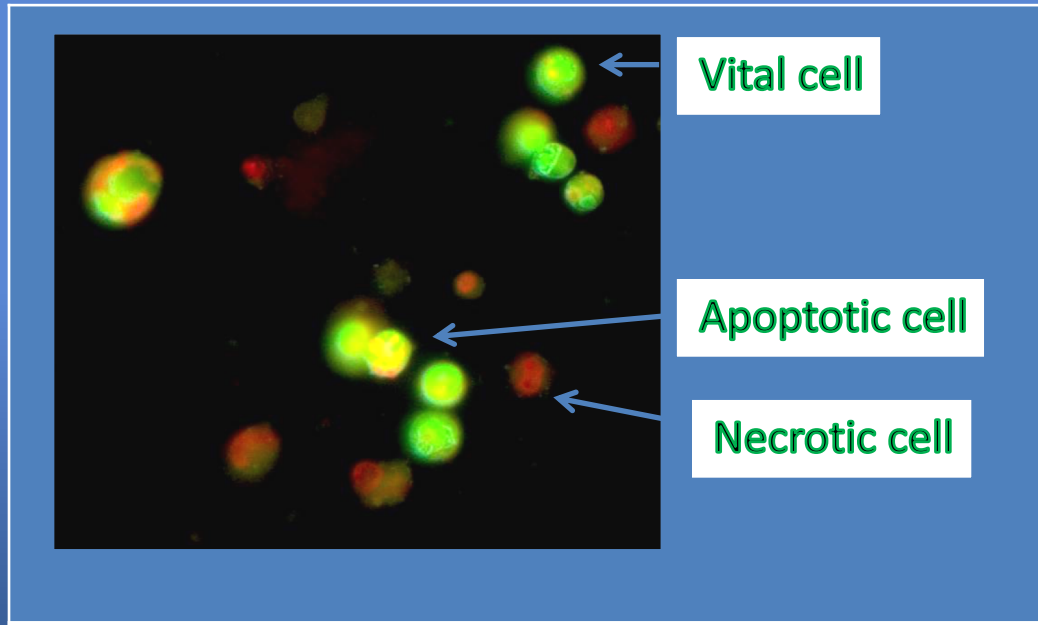
Anticancer activity

The treatment of MCF-7 cells with the tested sample resulted in high inhibition in the cell viability and resulted in an IC50 value of 11.03 $\mu\text{g/ml}$, while the treatment of MCF-7 cells with paclitaxel resulted in an IC50 value of 0.61 $\mu\text{g/ml}$.

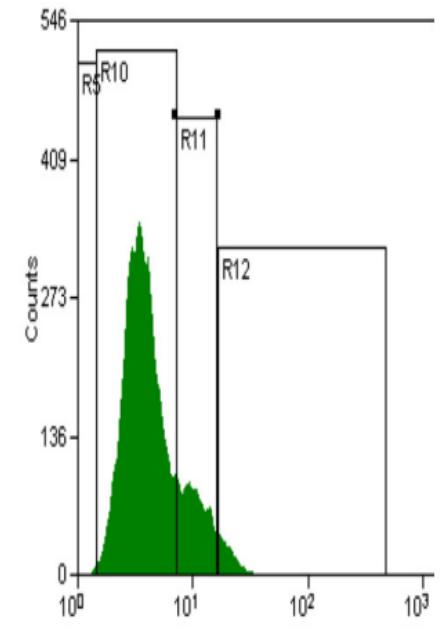
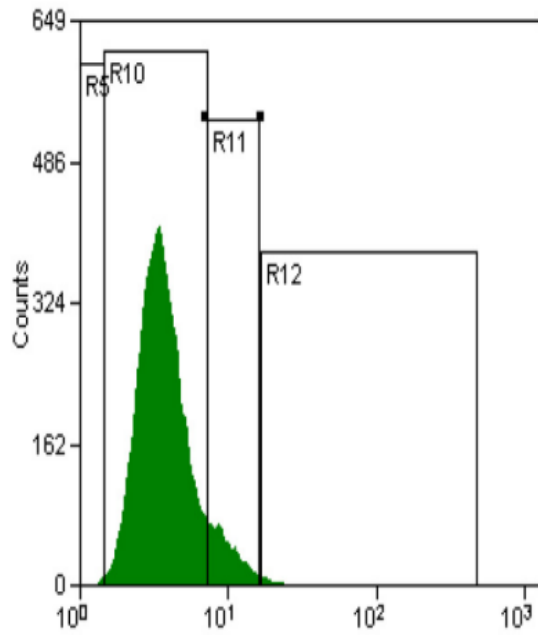
Hence present study shows the efficacy of **Diosgenin** for the cytotoxicity towards MCF-7 cells thus suggesting protection against breast cancer.



Cell cycle analysis



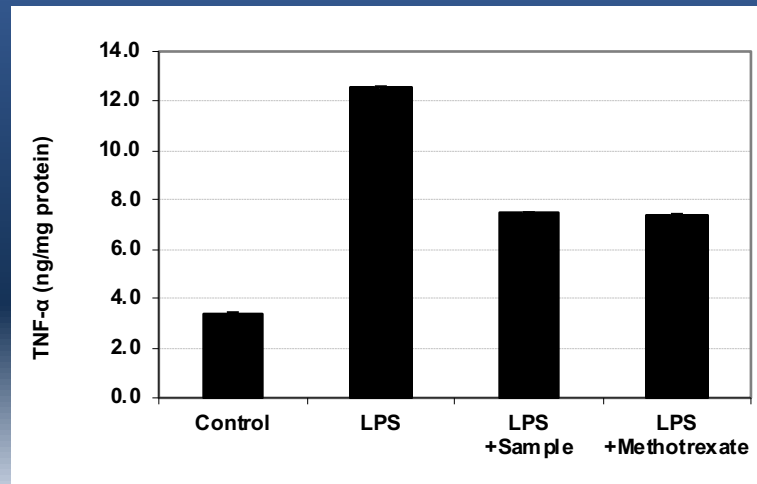
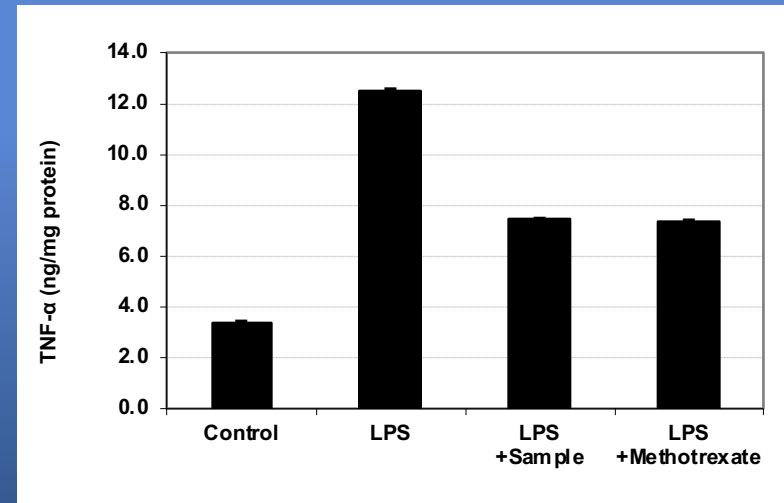
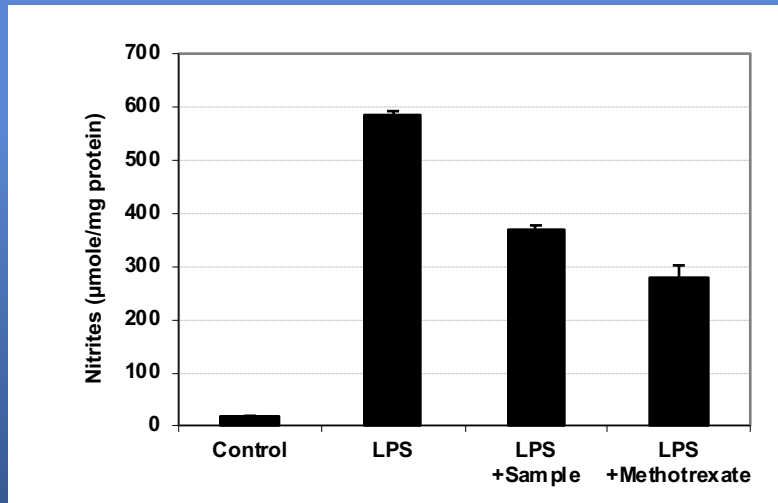
Representative images for the mode of cell death in the sample-treated MCF-7 cells (50% of IC50), as stained by AO/EB and captured under fluorescence microscope (x200). Vital cells (green), early apoptotic (bright green to yellow), late apoptotic (orange) and necrotic cells (red).



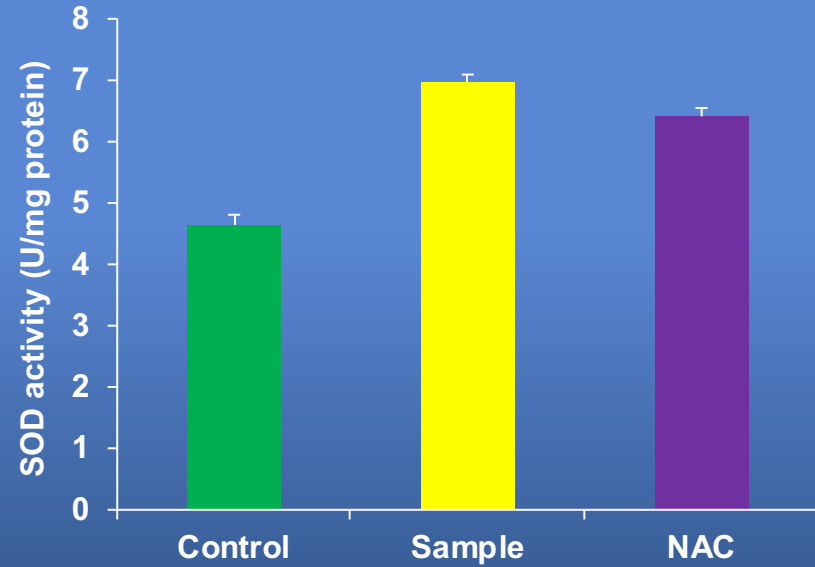
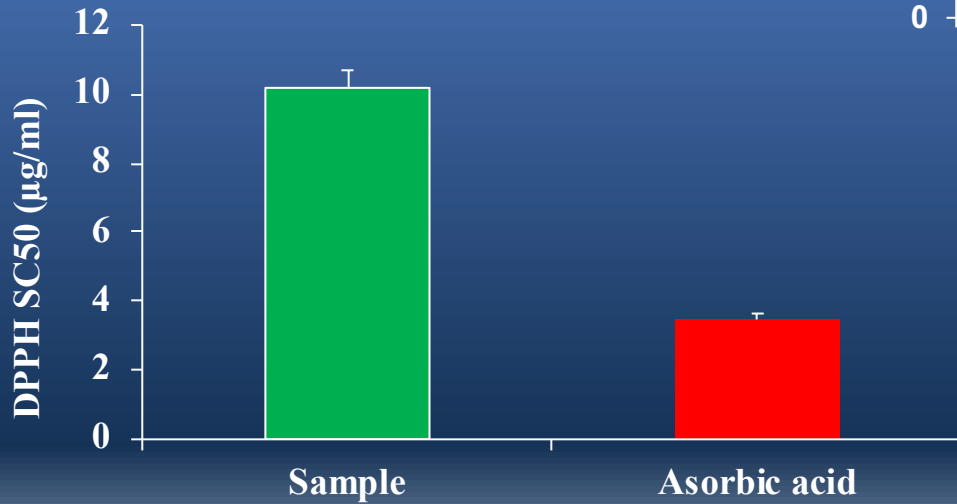
Cell cycle analysis of MCF-7 cells: DNA frequency distribution of cells cultured in control (*left*), Sample-treated (*right*), in one representative capture

Anti-inflammatory activity

The tested sample (50 $\mu\text{g/mL}$) possessed a remarkable significant inhibitory effect, which is close to the NO inhibitory activity of methotrexate.

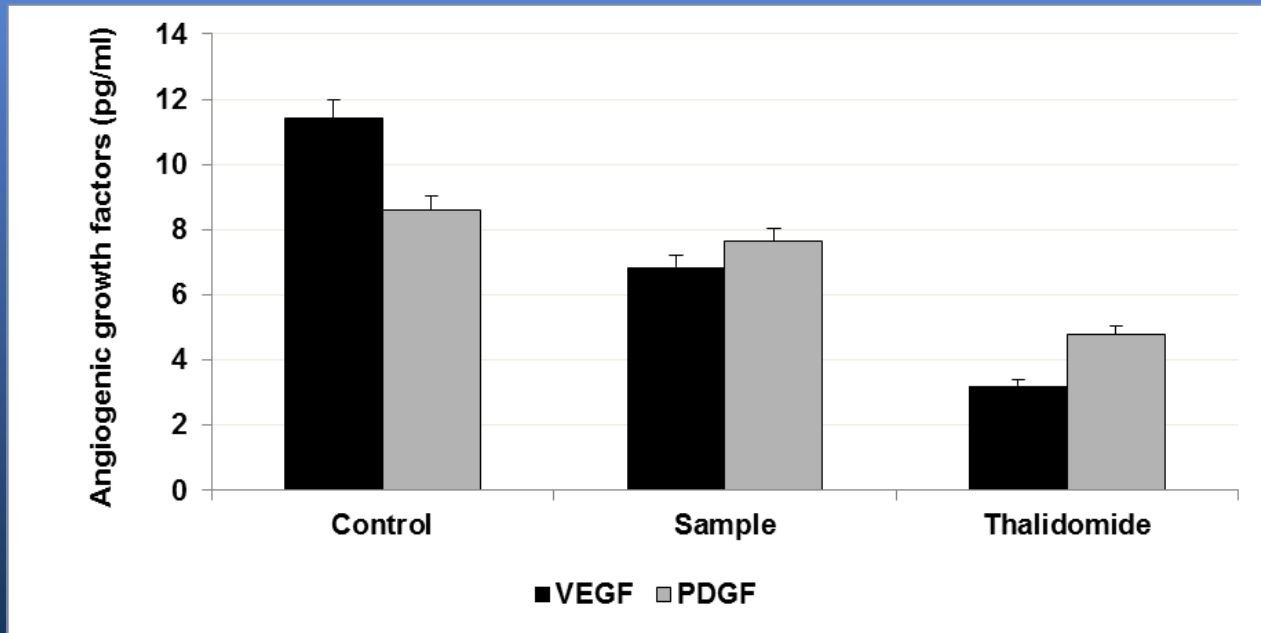


Antioxidant Activity



Anti-angiogenic activity

Using 30% of the IC50 of the tested sample to treat of Mcf-7 cells resulted in a significant inhibition in the VEGF concentration ($P < 0.05$) and a non-signification reduction in PDGF concentration compared to the significant inhibition to both of VEGF and PDGF by thalidomide, a known anti-angiogenic drug ($P < 0.01$).



Conclusion

- In conclusion, our current study is the first to identify the remarkable anticancer activity and apoptotic and inhibitory effects on cell proliferation of **Diosgenin** isolated from **Kust**.
- Our data generate compelling evidence for further evaluation of this constituent as chemo preventive regimen for liver cancer.
- However, animal and human studies are indeed required to prove the safety and efficacy of application of **Diosgenin** of **Kust** as a potential chemo preventive agent in clinical practice.

Publication

Selim and Al Jaouni *BMC Complementary and Alternative Medicine* (2015) 15:301
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 **BMC**
Complementary & Alternative Medicine

RESEARCH ARTICLE

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Anticancer and apoptotic effects on cell proliferation of diosgenin isolated from *Costus speciosus* (Koen.) Sm



Samy Selim^{1,3*} and Soad Al Jaouni²

BMC Complementary and Alternative Medicine (Impact Factor 2.479)

NATURAL PRODUCT RESEARCH, 2015
<http://dx.doi.org/10.1080/14786419.2015.1065493>



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SHORT COMMUNICATION

Anti-inflammatory, antioxidant and antiangiogenic activities of diosgenin isolated from traditional medicinal plant, *Costus speciosus* (Koen ex.Retz.) Sm

Samy Selim^{ac} and Soad Al Jaouni^b

Natural Product Research (Impact Factor 1.828)

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THANK YOU