Molecular and Cellular Biomedical Sciences

Volume 4, Number 1, March 2020

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Print ISSN: 2527-4384
Online ISSN: 2527-3442

https://www.cellbiopharm.com/ojs/index.php/MCBS

Cell and Biopharmaceutical Institute

Volume 4, Number 1, March 2020 Print ISSN: 2527-4384, Online ISSN: 2527-3442

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Research Article: Research Article should consist of no more than 3,500 words, not including the words in abstract, references, table, figure, and figure legend. The manuscript should have no more than six figures and/or tables in total and no more than 40 references.

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Book

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

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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.

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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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Volume 4, Number 1, March 2020 Print ISSN: 2527-4384, Online ISSN: 2527-3442

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Volume 4, Number 1, 2020 Print ISSN: 2527-4384, Online ISSN: 2527-3442

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Abstract

DDC 616.4624
Kartika R, Wibowo H (Master Program in Biomedical Science, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia)
Impaired Function of Regulatory T Cells in Type 2 Diabetes Mellitus
Mol Cell Biomed Sci. 2020; 4(1): 1-9
Abstract (English)
Pathogenesis of type 2 Diabetes Mellitus (DM) is often associated with chronic low-grade inflammation. This kind of inflammation is characterized by an increased level of pro-inflammatory cytokines such as tumor necrosis factor α (TNF-α), interleukin (IL)-6 and IL-1β. From an immunological point of view, an inflammatory response is always followed by an anti-inflammatory response as negative feedback to avoid excessive tissue damages. Regulatory T cells are a subset of cluster of differentiation (CD)4^+ T cells that have the function to maintain peripheral tolerance and suppress immune response. This review would discuss the impaired function of regulatory T cells in type 2 DM. DM is a group of metabolic diseases characterized by hyperglycemia due to a defect of insulin secretion or a combination of insulin resistance and relative insulin deficiency. Chronic low-grade inflammation has been known as a key factor in the development of insulin resistance. Regulatory T cells (Treg cells) action through contact and non-contact inhibition could suppress inflammatory response in innate and adaptive immune systems. In type 2 DM, the proportion and function of $CD4^+CD25^+Foxp3^+$ and $CD4^+CD25^+$ regulatory T cell decreases due to the reduced number of Treg cells and the Treg cells depletion contributes to metabolic conditions such as insulin resistance. Moreover, Treg cells are more susceptible to apoptosis, the ability of Treg cells to produce anti-inflammatory cytokines such as transforming growth factor β (TGF-β) and IL-10 decreases, and there is an imbalance between the proportion of Th1/Th17 cells and Treg cells. This inadequate anti-inflammatory response gives rise to the chronic low-grade inflammatory condition in type 2 DM.
Keywords: type 2 diabetes mellitus, inflammation, regulatory T cell

DDC 571.96
Pratiwi RD, Agustiyanti DF, Dewi TIT, Herlina N, Dewi KS, Yuliawati, Aminah, Fuad AM (Research Center for Biotechnology, Indonesian Institute of Sciences, Bogor, Indonesia)
Bioassay of Recombinant Human Granulocyte Colony Stimulating Factor (rhG-CSF) for Neutropenia Treatment in Male Sprague Dawley Rats
Mol Cell Biomed Sci. 2020; 4(1): 10-8
Abstract (English)
Background: Recombinant human granulocyte colony stimulating factor (rhG-CSF) is a first line therapy for neutropenia. However, it is less affordable for most patients in developing and poor countries. Therefore, biosimilar products are developed to suppress the cost of treatment, namely with rhG-CSF. This study aimed to explore the establishment of an affordable rhG-CSF that has similar potential to induce neutrophils recovery as the positive control.
Materials and Methods: The rhG-CSF was expressed as inclusion body in Escherichia coli NiCo21(DE3). The inclusion body was then solubilized, refolded, purified and characterized prior to be used in the bioactivity assay. Cyclophosphamide-induced male Sprague Dawley rats were used as animal model and administered with rhG-CSF. Blood sample was collected at several points of time, before and after rhG-CSF treatments. Complete blood count and peripheral blood smear were conducted to investigate the activity of the rhG-CSF on each blood cells type, particularly neutrophil.
Results: Specific activity on neutrophil proliferation was shown after treatments with our rhG-CSF and positive control. Positive control dose 40 mg/kg BW was statistically similar with that of the rhG-CSF dose 80 and 120 mg/kg BW. However, in neutropenic condition, recovery of neutrophil counts could not be achieved within 4 days of treatments. Thus, a longer treatment is needed to observe the activity of the rhG-CSF as an antineutropenia agent.
Conclusion: The rhG-CSF has been proven having specific activity on neutrophil proliferation. However, improvement in the rhG-CSF preparation is still needed and longer administration of the rhG-CSF has to be applied in the future study.
Keywords: rhG-CSF, biosimilar, neutropenia, Sprague Dawley rats

DDC 572.5795
Bohari, Lestari FD, Rahmadi A (Department of Chemistry, Faculty of Natural Sciences and Mathematics, Universitas Mulawarman, Samarinda, Indonesia)
Body Weight, Cholesterol Changes and Sub-Chronic Toxicity of Mice Treated with An Emulsion Product Rich in β-Carotene
Mol Cell Biomed Sci. 2020; 4(1): 19-26

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Abstract (English)
Background: One of the conditions for releasing standardized herbal medicines is the presence of pre-clinical testing that can be conducted with mice. Emulsion products with the main composition of pumpkin, red palm oil, and dragon fruit have high levels of β-carotene. The purpose of this study was to observe changes in weight, cholesterol, and sub-chronic toxicity from mice treated with emulsion products.
Materials and Methods: Mice observed consisted of 6 groups: (1) untreated control (given standard ration); (2) negative control (given standard ration and 2.8% (v/b) egg yolk); (3) positive control (given standard ration and 0.4% (v/b) β-carotene); (4) standard ration, 0.4% (v/b) β-carotene and 2.8% (v/b) egg yolk; (5) given a standard ration and 2% (v/b) emulsion products; and (6) given a standard ration, 2% (v/b) emulsion products and 2.8% (v/b) egg yolk. Observations of sub-chronic toxicity were done by measuring creatinine levels, kidney weight, and visual observation of kidney swelling.
Results: The use of β-carotene-rich emulsions does not cause a decrease in the average weight of mice. In general, β-carotene and emulsion can overcome cholesterol increases on the 7th day, but not for the 15th day as a result of standard food intake. The increase in creatinine levels only occurs in mice treated with egg yolk control. The additional treatment of β-carotene and emulsion successfully prevents the increase in creatinine levels.
Conclusion: Emulsion products did not cause changes in weight, were able to reduce cholesterol levels in a limited manner and were not toxic to mice.
Keywords: cholesterol changes, sub-chronic toxicity, β-carotene, emulsion

DDC 615.321
Ginting CN, Lister INE, Girsang E, Riastawati D, Kusuma HSW, Widowati W (Faculty of Medicine, Universitas Prima Indonesia, Medan, Indonesia)
Antioxidant Activities of *Ficus elastica* Leaves Ethanol Extract and Its Compounds
Mol Cell Biomed Sci. 2020; 4(1): 27-33
Abstract (English)
Background: The excessive free radicals condition called oxidative stress can harmful for the body. To prevent and cure it, the antioxidant agents are required. Nowadays, the natural product extracted from plants have been widely used in folk medicine as antioxidant for the treatment of many diseases. *Ficus elastica* (rubber tree) has some compounds that has several biological activities, *i.e.*, quercitrin, myricitrin, morin, and eleutheroside B. The *F. elastica* works against the free radicals and can be potential as antioxidant agent. The purpose of this study was to evaluate antioxidant properties of *F. elastica* ethanolic extract (FEE), quercitrin, myricitrin, morin, and eleutheroside B.
Materials and Methods: The antioxidant activities of FEE and standard compounds were evaluated by free radical-scavenging activity of 2,2-diphenyl-1-picrylhydrazil (DPPH), hydrogen peroxide (H2O2), 2,2'-azinobis-(3-ethylbenzothiazoline- 6-sulfonic acid) (ABTS), and ferric reducing antioxidant power (FRAP) activities using spectrophotometry method.
Results: FEE has the lowest of DPPH scavenging activity (IC_{50}=13.82 µg/mL) than other compounds. In ABTS scavenging activity, FEE has moderate activity with IC_{50} value 23.29 µg/mL. In FRAP activity, FEE has moderate activity with value 241.58 µM Fe(II)/µg, while in H_2O_2 scavenging activity, FEE also show moderate activity with IC_{50}=83.97 µg/mL compared to other compounds.
Conclusion: In summary, FEE and the pure compounds (quercitrin, myricitrin, morin, and eleutheroside B) have potential as antioxidant agent.
Keywords: free radical, morin, myricitrin, quercitrin, rubber tree, scavenging activities

DDC 611.0187
Bunaya R, Romus I, Marindra F, Juananda D (Faculty of Medicine, Universitas Riau, Pekanbaru, Indonesia)
The Effect of Immobilization Stress on Gastric Mucosal Histopathology in White Mice (*Mus musculus*) Male Swiss Webster Strain
Mol Cell Biomed Sci. 2020; 4(1): 34-8
Abstract (English)
Background: Immobilization stress is one method of stress induction on experimental animals. It affects the psychology and physical of experimental animals and is the recommended method for assessing changes in histological structure damage. The purpose of research was to analyze the effect of immobilization stress on gastric mucosal in mice.
Materials and Methods: This research was experimental with post-test-only control group design. Twenty white mice (*Mus musculus*) male Swiss Webster strains were used in this study and divided into 4 groups: control, immobilization stress 14 days, immobilization stress 21 days, immobilization stress 28 days. Mice were given immobilization stress using 50 cc syringes for 2 hours every day for 14 days, 21 days and 28 days. Gastric mucosal damage in mice was analyzed under a microscope with of 10 fields of view in each sample. Data were analyzed using the Kruskal Wallis test and Mann Whitney test.
Results: Gastric mucosal damage score were 0 in control, 1.42±0.265 in 14 days, 1.82±0.265 in 21 days, and 2.54±0.05 in 28 days. There was significant difference between each group (p<0.05), while the greatest damage was found in the 28 days group.

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Conclusion: These result indicated that immobilization stress caused gastric mucosal damage and the degree of damage is in accordance with duration of stress.
Keywords: gastric mucosal, immobilization, stress

DDC 615.321
Callixte C, Baptiste NJ, Arwati H (Department of Immunology, School of Postgraduate, Universitas Airlangga, Surabaya, Indonesia)
Phytochemical Screening and Antimicrobial Activities of Methanolic and Aqueous Leaf Extracts of *Carica papaya* Grown in Rwanda
Mol Cell Biomed Sci. 2020; 4(1): 34-44
Abstract (English)
Background: Nowadays, microbial infections remain as the leading cause of infectious diseases and human death worldwide. The use of plant-derived medicines is currently increasing in the treatment of various diseases. Papaya leaves have proteolytic enzymes and phytoconstituents with antimicrobial properties. Rwandan citizens use papaya leaves to treat hair dandruff, wounds and burns.
Materials and Methods: Papaya leaves were collected and allowed to dry under the shed at room temperature for 14 days. The powdered plant materials were soaked separately in clean flask and extracted successively using maceration method with water and methanol. Qualitative phytochemical screening was conducted by using specific standard procedures. Antimicrobial activity assays of all the extracts were performed by agar well diffusion method and determined by measuring the zones of inhibition with transparent scale.
Results: Phytochemical screening revealed the presence of alkaloids, carbohydrates, tannins, flavonoids, steroids and phenolic compounds. In this observation, all the extracts exhibit significant inhibitory activity against all test pathogens ranging from 2 mm to 26 mm of diameter. Methanol extracts showed the maximum activity against Candida albicans (inhibition zone: 26±0.11 and activity index: 1.23). Minimum inhibition concentration values ranges between 3.175 mg/mL and 12.5 mg/mL.
Conclusion: The results indicate that *Carica papaya* leaves could be very potent source of antimicrobial agents and secondary metabolites that can be used by pharmaceutical industries to produce medicines.
Keywords: *Carica papaya*, antimicrobial, agar well diffusion, phytochemical screening, zone of inhibition, activity index

DDC 615.321
Pujimulyani D, Yulianto WA, Setyowati A, Rizal R, Qodariah RL, Khoiriyah Z, Arlisyah A, Widowati W (Faculty of Agroindustry, University of Mercu Buana Yogyakarta, DI Yogyakarta, Indonesia)
***Curcuma mangga* Val. Extract as Antidiabetic Agent in 3T3-L1 Adipocyte Cells**
Mol Cell Biomed Sci. 2020; 4(1): 45-51
Abstract (English)
Background: With the increase of diabetes mellitus (DM) prevalence, natural product emerged as complementary source on the development of new drug for this disease. White saffron (*Curcuma mangga* Val.) is a widely available plant found in Indonesia which often used traditionally as medicine for various ailment. Unfortunately scientific evidence of its antidiabetic activity has not been described very well. Present study was trying to evaluate the antidiabetic potential of white saffron based on the change of lipid accumulation.
Materials and Methods: Cells viability assay was done using 3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium (MTS) reagent to determine the safe concentrations of *C. mangga* Val. extract and its fractions including hexane, ethyl acetate, butanol, ethanol, water fractions and curcumol for the further assay. The preadipocyte cells (3T3-L1) were grown and differentiated into adipocyte cells using 3-isobutyl-1-methylxanthine (IBMX), dexamethasone and insulin. The adipocyte cells were treated with *C. mangga* Val. extract (CME) (the safest fraction at all concentrations) for 24 h. Oil red O staining was used to measure the lipid accumulation in adipocyte cells.
Results: The CME was not toxic and able to decrease the lipid droplets of the 3T3-L1 adipocyte cells.
Conclusion: The CME has potential antidiabetic activity due to ability to decrease the lipid droplet without disturbing the viability of the 3T3-L1 adipocyte cells.
Keywords: white saffron, *Curcuma mangga* Val., antidiabetic

Volume 4, Number 1, 2020 Print ISSN: 2527-4384, Online ISSN: 2527-3442

Molecular and Cellular Biomedical Sciences

Thank to Reviewers

We thank the following reviewers for their contributions in this number:

Adelina Simamora
Anna Meiliana
Budi Widodo
Dian Ratih Laksmitawati
Eka Herawati
Ferry Sandra
Kris Herawan Timotius
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Parawansah
Rina Triana
Susy Tjahjani
Valentina Ermita Herdani
Yahdiana Harahap
Yanni Dirgantara

Print ISSN: 2527-4384

Online ISSN: 2527-3442

Molecular and Cellular Biomedical Sciences

Volume 4, Number 1, March 2020

Information of this journal can be accessed at: https://CellBioPharm.com/ojs/index.php/MCBS