OP-024 [Apitherapy]
Propolis as an apitherapeutic agent for use in the oral cavity

Anna Kurek Górecka[1]
[1]Department of Microbiology and Immunology, Medical University of Silesia, Poland
[2]Polish Apitherapy Society, Poland

BACKGROUND: Propolis is a good candidate for use as a cariostatic agent as it exhibits antimicrobial, anti-adherent, and anti-inflammatory activity. Furthermore, due to the strong association between periodontal disease and cardiovascular diseases, propolis, as a source of polyphenols, may have a beneficial effect not only on the oral cavity but also exhibit a cardioprotective effect.

Aim of study: The objective of the study was to demonstrate the potential of propolis as an apitherapeutic agent with cariostatic and immunomodulatory effects.

METHODOLOGY: Polish propolis's antibacterial effect was evaluated by determining cariogenic streptococci's minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). Moreover, ethanolic propolis extract was used to investigate the effect of cytokine secretion by human gingival fibroblasts (HGF-1). The study material consisted of supernatants from HGF-1 cultures stimulated with lipopolysaccharide (LPS), interferon alpha (IFN-α), and LPS+IFN-α. Selective interleukins and adhesion molecules were determined using xMAP technology (Bio-Plex).

RESULTS: Ethanolic extract of propolis (EEP) showed antimicrobial activity against Streptococcus mutans, Streptococcus salivarius, Streptococcus mitis and Streptococcus oralis. EEP had no cytotoxic effect against HGF-1. It also affected the release of the pro-inflammatory cytokines IL-1β, IL-6, IL-8, IL-15, and TNF-α secreted by HGF-1. There were also effects on the anti-inflammatory cytokine IL-10 and adhesion molecules: ICAM-1, E-selectin, and endothelin-1.

CONCLUSION: As an oral apitherapeutic, EEP can be an active ingredient in oral hygiene supplements. Furthermore, EEP can not only reduce plaque and thus prevent tooth decay but also its consequences. When applied to the mouth, EEP has an immunomodulatory effect, influencing the production of cytokines and adhesion molecules released by HGF-1.
Practical implication: EEP's cariostatic and immunomodulatory effects may influence propolis's potential use in dentistry.

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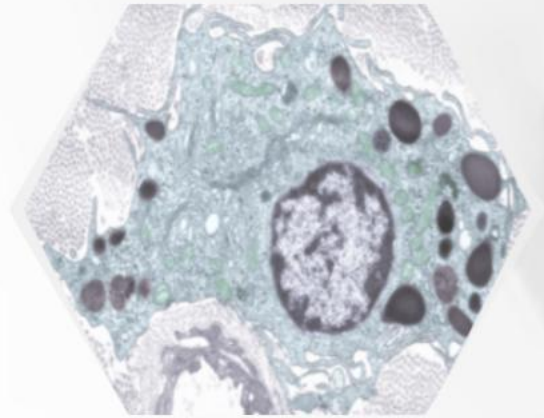
Dr Anna Kurek-Górecka

Polish Apitherapy Society, Poland;

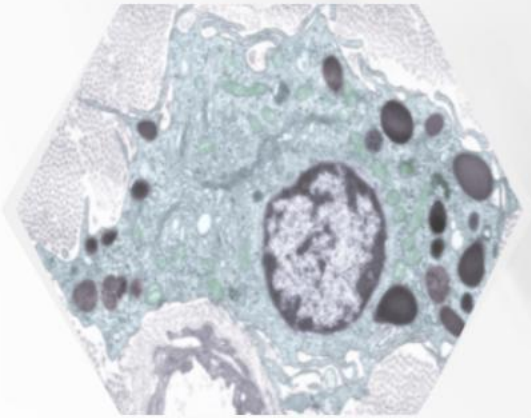
Department of Microbiology and Immunology

Faculty of Medical Sciences in Zabrze

Medical University of Silesia in Katowice



Memories Apimondia 2023



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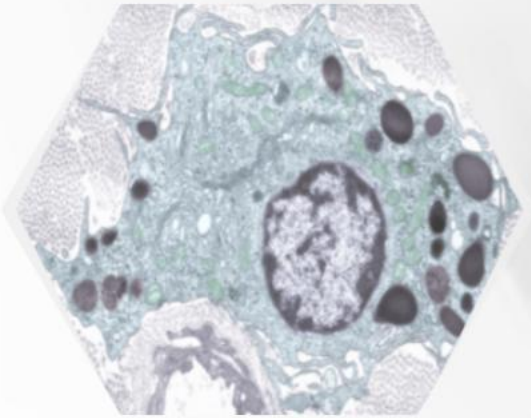
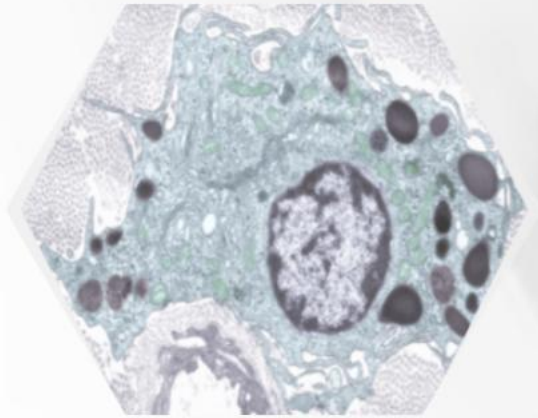
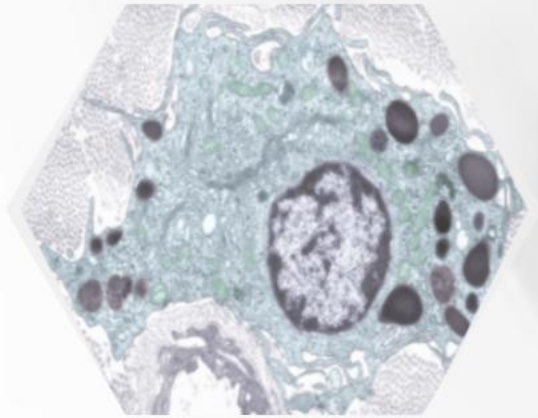


Our activities



Full service pharmacy

Bees are running a full service pharmacy



Analgetic activity

Antiseptic activity (antifungal, antibacterial, antiviral)

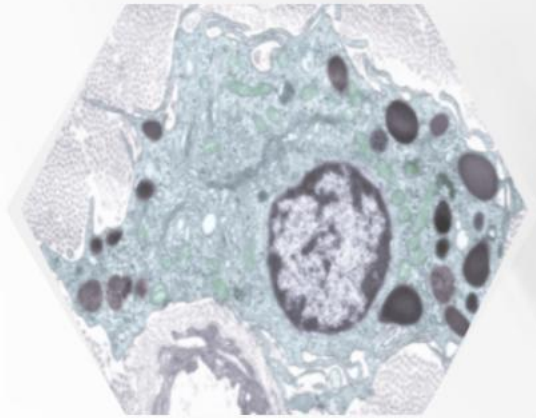
Anti-inflammatory activity

PROPOLIS

Antioxidant activity

Regenerative activity

Immunomodulatory activity



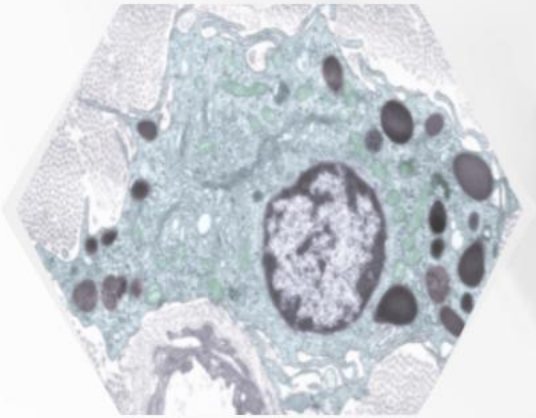
Kurek-Górecka A., Górecki M., Rzepecka-Stojko A., Górecki M., Stojko J. , Sosada M., Świerczek-Zięba G. Structure and antioxidant activity of polyphenols derived from propolis. Molecules 2014,19,78-1010. doi: 10.3390/molecules19010078

Kurek-Górecka A., Górecki M., Rzepecka-Stojko A., Balwierz R., Stojko J. Bee Products in Dermatology and Skin Care. Molecules 2020 Feb; 25(3): 556. doi: 10.3390/molecules25030556

Kurek-Górecka A., Kłósek M ,Pietsz G, Czuba Z. P., Kolayli S., Can K , Balwierz R., Olczyk P. The Phenolic Profile and Anti-Inflammatory Effect of Ethanolic Extract of Polish Propolis on Activated Human Gingival Fibroblasts-1 Cell Line. Molecules 2023, 28, 7477. https://doi.org/10.3390/molecules28227477

Antibacterial activity of propolis

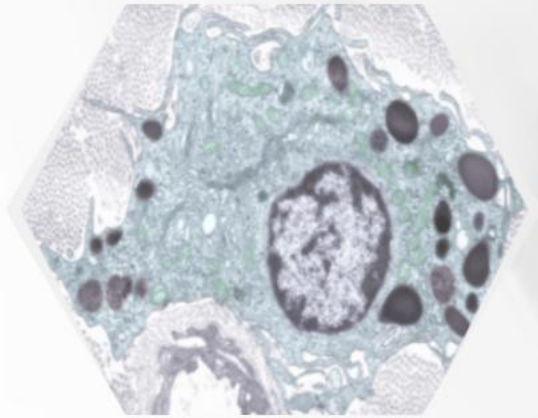
Evaluation of the antimicrobial activity of lozenges with Polish propolis extract against caries-forming bacteria



Antimicrobial analysis

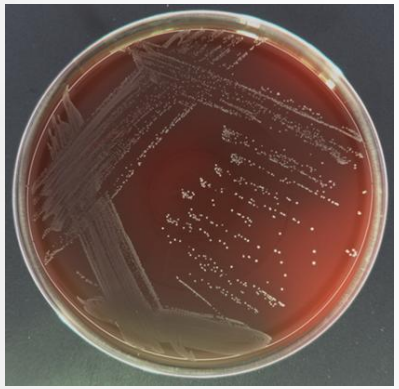
- In a conducted study 4 bacterial strains obtained from the American Type Culture Collection were used. All bacteria strains were grown on blood agar with 5% CO_2 at 37ºC.

- Determination of the Minimum Inhibitory Concentration (MIC) , as well as the Minimum Bactericidal Concentration (MBC) of ethanolic extract of propolis, was evaluated.



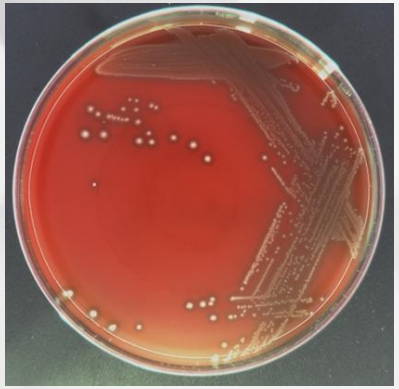
Antimicrobial analysis

Streptococcus mutans
ATCC 33535

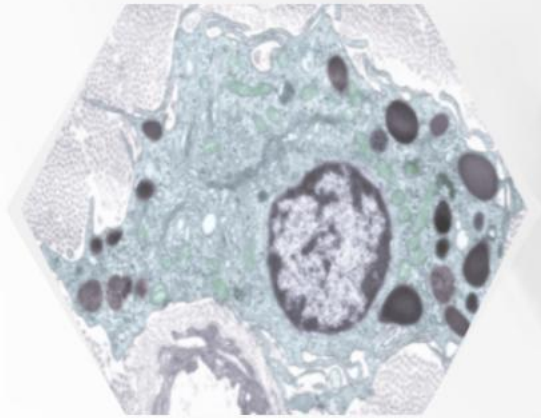


Streptococcus mitis
NC IMB 13770

Streptococcus oralis
ATCC 6249

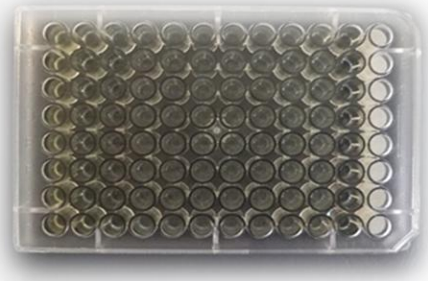


Streptococcus salivarius
ATCC 13419

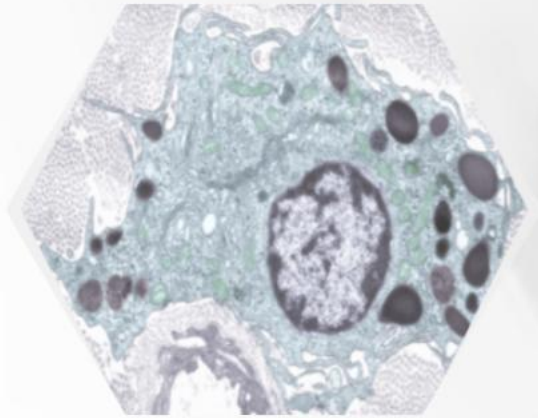


Determination of the Minimum Inhibitory Concentration (MIC)

- MIC was evaluated using the microdilution method in 96-well microtiter plates. We used final concentrations of EEP (ethanolic extract of propolis) from 100 µg/mL to 0.78 µg/mL. concentration of antimicrobial agent that completely inhibits

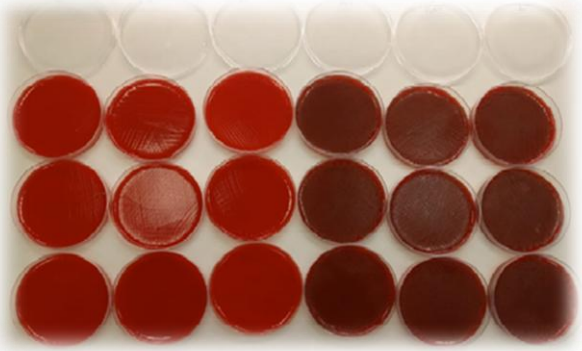


- The MIC is the lowest the growth of organisms in microdilution wells after 24 h of incubation.

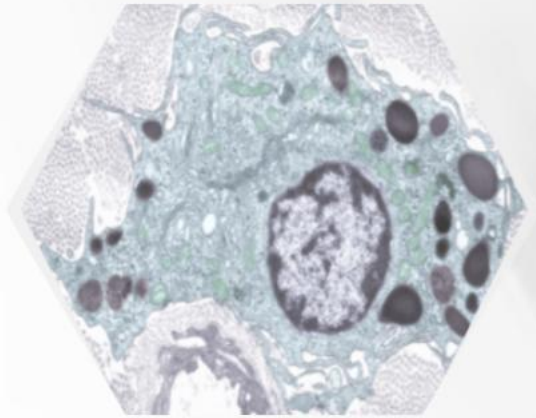


Determination of the Minimum Bactericidal Concentration (MBC)

- For MBC assessment, liquid culture was taken from each well that showed no visible growth and further cultured on fresh blood agar plates followed by incubation for 24 hours.

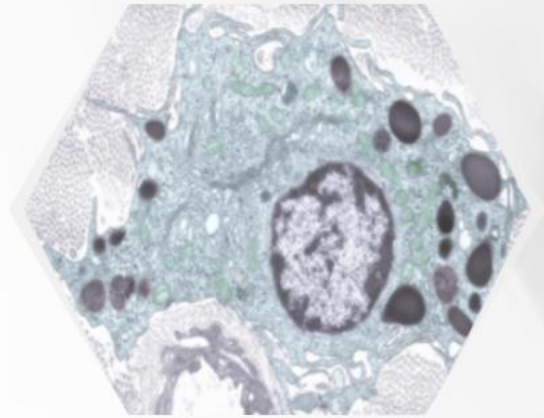


- The MBC was determined as the least concentration showing no visible growth on a plate



Antimicrobial analysis

Tested bacteria	EEP		Lozenges		Lozenges after a conditioning test	
	MIC [µg/ml]	MBC [µg/ml]	MIC [µg/ml]	MBC [µg/ml]	MIC [µg/ml]	MBC [µg/ml]
Steptococcus mutans	25	50	<100	<100	<100	<100
Streptococcus salivarius	50	100	<100	<100	<100	<100
Streptococcus mitis	25	50	<100	<100	<100	<100
Streptococcus oralis	50	50	<100	<100	<100	<100



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Propolis as a Cariostatic Agent in Lozenges and Impact of Storage Conditions on the Stability of Propolis

by Anna Kurek-Górecka [1,*], Paweł Ramos [2], Małgorzata Kłósek [3], Elżbieta Bobela [3], Zenon P. Czuba [3], Radosław Balwierz [4] and Paweł Olczyk [1]

[1] Department of Community Pharmacy, Faculty of Pharmaceutical Sciences in Sosnowiec, Medical University of Silesia in Katowice, Kasztanowa 3, 41-200 Sosnowiec, Poland

[2] Department of Biophysics, Faculty of Pharmaceutical Sciences in Sosnowiec, Medical University of Silesia in Katowice, Jedności 8, 41-200 Sosnowiec, Poland

[3] Department of Microbiology and Immunology, Faculty of Medical Sciences in Zabrze, Medical University of Silesia in Katowice, Jordana 19, 41-808 Zabrze, Poland

[4] Institute of Chemistry, University of Opole, Oleska 48, 45-052 Opole, Poland

[*] Author to whom correspondence should be addressed.

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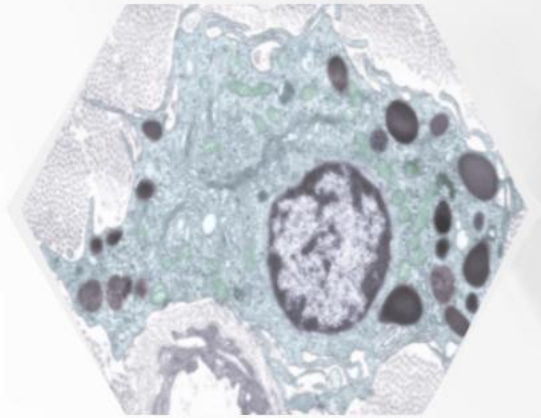
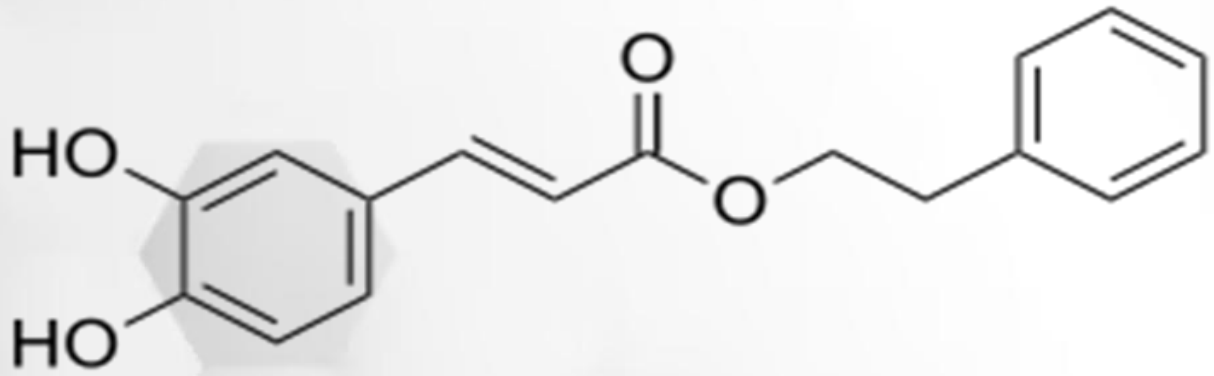
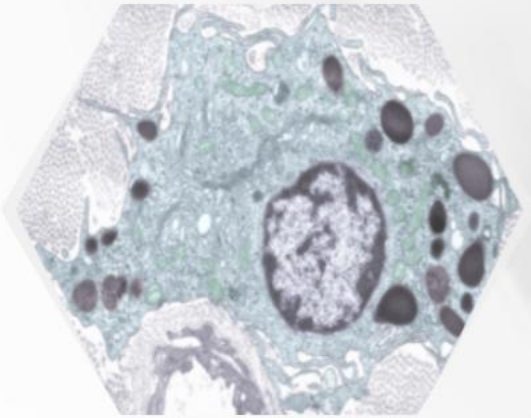
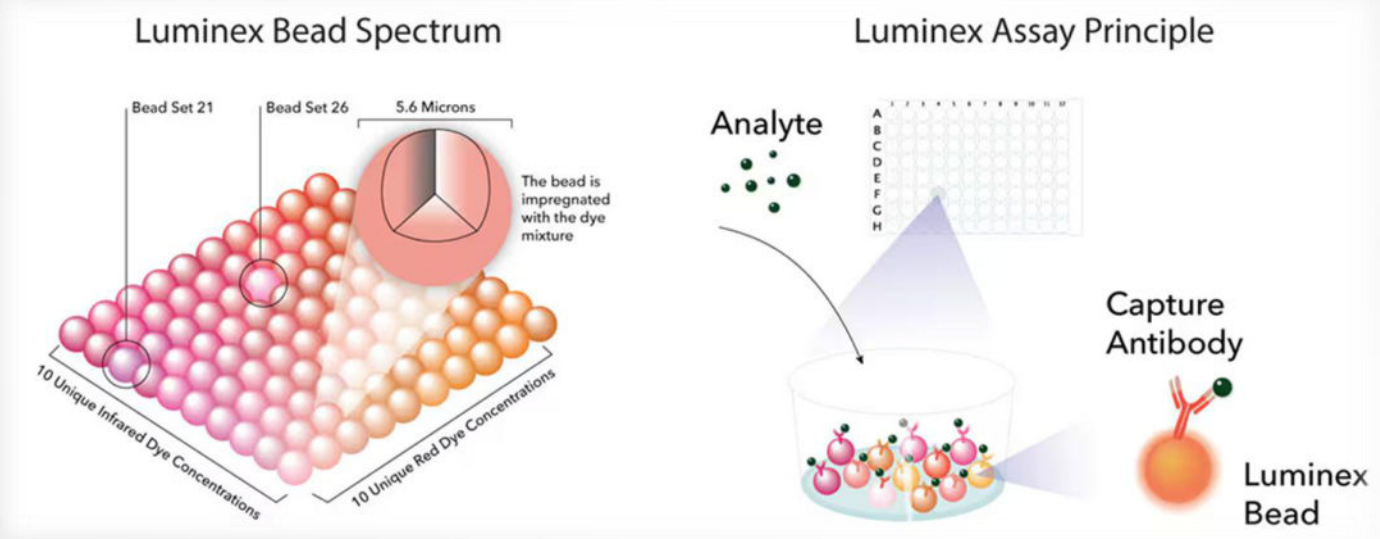


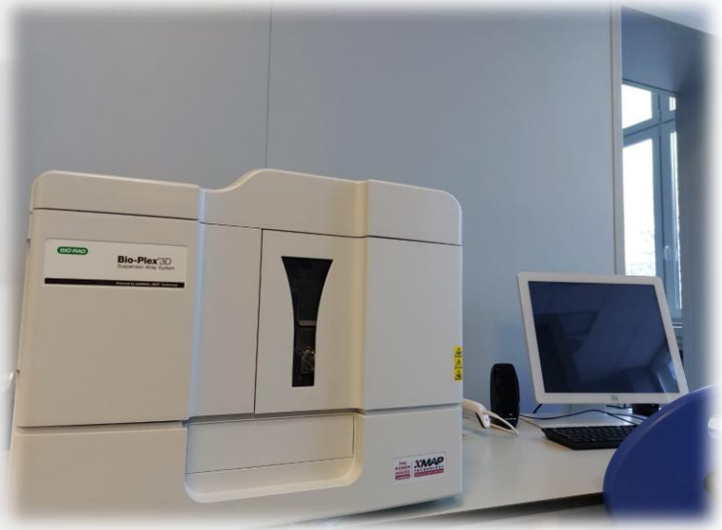
Anti-inflammatory activity of propolis and CAPE

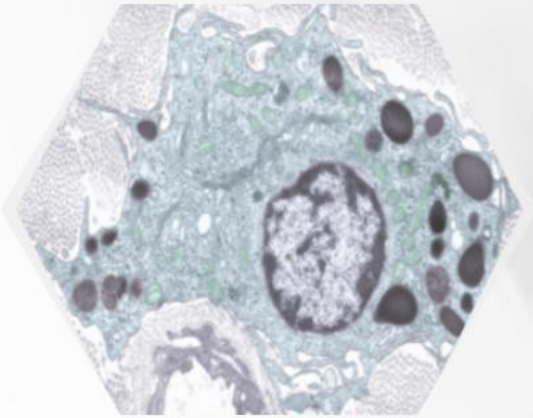


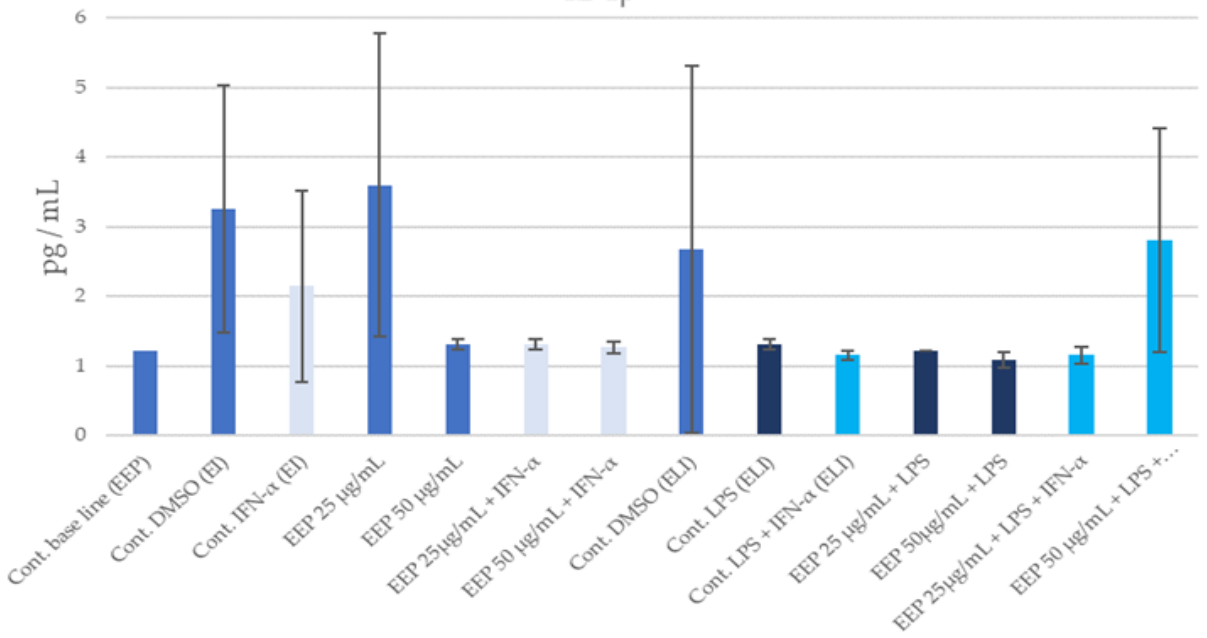


Methodology





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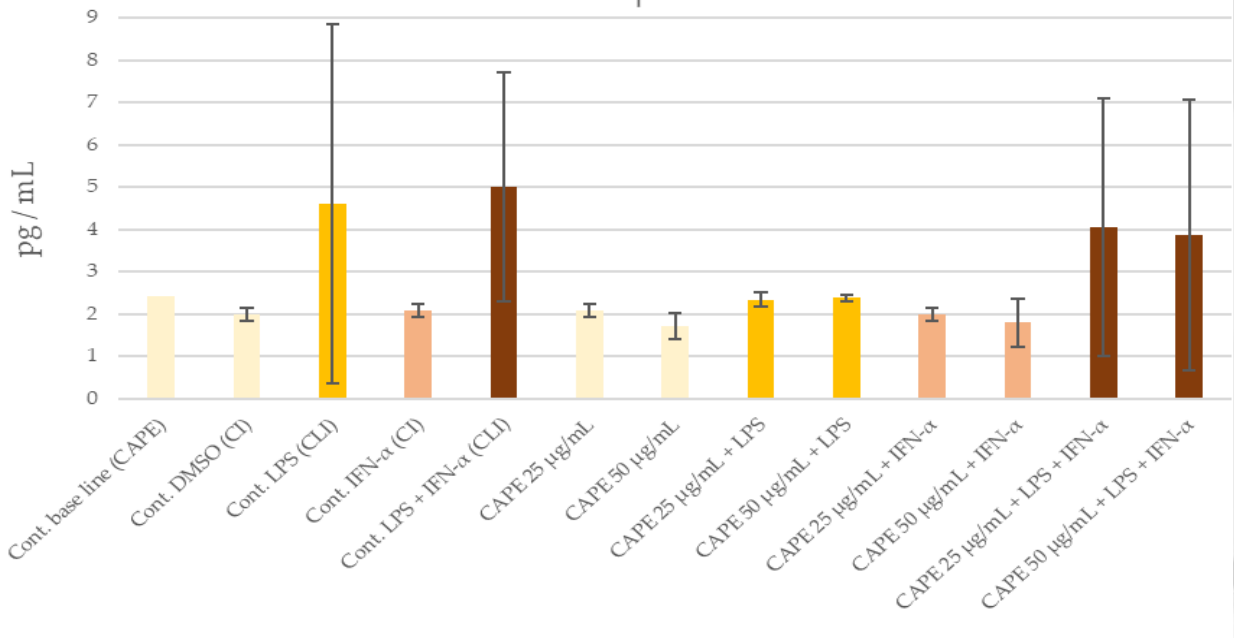
pg / mL
0
1
2
3
4
5
6
Cont. base line (EEP)
Cont. DMSO (EI)
Cont. IFN-α (EI)
EEP 25 µg/mL
EEP 50 µg/mL
EEP 25µg/mL + IFN-α
EEP 50 µg/mL + IFN-α
Cont. DMSO (ELI)
Cont. LPS (ELI)
Cont. LPS + IFN-α (ELI)
EEP 25 µg/mL + LPS
EEP 50µg/mL + LPS
EEP 25µg/mL + LPS + IFN-α
EEP 50 µg/mL + LPS +…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3
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9
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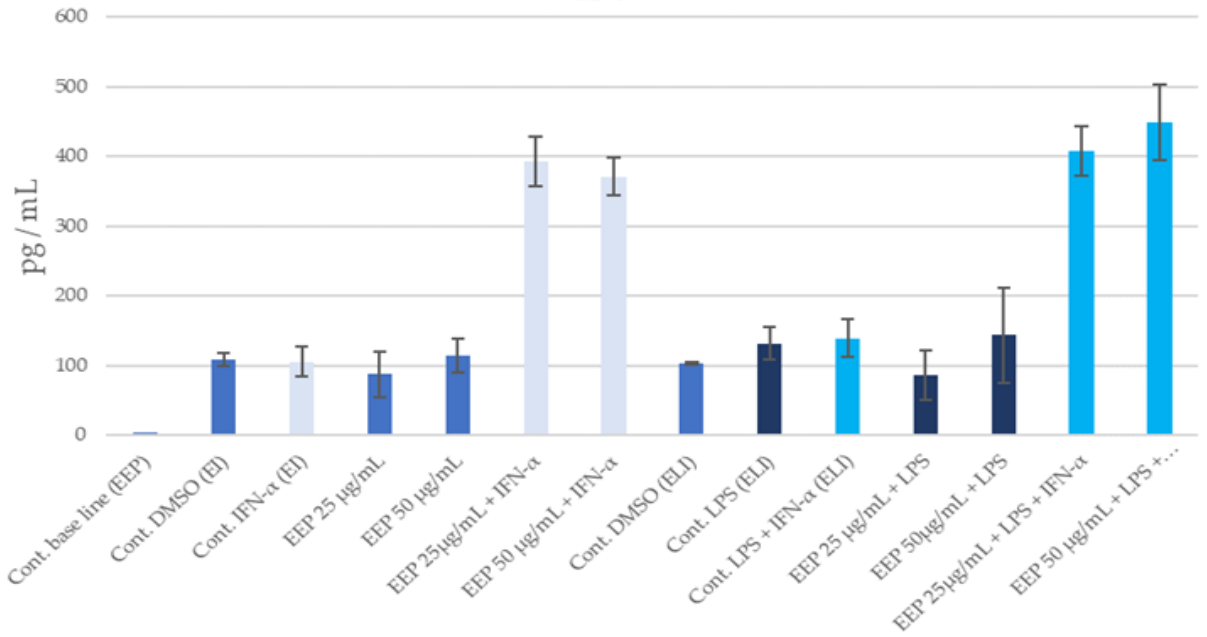
Cont. DMSO (CI)
Cont. LPS (CLI)
Cont. IFN-α (CI)
Cont. LPS + IFN-α (CLI)
CAPE 25 µg/mL
CAPE 50 µg/mL
CAPE 25 µg/mL + LPS
CAPE 50 µg/mL + LPS
CAPE 25 µg/mL + IFN-α
CAPE 50 µg/mL + IFN-α
CAPE 25 µg/mL + LPS + IFN-α
CAPE 50 µg/mL + LPS + IFN-α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pg / mL
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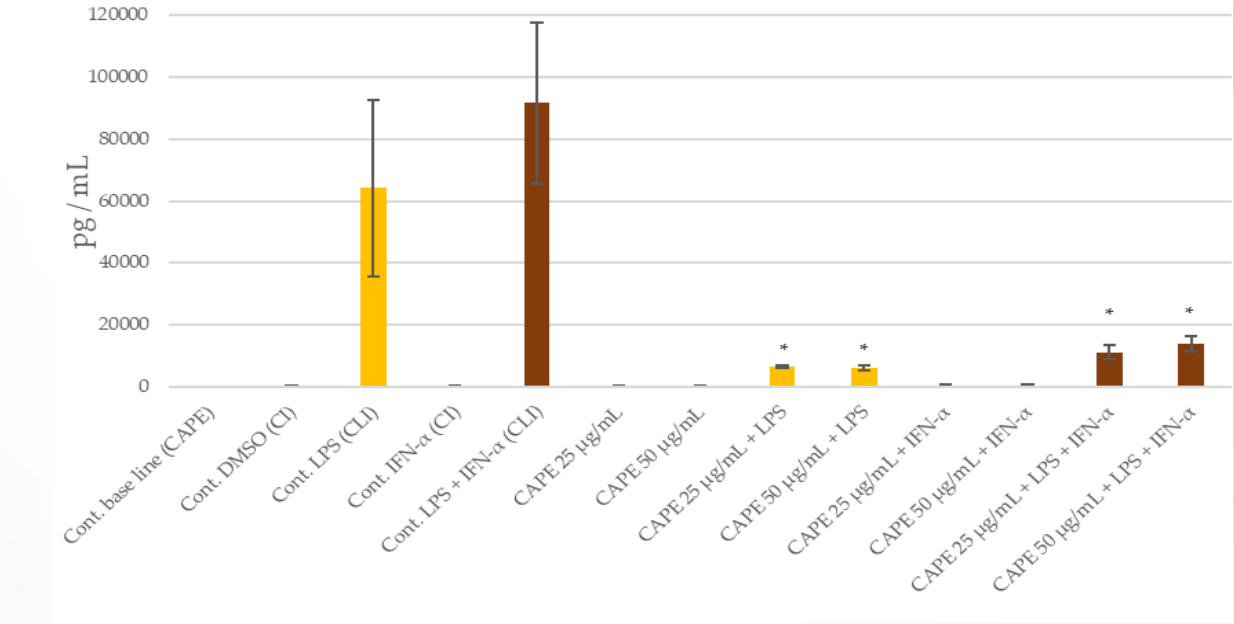
EEP 50 µg/mL
EEP 25µg/mL + IFN-α
EEP 50 µg/mL + IFN-α
Cont. DMSO (ELI)
Cont. LPS (ELI)
Cont. LPS + IFN-α (ELI)
EEP 25 µg/mL + LPS
EEP 50µg/mL + LPS
EEP 25µg/mL + LPS + IFN-α
EEP 50 µg/mL + LPS +…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pg / mL
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120000
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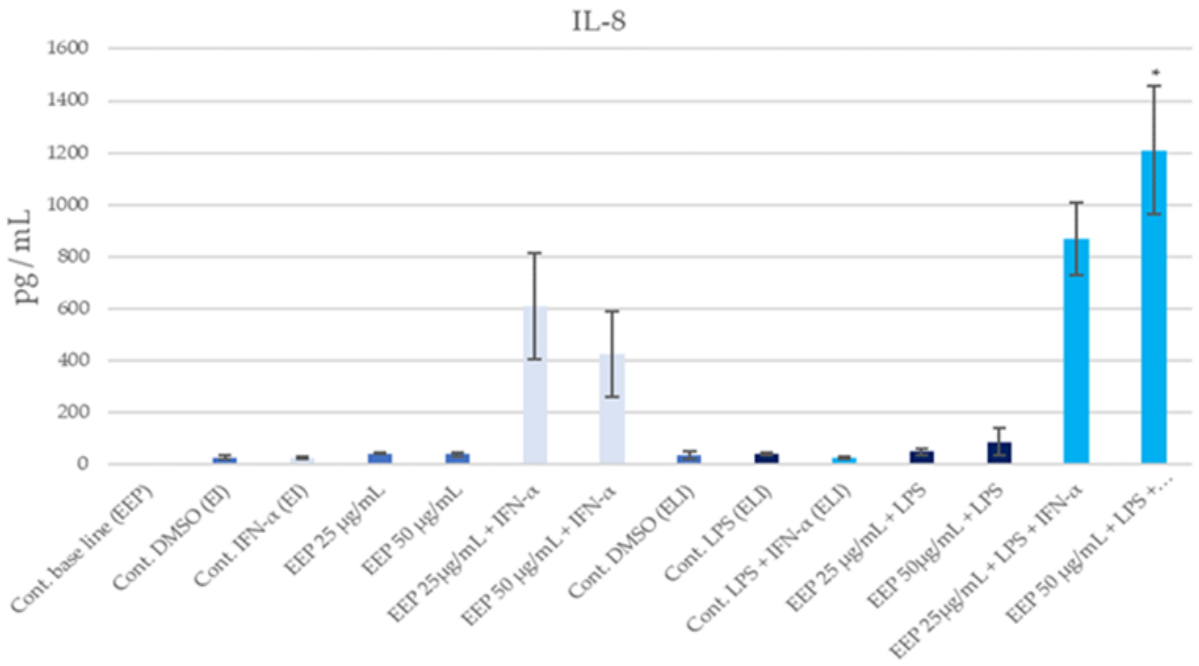
Cont. IFN-α (CI)
Cont. LPS + IFN-α (CLI)
CAPE 25 µg/mL
CAPE 50 µg/mL
CAPE 25 µg/mL + LPS
CAPE 50 µg/mL + LPS
CAPE 25 µg/mL + IFN-α
CAPE 50 µg/mL + IFN-α
CAPE 25 µg/mL + LPS + IFN-α
CAPE 50 µg/mL + LPS + IFN-α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EEP 50 µg/mL
EEP 25µg/mL + IFN-α
EEP 50 µg/mL + IFN-α
Cont. DMSO (ELI)
Cont. LPS (ELI)
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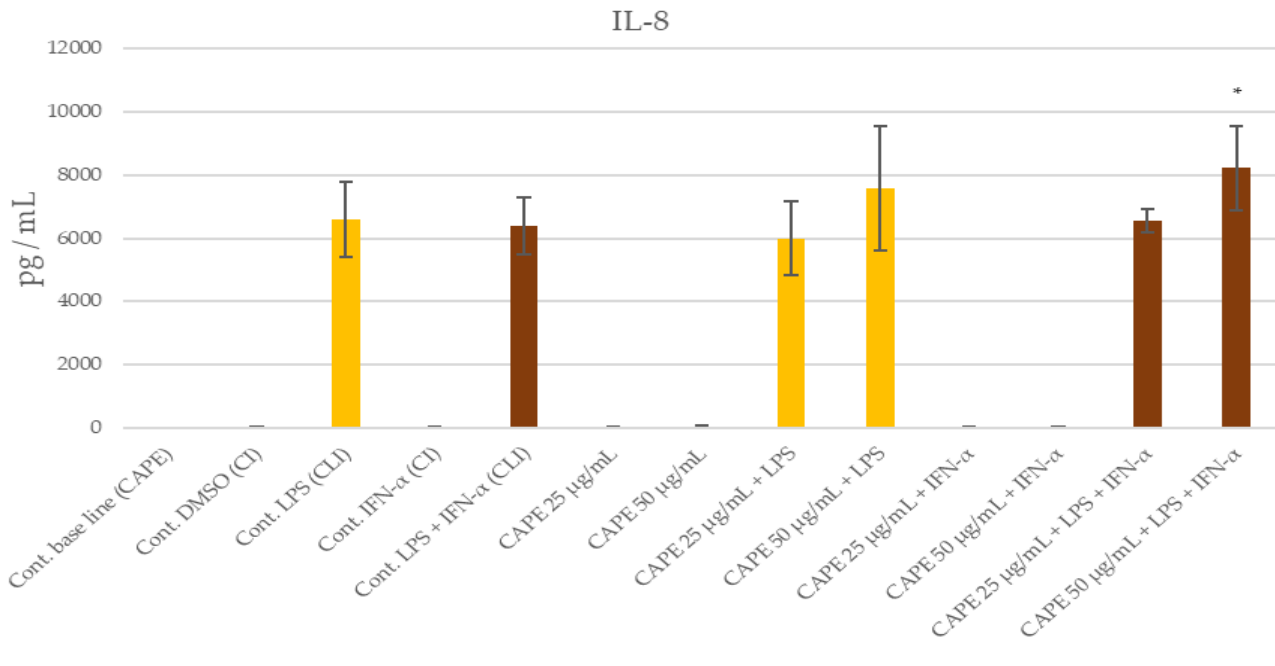
EEP 25µg/mL + LPS + IFN-α
EEP 50 µg/mL + LPS +...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Cont. LPS + IFN-α (CLI)
CAPE 25 µg/mL
CAPE 50 µg/mL
CAPE 25 µg/mL + LPS
CAPE 50 µg/mL + LPS
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CAPE 50 µg/mL + IFN-α
CAPE 25 µg/mL + LPS + IFN-α
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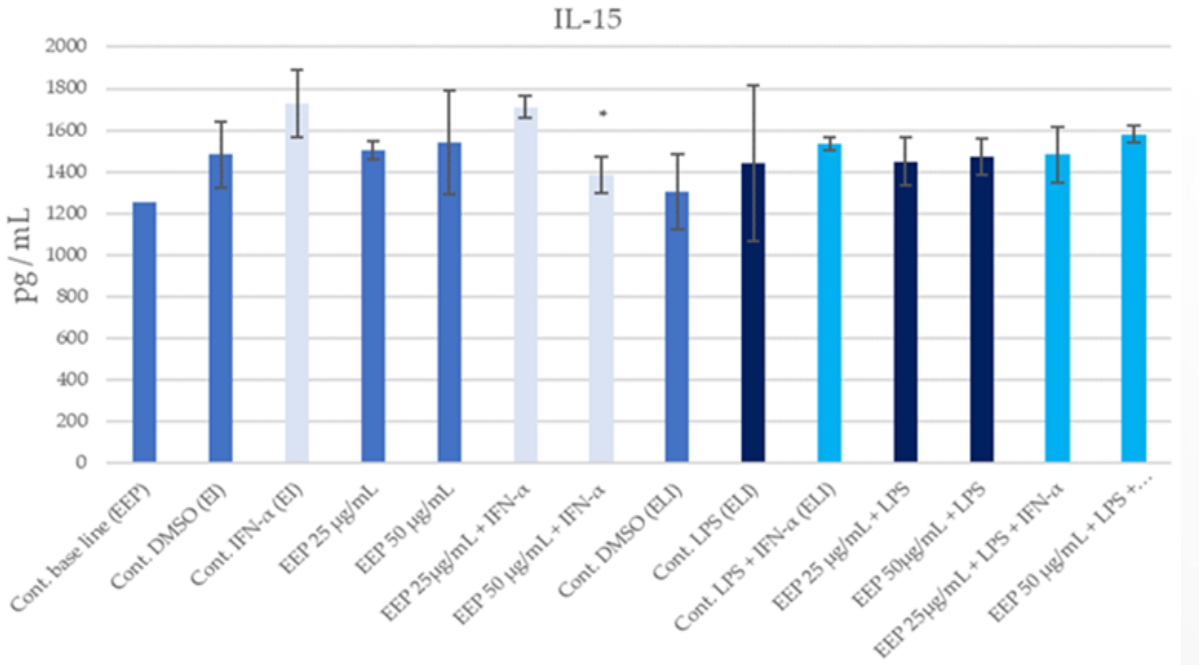
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EEP 25 µg/mL
EEP 50 µg/mL
EEP 25µg/mL + IFN-α
EEP 50 µg/mL + IFN-α
Cont. DMSO (ELI)
Cont. LPS (ELI)
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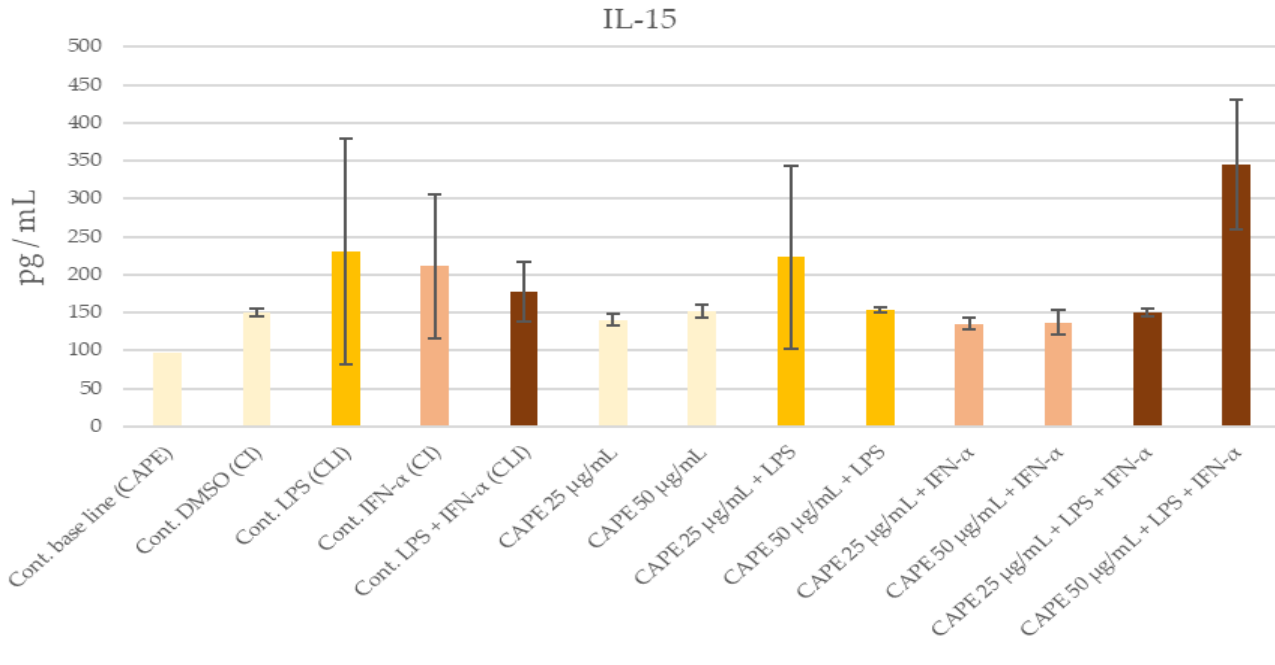
EEP 50 µg/mL + LPS +...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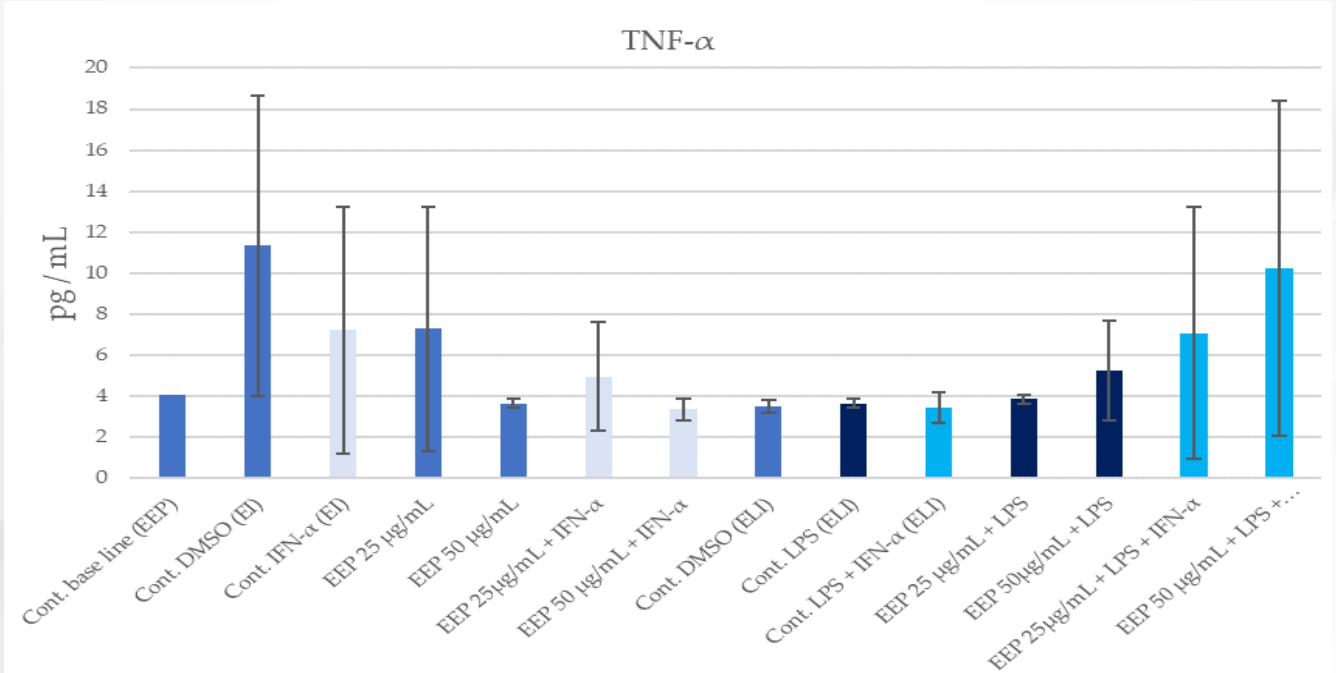
Cont. LPS (CLI)
Cont. IFN-α (CI)
Cont. LPS + IFN-α (CLI)
CAPE 25 µg/mL
CAPE 50 µg/mL
CAPE 25 µg/mL + LPS
CAPE 50 µg/mL + LPS
CAPE 25 µg/mL + IFN-α
CAPE 50 µg/mL + IFN-α
CAPE 25 µg/mL + LPS + IFN-α
CAPE 50 µg/mL + LPS + IFN-α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pg/mL
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4
6
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12
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Cont. DMSO (EI)
Cont. IFN-α (EI)
EEP 25 µg/mL
EEP 50 µg/mL
EEP 25µg/mL + IFN-α
EEP 50 µg/mL + IFN-α
Cont. DMSO (ELI)
Cont. LPS (ELI)
Cont. LPS + IFN-α (ELI)
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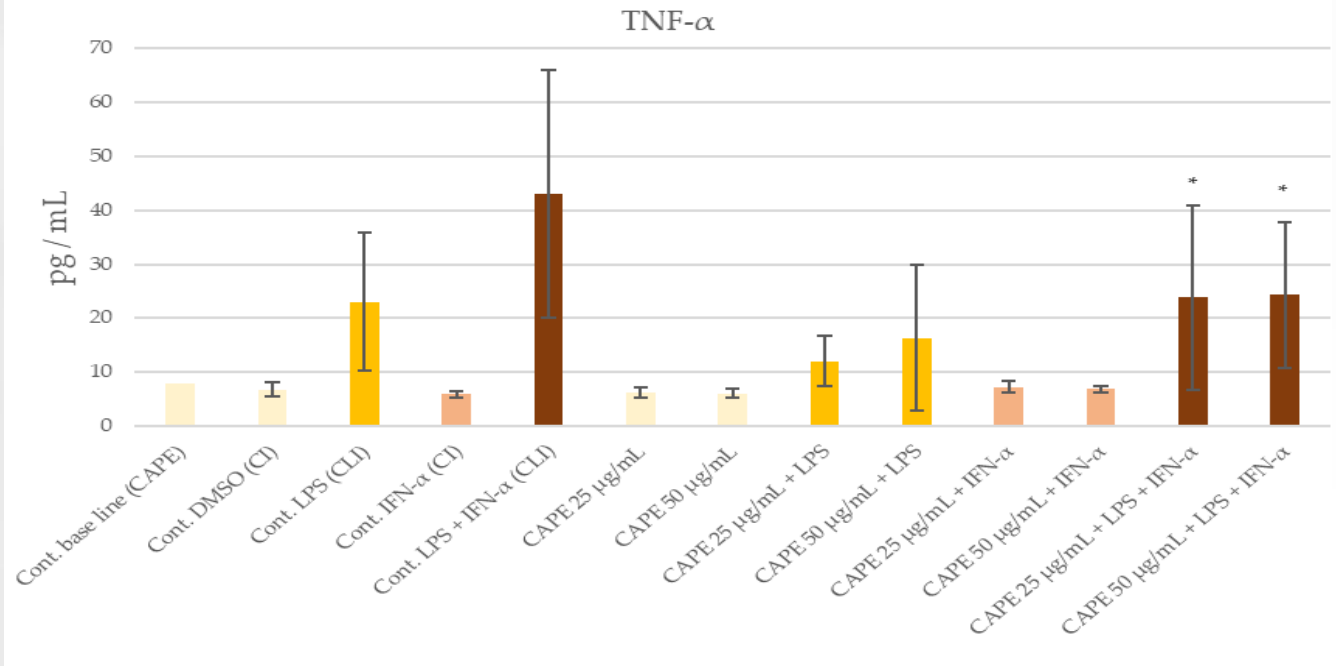
EEP 50µg/mL + LPS
EEP 25µg/mL + LPS + IFN-α
EEP 50 µg/mL + LPS +…


TNF-α
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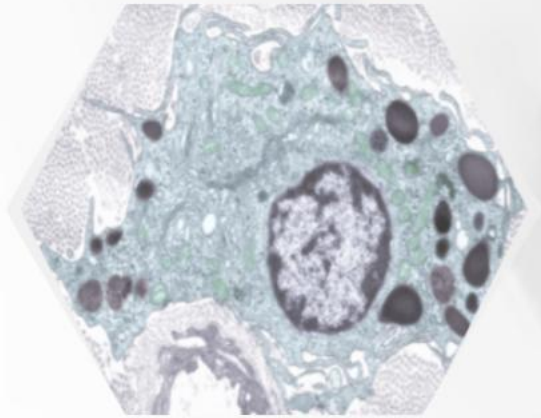
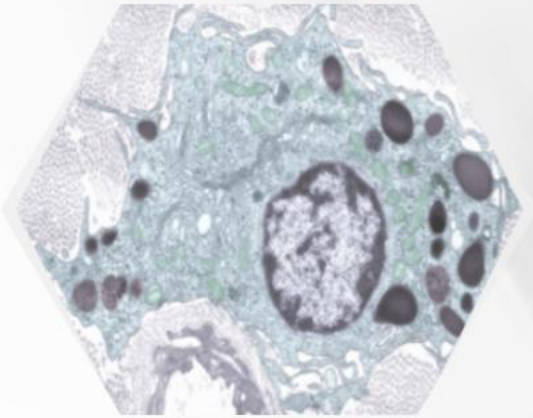
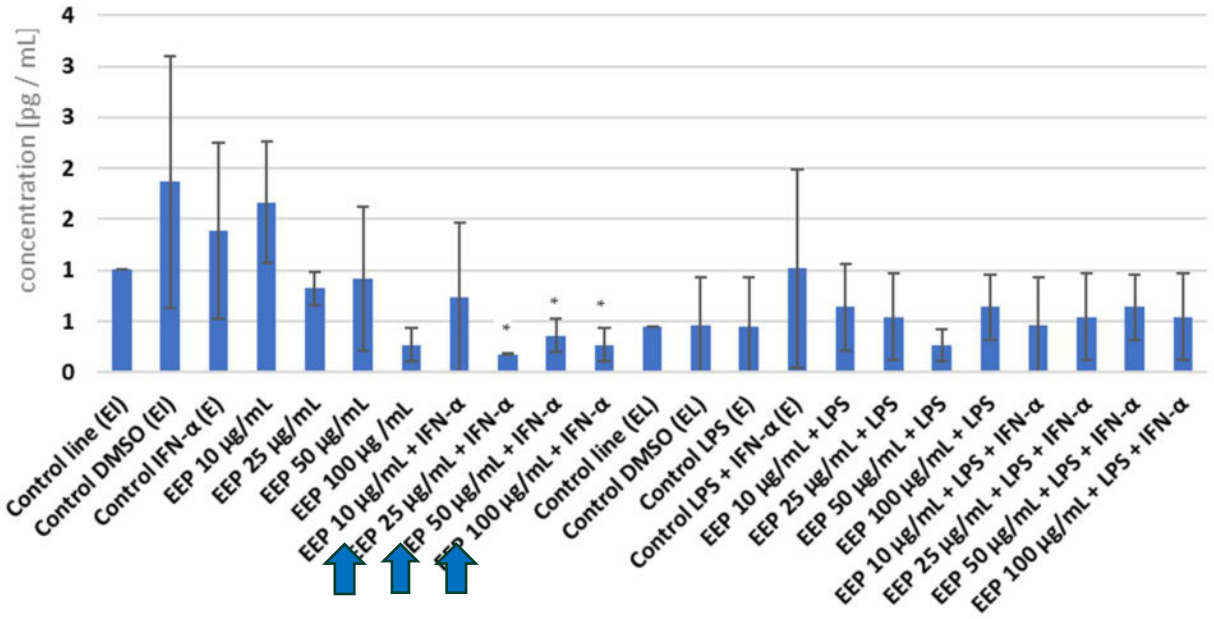
*
*
Cont. base line (CAPE)
Cont. DMSO (CI)
Cont. LPS (CLI)
Cont. IFN-α (CI)
Cont. LPS + IFN-α (CLI)
CAPE 25 µg/mL
CAPE 50 µg/mL
CAPE 25 µg/mL + LPS
CAPE 50 µg/mL + LPS
CAPE 25 µg/mL + IFN-α
CAPE 50 µg/mL + IFN-α
CAPE 25 µg/mL + LPS + IFN-α
CAPE 50 µg/mL + LPS + IFN-α



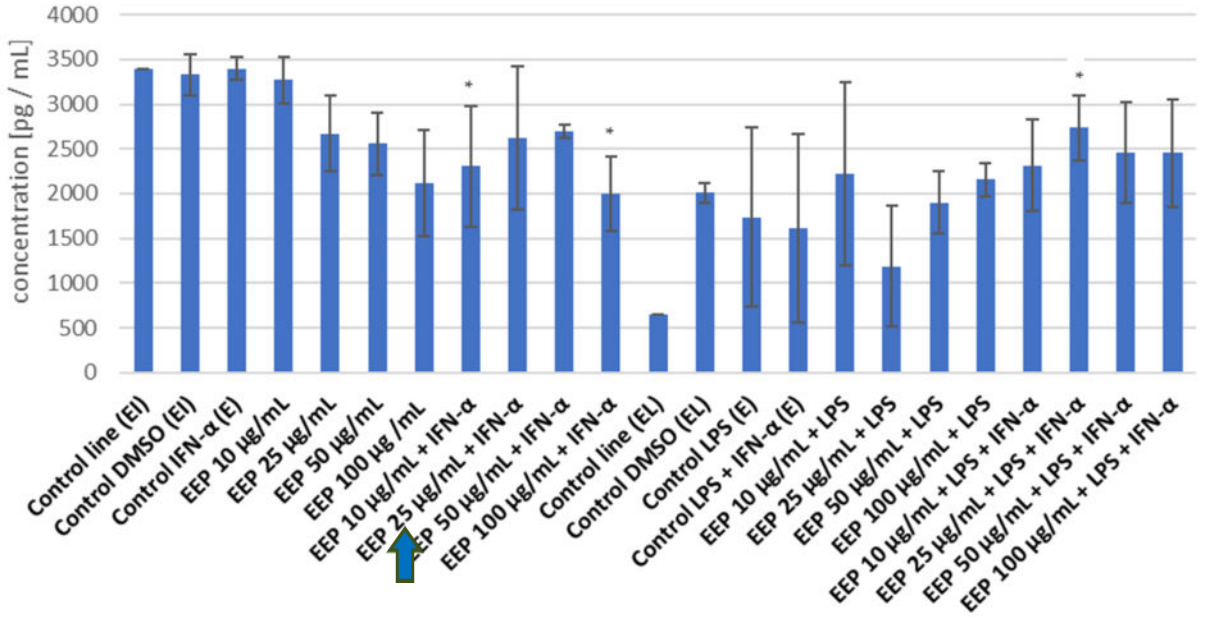
The immunomodulatory and cardioprotective effect of propolis



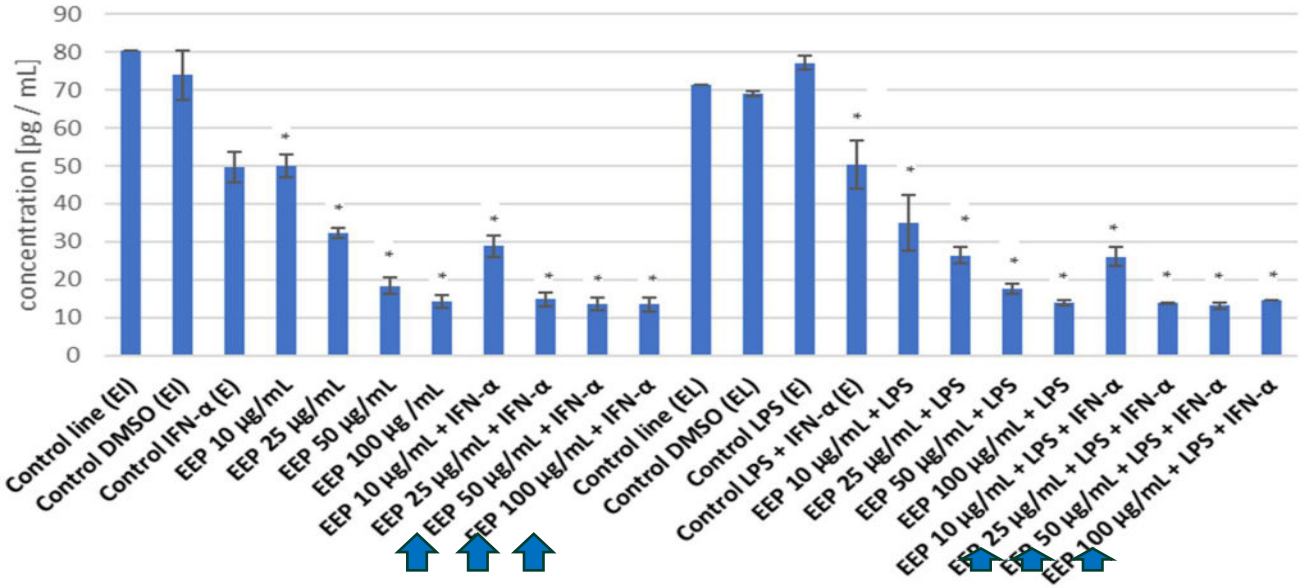
E-selectin

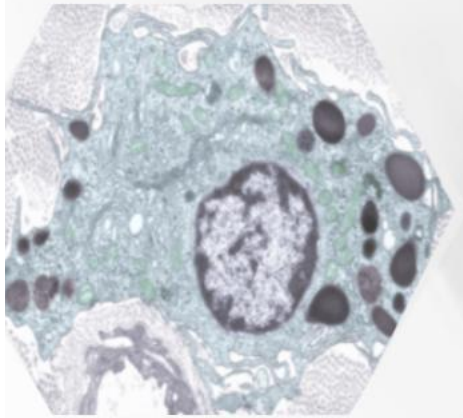


ICAM-1



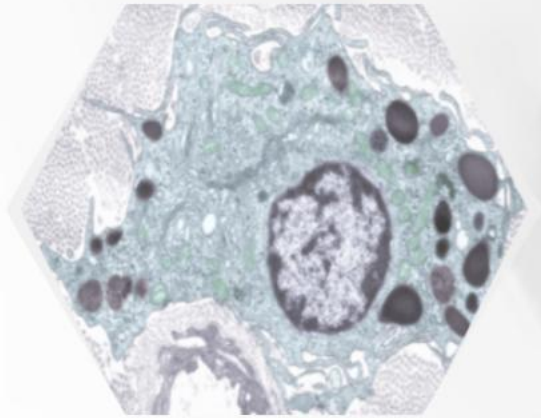
Endothelin





Conclusions

The practical implications of the studies conducted indicate a potentially beneficial cardioprotective effect of propolis through its effects on interleukin and adhesion molecule levels, which correlate with endothelial changes and the occurrence of ischaemic heart disease



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Ethanolic Extract of Propolis and CAPE as Cardioprotective Agents against LPS and IFN-α Stressed Cardiovascular Injury

by Anna Kurek-Górecka [1,*], Małgorzata Kłósek [2,*], Grażyna Pietsz [2], Radosław Balwierz [3], Paweł Olczyk [1] and Zenon P. Czuba [2]

[1] Department of Community Pharmacy, Faculty of Pharmaceutical Sciences in Sosnowiec, Medical University of Silesia in Katowice, Kasztanowa 3, 41-200 Sosnowiec, Poland

[2] Department of Microbiology and Immunology, Faculty of Medical Sciences in Zabrze, Medical University of Silesia in Katowice, Jordana 19, 41-808 Zabrze, Poland

[3] Institute of Chemistry, University of Opole, Oleska 48, 45-052 Opole, Poland

[*] Authors to whom correspondence should be addressed.

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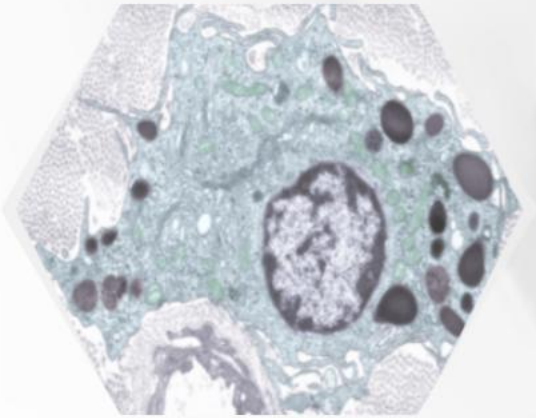
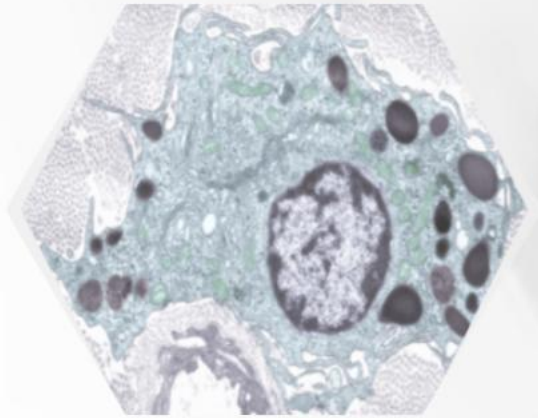


Allergenic potential of propolis

- Pinocembrin
- Chryzine
- Benzyl salicylate
- Benzyl cinnamate
- CAPE



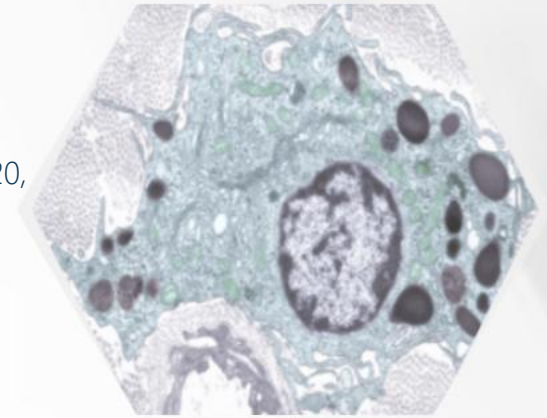
Choi et al. 2017 Chrysin attenuates atopic dermatitis by suppressing inflammation of keratinocytes. Food ChemToxicol, 2017; 110:142–50.

Gu et al. 2017 Pinocembrin attenuates allergic airway inflammation via inhibition of NF-κB pathway in mice. Int Immunopharmacol, 2017; 53:90–5.

Hanieh et al. 2017 Pinocembrin, a novel histidine decarboxylase inhibitor with anti-allergic potential in in vitro. Eur J Pharmacol, 2017;814:178–86.

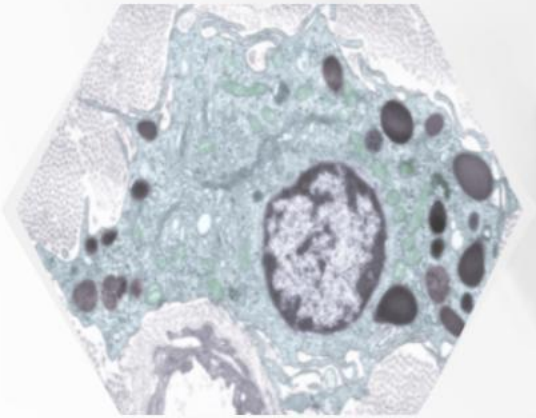
Safety of application

Both oral and topical use of propolis has been found to be generally safe, and propolis has been found to be non-toxic at doses of approximately 1.4 mg/kg per day or 70 mg per day

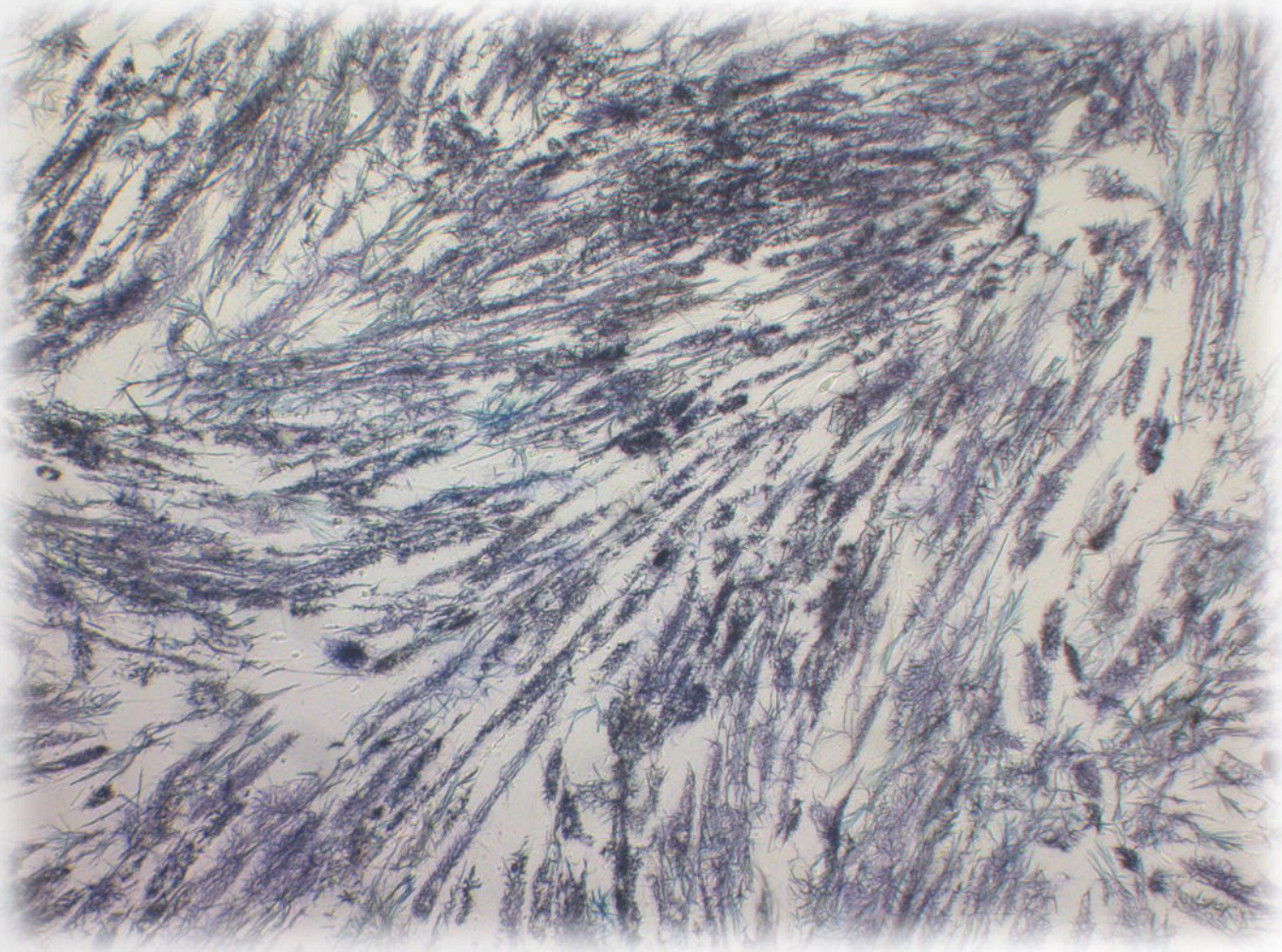


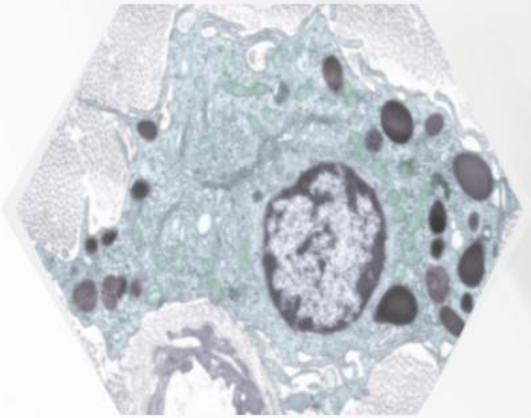
Mônica Valero da Silva, Nélio Gomes de Moura Jr, Andrea Barretto Motoyama, Vania Moraes Ferreira. A review of the potential therapeutic and cosmetic use of propolis in topical formulations. Journal of Applied Pharmaceutical Science 2020, 10(1), pp 131-141

Safety of use - effect onHGF-1



Test MTT – HGF-1





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Phenolic content, volatile compounds and antioxidant activity in pooled propolis samples from Turkey and Poland

Anna Kurek-Górecka[1] · Yakup Kara[2] · Katarzyna Pokajewicz[3] · Ibtissem Ben Hammouda[3] · Piotr P. Wieczorek[3] · Dominik Marciniak[4] · Radosław Balwierz[3] · Małgorzata Kłósek[1] · Zenon P. Czuba[1] · Sevgi Kolayli[2]

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Article

The Effect of Ethanolic Extract of Brazilian Green Propolis and Artepillin C on Cytokine Secretion by Stage IV Glioma Cells Under Hypoxic and Normoxic Conditions

Małgorzata Kłósek [1,*], Anna Kurek-Górecka [1], Radosław Balwierz [2], Grażyna Pietsz [1] and Zenon P. Czuba [1]

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Article

The Potential Anti-Cancer Effects of Polish Ethanolic Extract of Propolis and Quercetin on Glioma Cells Under Hypoxic Conditions

Małgorzata Kłósek [1,*], Anna Kurek-Górecka [1,*], Radosław Balwierz [2], Grażyna Pietsz [1] and Zenon P. Czuba [1]

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Article

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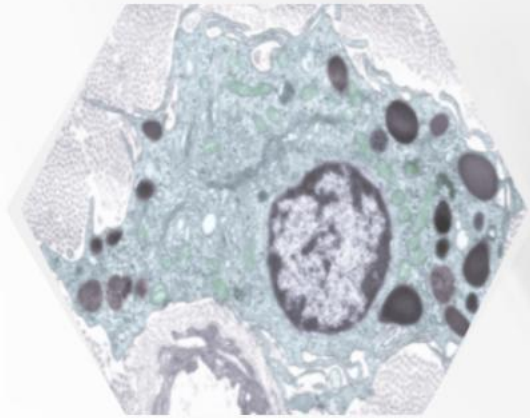
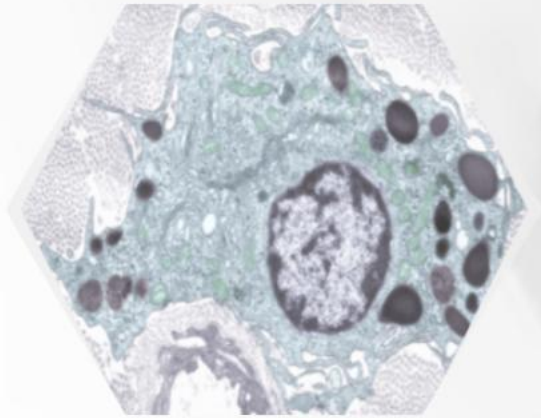
Anna Kurek-Górecka [1,*], Małgorzata Kłósek [1], Radosław Balwierz [2], Grażyna Pietsz [1] and Zenon P. Czuba [1]



Thank you for attention

Anna Kurek-Górecka

email: akurekgorecka@sum.edu.pl



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