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REVIEW ARTICLES

RESEARCH ARTICLES

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Molecular and Cellular Biomedical Sciences

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Article:

Sandra F, Esposti MD, Ndebele K, Gona P, Knight D, Rosenquist M, et al. Tumor Necrosis Factor-Related Apoptosis-Inducing Ligand Alters Mitochondrial Membrane Lipids. Cancer Res. 2005; 65(18): 8286-97.

Book

Murray PR, Rosenthal KS, Kobayashi GS, Pfaller MA. Medical microbiology. 4th ed. St. Louis: Mosby; 2002.

Chapter in a book:

Rosenberg GA. Matrix metalloproteinase and proteolytic opening of the blood-brain-barrier in neuroinflammation. In: deVries E, Prat A, editors. The Blood-brain Barrier and Its Microenvironment Basic Physiology To Neurological Disease. New York: Taylor and Francis Group; 2005. p.335-58.

Dissertation/Thesis/Essay:

Arlauckas SP. Near infrared fluorescent choline kinase alpha inhibitors for cancer imaging and therapy [Dissertation]. Philadelphia: University of Pennsylvania; 2015.

Part of Website/Monograph:

Medline Plus [Internet]. Bethesda: US National Library of Medicine; ©2009. Diabetic Kidney Problems [update 2015 Nov 2; cited 2015 Nov 16]. Available from: https://www.nlm.nih.gov/medlineplus/diabetickidneyproblems.html/.

Conference Paper:

Fledelius HS. Myopia and significant visual impairment: global aspects. In: Lin LLK, Shin YF, Hung PT, editors. Myopia Updates II: Proceedings of the 7th International Conference on Myopia 1998 Nov 17-20, Taipei. Tokyo: Springer; 2000. p.3-17.

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CONTENT

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Abstract

DDC 616.398

Febriza A, Ridwan, As'ad S, Kasim VN, Idrus HH (Department of Physiology, Faculty of Medicine, Universitas Muhammadiyah Makassar, Makassar, Indonesia)

Adiponectin and Its Role in Inflammatory Process of Obesity

Mol Cell Biomed Sci. 2019; 3(2): 60-6

Abstract (English)

Obesity is a chronic, low degree systemic inflammatory status. Microarray examination shows a disturbance in the expression of cytokine, chemokine, complementary protein and half of the other acute phase components in obese patients. Adiponectin is the hormone that increases insulin sensitivity, while its level decreases under condition of fatty tissue enlargement that occurs in obesity. Excessive weight causes the adipocyte cells and adipose tissues produce various types of mediators. The inflammatory process is the main cause of metabolic diseases, and the main role of adipose tissue in the inflammatory process is determined by the production of pro-inflammatory mediators and anti-inflammatory mediators. Adiponectin has an important anti-inflammatory effect on obesity. Adiponectin has an important anti-inflammatory effect on obesity. Adiponectin works on macrophage and monocyte to inhibit the production of pro-inflammatory cytokine and increase the expression of interleukin (IL)-10 and IL-1 receptor antagonists. Adiponectin reduces induction of intercellular adhesion molecule (ICAM)-1 and vascular cell adhesion molecule (VCAM)-1 endothelial adhesion by TNF-α or resistin. In obese patients, it is characterized by resistance to adiponectin alongside a decrease and the possibility of adiponectin loss in the receptor population in liver and muscles, leading to low adiponectin level.

Keywords: adiponectin, obesity, inflammation

DDC 613.286

Limanto A, Simamora A, Santoso AW, Timotius KH (Department of Biochemistry, Krida Wacana Christian University, Jakarta, Indonesia)

Antioxidant, a-Glucosidase Inhibitory Activity and Molecular Docking Study of Gallic Acid, Quercetin and Rutin: A Comparative Study

Mol Cell Biomed Sci. 2019; 3(2): 67-74

Abstract (English)

Background: Plant-phenolics and flavonoids, including gallic acid, quercetin and rutin, are considered as safe inhibitors for α-glucosidase. This study aimed to compare antioxidant and α-glucosidase inhibitory activities of gallic acid (GA), quercetin (QUE) and rutin (RUT).

Materials and Methods: Pure compounds of GA, QUE, and RUT were used. Their antioxidant and inhibitory activity on α-glucosidase were investigated spectroscopically, including their kinetic analysis and interaction mechanism by docking simulation.

Results: All the tested compounds (GA, QUE, and RUT) showed good antioxidant activity better than the standards ascorbic acid (AA) and butylated hydroxytoluene (BHT), with QUE showing the highest antioxidant activity based on 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity. Based on their reducing properties, the activities of the compounds follow the following order: AA > GA > BHT > QUE > RUT. Both GA and RUT induced a competitive type of inhibition, with activities stronger than acarbose (IC_{50} = 823 μg/mL), whereas QUE inhibited in a mixed type manner. The IC_{50} of GA, QUE, and RUT were 220.12, 65.52, and 224.55 μg/mL respectively. The results obtained from molecular docking indicate that all compounds have affinity in the active site pocket of α-glucosidase, with the hydrogen bond being the major force involved in each compound binding to the enzyme.

Conclusion: In conclusion, QUE has better antioxidant and α-glucosidase inhibitory activity than GA and RUT. This work provides insights into the interactions between GA, QUE, and RUT and α-glucosidase.

Keywords: docking, gallic acid, α-glucosidase, rutin, quercetin

DDC 573.76

Irianto KA, Pribadi A, Irsyam IA, Kloping YP, Sindrawati O (Dr. Soetomo General Hospital, Surabaya, Indonesia)

A Comparison of Osteoblast Cell Proliferation and Osteocalcin Expression in Cuttlefish Bone and Bovine Bone Xenograft

Mol Cell Biomed Sci. 2019; 3(2): 75-80

Abstract (English)

Background: Cuttlefish bone Xenograft, calcium phosphate (CaP)-based biomaterial graft, offers an alternative and has been accepted for osteoconductive and probable osteo-inductive attributes. This study aims to compare the bone healing potential between the bovine-derived (BHA) and cuttlefish bone-derived (CHA).

Materials and Methods: The study compared osteoblast cell proliferation of 27 New Zealand rabbits in 2.5 mm bone defect made in the femoral bone. The samples were divided into three groups, which were control, BHA and CHA group. The chemical and physical

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characteristics of BHA and CHA were determined for the content of hydroxyapatite by Fourier-Transform Infrared Spectroscopy (FTIR) and X-Ray Diffraction (XRD), then tested by Scanning Electron Microscopy (SEM) to evaluate the porosity. In the end of the second week, histopathologic and immunohistochemistry examinations were performed to evaluate the amount of osteoblast and osteocalcin expression.
Results: The FTIR, XRD and SEM analysis showed both BHA and CHA samples were hydroxyapatite according to Joint Committee on Powder Diffraction Standards (JCPDS). The CHA was significantly higher (297.22±19.772) compared to BHA (258.22±30.926) and control (131.67±34.213). Osteocalcin expression in CHA (7.82±2.230) compared to BHA (6.09±3.724) and control (4.07±3.606), was not significant (p>0.05).
Conclusion: CHA group has the highest osteoblast cell proliferation and osteocalcin expression, meaning has a good potential as future source of bone graft.
Keywords: cuttlefish bone, bovine, bone graft, osteoblast cell

DDC 616.462
Pramesthi ADED, Ardana M, Indriyanti N (Research and Development Farmaka Tropis Laboratory, Faculty of Pharmacy, Universitas Mulawarman, Samarinda, Indonesia)
Drug-Herb Interaction between Metformin and *Momordica charantia* in Diabetic Mice
Mol Cell Biomed Sci. 2019; 3(2): 81-7
Abstract (English)
Background: Bitter gourd has various metabolites, such as momordicosides, polypeptide-P, v-insulin, charantin, and vicine that have antidiabetic effect. It has synergistically effect while combined with oral diabetic drugs, such as metformin as glucose lowering agent. The aim of this study is to investigate the interaction of bitter gourd fruit juice and metformin as glucose lowering agent in mice.
Materials and Methods: Alloxan-induced diabetic mice were treated with bitter gourd fruit juice, metformin, and the combination of those two for 21 days. Glucose level was checked on first and last day of treatment.
Results: Furthermore, blood glucose levels measurement showed no significant difference between groups compared with negative control, which was p>0.05. The stomach of groups that treated with metformin and bitter gourd fruit juice histopathologically showed no significant differences.
Conclusion: The use of bitter gourd once daily together with metformin is a better choice, while twice daily might induce hypoglycemia and mice death. There is no interaction between them on lowering blood glucose.
Keywords: metformin, *Momordica charantia*, diabetes mellitus

DDC 616.99419
Purnomo A, Bintoro UY, Sedana MP, Ashariati A (Hematology Oncology Medic Sub-specialist Program, Department of Internal Medicine, Faculty of Medicine, Universitas Airlangga/Dr. Soetomo General Hospital, Surabaya, Indonesia)
Association between Hasford Scoring System and Hematologic Response in Chronic and Accelerated Phase of Chronic Myelocytic Leukemia Patient with Imatinib for Three Months
Mol Cell Biomed Sci. 2019; 3(2): 88-94
Abstract (English)
Background: Hasford score is a scoring system which was made in interferon treatment era to assess chronic myelocytic leukemia (CML) prognosis. Complete hematologic response (CHR) is the milestone of prognosis evaluation. CHR achievement will significantly increase survival. Imatinib is a revolutionized treatment that change the prognosis of CML. With the advent of Imatinib, lessened the prognostic impact of the Hasford score to predict prognosis.
Materials and Methods: An observational analytic with prospective cohort study conducted in oncology outward division Dr. Soetomo hospital Surabaya, from July until October 2018. Hasford score determined in 32 patients at the beginning of the study, given imatinib and followed up regularly for 3 months to know the hematologic response. Data were analyzed using Fisher exact test which was considered significant if p<0.05.
Results: Median age was 39 years old, male 37.5% and female 62.5%, the median spleen was 18 cm, median hemoglobin was 9.1 g/dL, median leukocyte was $180x10^9$/L, median thrombocyte was $645x10^9$/L, median eosinophil was 2.9%, median basophil was 4.6%, median myeloblast was 6%. Hasford score showed 3.1% in low risk, 25% in intermediate risk and 71.9% in high risk. As much as 78.1% complete hematologic response was found in patient, and 21.9% was incomplete.
Conclusion: There was no association between Hasford scoring system and hematologic response in chronic and accelerated phase of chronic myelocytic leukemia patient with imatinib for three month. Hasford score had no impact in hematologic response with imatinib.
Keywords: Hasford score, hematologic response, CML, imatinib

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DDC 571.978
Saragih CF, Rivany R, Sahil MF, Fadjrir, Ardiansyah E, Yaznil MR, Sarirah M (Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia)

The Difference of Bax Protein Expression between Endometrioma and Ovarian Carcinoma

Mol Cell Biomed Sci. 2019; 3(1): 95-9

Abstract (English)

Background: Endometriosis is a benign disease that has malignant properties such as genetic polymorphism, loss control of cell proliferation, infiltration, and local spread or to distant places. Several endometriosis studies linking endometrioma/ovarian endometriosis with an increased risk of ovarian malignancy give rise to a transformation phenomenon of endometriotic cysts into malignancy. Bax is a pro apoptotic protein whose expression decreases in a malignancy. This decrease is related to the poor prognosis of endometrioma and ovarian carcinoma. This study was aimed to identify the expression and the difference of Bax expression between endometrioma and ovarian carcinoma.

Materials and Methods: Fifty of paraffin blocks of endometrioma tissue and ovarian carcinoma (serous, mucinous, clear cell, and endometrioid type) were examined by immunohistochemical using Bondmax Full Automatic with specific monoclonal antibody to identify Bax expression. The difference of Bax expression score between endometrioma tissue and ovarian carcinoma was tested by Mann-Whitney test with significant value was set at $p<0.05$.

Results: This study found that mean Bax expression score in endometrioma tissue and ovarian carcinoma was 3.88 and 3.72. No difference of Bax expression between endometrioma tissue and ovarian carcinoma ($p>0.05$). No difference of Bax expression between the clinical stages and histopathological types of ovarian carcinoma ($p>0.05$).

Conclusion: There are no statistically significant difference in Bax protein expression in ovarian cancer and endometrioma.

Keywords: Bax expression, endometrioma, ovarian carcinoma, apoptotic resistance

DDC 613.286
Sugianto M, Achadiyani, Nugraha GI (Postgraduate Program of Antiaging and Aesthetics Medicine, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia)

Antioxidant Effects of Red Fruit Oil on MMP-1 Gene Expression and Malondialdehyde Levels on Skin Exposed to UVB Rays

Mol Cell Biomed Sci. 2019; 3(2): 100-6

Abstract (English)

Background: Chronic exposure ultraviolet (UV)-B radiation causes reactive oxygen species (ROS) formation. Furthermore, ROS will induce the formation of malondialdehyde and increase matrix metalloproteinase (MMP)-1 expression. One strategy against the free radicals effects is by consuming antioxidants. This study aims to analyze the antioxidants effect of red fruit oil (RFO) on MMP-1 expression and malondialdehyde levels due to exposure to UVB rays.

Materials and Methods: Thirty male Wistar rats were divided into 5 groups. The P0 group was not given treatment, the P1 group was only exposed to UVB light, the P2 group was exposed to UVB light and given 0.5 mL/200 g body weight (BW) of RFO, the P3 group was exposed to UVB light and given 1 mL/200 g BW of RFO, and group P4 exposed to UVB rays and given 2 mL/200 g BW of RFO. Experimental animals would be examined for MMP-1 expression and malondialdehyde level. RFO would be identified with β-carotene and tocopherol content.

Results: Beta-carotene and tocopherol were detected in RFO. RFO reduced significantly MMP-1 expression ($p<0.05$) in P2 group (0.73±1.27), P3 group (0.63±0.95), P4 group (9.56±20.97) compared group P1 (48.07±65.58). However, RFO did not reduce malondialdehyde levels ($p>0.05$).

Conclusion: Our research demonstrates RFO containing tocopherol and β-carotene can reduce the MMP-1 expression, but does not affect malondialdehyde levels due to exposure to UVB rays. An effective dose that can reduce malondialdehyde levels and MMP-1 expression is 1 mL/200 g BW.

Keywords: red fruit oil, antioxidant, skin, MMP-1 expression, malondialdehyde, UVB rays, photoaging

DDC 615.321
Sovia E, Anggraeny D (Pharmacology Laboratory, Faculty of Medicine, Universitas Jenderal Achmad Yani, Cimahi, Indonesia)

Sugar Palm Fruits (*Arenga pinnata*) as Potential Analgesics and Anti-Inflammatory Agent

Mol Cell Biomed Sci. 2019; 3(2): 107-14

Abstract (English)

Background: Sugar palm fruit (*Arenga pinnata*) is used for osteoarthritis empirically. It also has antioxidant activity and showed inhibition to lipoxygenase activity. The study about analgesic and anti-inflammatory activities of sugar palm fruit is still limited, this study was initiated to explore analgesic and anti-inflammatory effects of sugar palm fruit ethanol extract (SFEE).

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Materials and Methods: Acetic acid induced writhing was performed for screening analgesic activity, meanwhile anti-inflammatory activity was tested against rat paw edema. Acute toxicity and phytochemical screening were also investigated.
Results: The results of phytochemical screening revealed that flavonoids, alkaloids and quinones were present in SFEE. SFEE 50 and 100 mg/kg have analgesic effect and show the anti-oedematogenic effect against paw edema induced by carrageenan. SFEE could significantly decrease the neutrophils numbers as compared to the carrageenan-treated group. Neutrophil activation has been shown to contribute to tissue inflammation and damage.
Conclusion: SFEE have analgetic and anti-inflammatory activity.
Keywords: *Arenga pinnata*, analgesic, anti-inflammatory, acute toxicity

DDC 615.321
Sudiono J, Hardina M (Department of Oral Pathology, Faculty of Dentistry, Universitas Trisakti, Jakarta, Indonesia)
The Effect of *Myrmecodia pendans* Ethanol Extract on Inflamed Pulp: Study on Sprague Dawley Rats
Mol Cell Biomed Sci. 2019; 3(2): 115-21
Abstract (English)
Background: Inflammation is a body response caused by injury and infection. Pulpitis is a pulp tissue inflammation which is the continuous process of pulp hyperemia by bacteria invasion. *Myrmecodia pendans* or Sarang semut is known to contain flavonoid compound which has the anti inflammation effect. The purpose of this study is to investigate the effect of *Myrmecodia pendans* ethanol extract on the healing process of pulp inflammation.
Materials and Methods: This experimental study involved pre- and post-*in vivo* treatment of 27 Sprague Dawley rats in which the inducted pulpitis model was obtained by injecting 0.01 mL Porphyromonas gingivalis into the dental pulp for 48 hours. Subjects were divided randomly into Group I (negative control), Group II (pulpitis treated by *Myrmecodia pendans* extract ethanol as treatment group), and Group III (pulpitis treated by $Ca(OH)_2$ as positive control group). Group II and III as pulpitis treatment groups were divided into subgroups based on the induction periods of 48 hours (2 days), 168 hours (7 days), and 366 hours (14 days). All specimens were processed into the slides and evaluated microscopically for the healing process.
Results: The result of this study showed significant difference ($p<0.05$) among groups on day 2, 4 and 7. On day 4, the pulpitis treatment group of *Myrmecodia pendans* extract showed better healing process than $Ca(OH)_2$. On day 7, the pulpitis treatment group of $Ca(OH)_2$ showed better healing process than *Myrmecodia pendans* extract. On day 14, both of the pulpitis treatment groups showed normal pulp.
Conclusion: *Myrmecodia pendans* ethanol extract is effective for the healing process of inflamed pulp.
Keywords: inflamed pulp, *Myrmecodia pendans*, sarang semut, $Ca(OH)_2$, healing process

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Chemical Constituents of Snake Fruit (*Salacca zalacca* (Gaert.) Voss) Peel and *in silico* Anti-aging Analysis
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Background: Skin aging is a condition where skin is unable to retain both its physiological and structural integrity. Plants is the main source of phtytochemicals compound with wide range of biological activities. Through the efforts of ongoing scientific researches, an increasing number of plant extracts and phytochemicals have been showed promising result as anti-aging agent. Snake fruit (*Salacca zalacca* (Gaert.) Voss) is tropical plant belongs to the palm tree family (Arecaceae) that served as important crop in Indonesia. Despite its utilization, the phytochemical compound available in snake fruit, especially its peel have not been well documented. Present study aimed to elucidate the phytochemical constituent of snake fruit peel and its anti-aging potency.
Materials and Methods: Snake fruit peel extract (SPE) was subjected to qualitative phytochemical assay, high performance liquid chromatography, and molecular docking towards protein related in skin aging.
Results: The screening showed SPE contained phytochemical compound belong to flavonoid, tannin, phenol, triterpenoid, saponin and alkaloid. Thus, based on the analysis only chlorogenic acid was present in SPE whilst rutin and caffeic acid were not detected. The SPE was contained chlorogenic acid around 1.074 mg/g dry weight. Chlorogenic acid had the high binding affinity towards matrix metalloproteinase (MMP)-1 (-9.4 kcal/mol).
Conclusion: Current findings may provide scientific evidence for possible usage of SPE and its compounds as antioxidant and anti-aging agent.
Keywords: *Salacca zalacca*, phytochemical compound, high performance liquid chromatography, anti-aging

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