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

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Abstract

DDC 616.02774

Dini T, Nugraha Y, Revina R, Karina (Faculty of Medicine, Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia)

Safety and Efficacy of Mesenchymal Stem Cells in Burn Therapy: Systematic Review

Mol Cell Biomed Sci. 2022; 6(3): 104-16

Abstract (English)

The experimental research on the use of mesenchymal stem cells (MSCs) for burn therapy has been published several times. However, current clinical procedure remains a challenging discussion. This systematic review assesses the safety and efficacy of administering mesenchymal stem cells (MSCs) to burns and determines the most effective source of MSCs for burn therapy. We reviewed several studies through PubMed, Google Scholar, Science Direct, and DOAJ online databases. PRISMA-P 2020 method was used based on inclusion and exclusion criteria that were re-selected through Joanna Briggs Institute (JBI) Critical Appraisal Tools. Results from 13 articles showed that MSCs are safe for burn therapy with minimal side effects/complications and have the potential to repair tissue and accelerate burn healing through several mechanisms. The treatment of MSCs in burns is influenced by donor characteristics and related to the severity and area of the burn. It can be concluded that the administration of MSCs is safe and effective in burn therapy.

Keywords: burns, mesenchymal stem cells, therapeutic safety, therapeutic efficacy, wound healing

DDC 616.075

Abdihalim TS, Idris AAA (Faculty of Medical Laboratory Sciences, National University, Sudan)

Mucin Level as a Potential Biomarker for Breast Cancer Diagnosis

Mol Cell Biomed Sci. 2022; 6(3): 117-20

Abstract (English)

Background: Breast cancer is the second leading cause of cancer death and a health problem worldwide. Secreted mucins are upregulated in ductal adenocarcinoma of the breast, however, the use of mucin as breast cancer biomarker has not been established before. This study aimed to determine the use of mucin level as a potential biomarker for breast cancer diagnosis.

Materials and methods: This was a retrospective, cross-section study involving 40 women subjects with breast cancer. Mucin level was examined with a combination of Alcian blue/periodic acid Schiff (AB/PAS) technique applied to each specimen. The results obtained were statistically analyzed using SPSS.

Results: Results of neutral mucin detection showed that among breast cancer subjects, 16 cases (40%) were neutral mucin score (+), 23 cases (57.5%) were neutral mucin score (++), and 1 case (2.5%) was neutral mucin score (+++). Meanwhile, 10 cases (25%) were acid mucin negative, 17 cases (42.5%) were acid mucin score (+), 11 cases (27.5%) were acid mucin score (++), and 2 cases (5%) were acid mucin score (+++). The most frequent type of mucin was the combination of acid and neutral mucin (30 cases; 75%) and neutral mucin were 10 cases (25%).

Conclusion: Detection of mucin level can be used as an alternative technique for the diagnosis of breast cancer complementary to other types of special stains.

Keywords: AB, PAS, breast cancer, histological grade, mucin level

DDC 572.43

Siddiqui T, Zia MK, Muaz M, Ahsan H, Khan FH (Department of Biochemistry, Faculty of Life Sciences, Aligarh Muslim University, Aligarh, India)

Interaction of Silver Nanoparticles with Human Alpha-2-macroglobulin: Biochemical and Biophysical Investigation

Mol Cell Biomed Sci. 2022; 6(3): 121-8

Abstract (English)

Background: Silver nanoparticles (AgNPs) have a broad spectrum of applications in nanoscience and nanomedicine due to their flexible properties, such as antibacterial, antifungal, anti-inflammatory and anti-angiogenic. Present study investigated the interaction of chemically synthesized AgNPs with human major antiproteinase alpha-2-macroglobulin (α_2M).

Materials and methods: The first step of the study involved the synthesis and characterization of AgNPs using various biochemical and biophysical techniques, such as UV-visible spectroscopy, fluorescence quenching spectroscopy, synchronous fluorescence, and circular

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dichroism (CD). Different methods were used to explore the primary and secondary structural changes induced in α_2M by the binding of AgNPs.

Results: The UV-visible spectroscopy revealed hyperchromicity in the absorption spectra of α_2M . The presence of a static quenching mechanism was indicated by the temperature-dependent fluorescence spectroscopy. The synchronous fluorescence revealed a change in the microenvironment of the tryptophan residues in α_2M . The CD results showed the reduction in β -helical content of α_2M . The activity of α_2M decreased significantly with the increase of AgNPs concentration.

Conclusion: Our result suggests that AgNPs cause modifications in the structure and functional activity of α_2M . The interaction of nanoparticles with proteins is important for understanding their potential risks to human health.

Keywords: alpha-2-macroglobulin, antiproteinase, silver nanoparticles, fluorescence quenching, FTIR, TEM

DDC 615.321

Andari D, Khan FI, Jakfar SI (Department of Histology, Faculty of Medicine, University of Muhammadiyah Malang, Malang, Indonesia)

Methanol Extract of *Katuk (Sauropus androgynus)* Leaves as an Anti-inflammatory Agent: Animal Study in Carrageenan-induced Rat Models of Inflammation

Mol Cell Biomed Sci. 2022; 6(3): 129-34

Abstract (English)

Background: Inflammation is a response in the human body to survive during infection, injury and tissue damage. Acute inflammation causes edema and polymorphonuclear neutrophils (PMNs) release. *Sauropus androgynus* leaves which contain flavonoids, tannins, saponins, steroids and triterpenoids may have anti-inflammatory properties. These compounds can be extracted with methanol. This research aimed to determine the anti-inflammatory effect of *S. androgynus* leaves methanol extract (SALME) on carrageenan induced-rats.

Materials and methods: True experimental study was conducted using 12 Wistar rats. Rats were induced with carrageenan subcutaneously on the plantar pedis. Carrageenan-induced rats were treated with/without various doses of SALME. Edema volume was measured with a plethysmometer. The plantar pedis tissues were collected and stained with haematoxylin-eosin (HE) staining, then PMNs were observed and counted under a light microscope. All data were analyzed by one-way ANOVA, Bonferroni *post hoc* test, Pearson correlation and linear regression.

Results: SALME had significant effects on the volume of edema ($p=0.000$) and the number of PMNs ($p=0.000$). The most effective dose to reduce the edema volume and decrease the PMNs cell number was 37.80 mg/200 g body weight (BW). SALME doses may affect 91.0% of edema volume and 89.2% of PMNs cell number. Edema volume had a significant, robust correlation (92.3%) with PMNs cell number.

Conclusion: SALME is confirmed to have an anti-inflammatory activity by reducing the edema volume and decreasing the PMNs cell number.

Keywords: *Sauropus androgynus*, methanol extract, anti-inflammatory, carrageenan, plantar pedis, rats

DDC 615.321

Qurrotuaini SP, Wiqoyah N, Mustika A (Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia)

Antimicrobial Activity of Ethanol Extract of *Centella asiatica* Leaves on *Proteus mirabilis*, *Proteus vulgaris*, and *Yersinia enterocolitica* in vitro

Mol Cell Biomed Sci. 2022; 6(3): 135-40

Abstract (English)

Background: *Centella asiatica* leaves ethanol extract (CALEE) has higher concentration compared to other structures within the plant. The extract contains alkaloids, saponins and flavonoids, which play an active role as antioxidant and antibacterial. Current study aimed to determine the effect of CALEE on *Proteus mirabilis*, *Proteus vulgaris*, and *Yersinia enterocolitica*, Gram-negative bacteria that cause diarrhea.

Materials and methods: *Simplicia* of *C. asiatica* leaves was dissolved in 96% ethanol and macerated to get condensed extract, which then produced a concentration of 1 g/mL. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) were determined to assess the effectiveness of CALEE on *P. mirabilis*, *P. vulgaris*, and *Y. enterocolitica*. MIC was determined through serial dilution test with Mueller Hinton broth media. After incubation, the bacteria were streaked on nutrient agar or McConkey agar to determine the MBC.

Results: The MIC value of CALEE could not be determined since the color of CALEE was dark, hence the turbidity could not be compared. CALEE had the same MBC value (0.25 g/mL) in all bacteria species used in this study.

Conclusion: CALEE is effective against Gram-negative bacteria, such as *P. mirabilis*, *P. vulgaris*, and *Y. enterocolitica*. Further research

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is needed, especially *in vivo* experiments and evaluation of the cytotoxicity effect of CALEE.

Keywords: *Centella asiatica*, *Proteus mirabilis*, *Proteus vulgaris*, *Yersinia enterocolitica*, antibacterial

DDC 616.075

Ferdian H, Siregar R, Moelyo AG (Department of Child Health, Faculty of Medicine, Sebelas Maret University, Surakarta, Indonesia)

D-dimer as a Potential Biomarker of Severity in Children Confirmed with COVID-19

Mol Cell Biomed Sci. 2022; 6(3): 141-6

Abstract (English)

Background: Coronavirus disease 2019 (COVID-19) in children spreads easily and has a relatively high incidence. Severe complications in children confirmed with COVID-19 are thought to be related to the multisystem inflammatory syndrome, which is associated with coagulation disorders. D-dimer is a fibrin degradation end product which is easy to examine, affordable, fast and reliable. This study investigated the potency of D-dimer levels as a biomarker and assessed optimal cut-off value of D-dimer on severity of COVID-19 in children.

Materials and methods: An analytical observational study with a cross-sectional design was conducted in children aged 1-18 years confirmed to have mild, moderate or severe COVID-19 who were treated in the isolation room of Dr. Moewardi Hospital, Surakarta, Indonesia from September 2021 to February 2022. Statistical analysis was conducted using Mann-Whitney test and $p < 0.05$ was considered as statistically significant. The cut-off value of D-dimer was determined with the receiver operating characteristic (ROC) curve.

Results: There were 39 children with COVID-19. They were in mild ($n=14$; 35.9%), moderate ($n=19$; 48.7%) and severe ($n=6$; 15.4%) stages. There were significant differences in D-dimer levels between mild and moderate stages ($p=0.001$), and mild and severe stages ($p=0.001$). No significant difference in D-dimer levels between moderate and severe stages ($p=0.162$). The cut-off value of D-dimer was 485 $\mu\text{g/mL}$ with 92% sensitivity and 71.4% specificity.

Conclusion: D-dimer can be used as a potential biomarker of severity in children with COVID-19.

Keywords: D-dimer, COVID-19, severity, children

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***In silico* Study of Essential Oil of *Bambusa vulgaris* Leaves as an Anti Beta-lactamase Compound**

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Abstract (English)

Background: *Klebsiella pneumoniae* is known as an extended spectrum beta (β)-lactamases (ESBLs)-producing bacteria, which produces enzymes that cause resistance to β -lactam antibiotics by degrading β -lactam ring. A solution is needed to prevent the degradation of the β -lactam ring. In this *in silico* study, combining β -lactam antibiotics with secondary metabolites has the possibility to inhibit the active site of the β -lactamase enzyme. This study aimed to explore the potential of the essential oil of yellow bamboo (*Bambusa vulgaris*) leaves as inhibitors of β -lactamase.

Materials and methods: This research was conducted by simulating molecular docking to determine the interaction of ligands with proteins, pharmacological tests of compounds based on the Lipinski's rule of five, and ligand toxicity tests with pkCSM.

Results: The free bond energy values (ΔG) were in the range of -4.3 to -8.0 kcal/mol. The ligands with the best ΔG value were sulfur pentafluoride (-8.0 kcal/mol), squalene (-7.3 kcal/mol), 3-aminodibenzofuran (-7.1 kcal/mol), and 2-monolaurin (-5.5 kcal/mol). Secondary metabolites from the essential oil of *B. vulgaris* leaves fulfilled Lipinski's rule of five, so that oral use can be carried out except for squalene and tridecane.

Conclusion: Secondary metabolite compounds in the essential oil that have potential as oral drugs based on the Lipinski pharmacological test and the pkCSM toxicity test are dipivaloylmethane, β -ocimene, 2-monolaurin, and undecane.

Keywords: β -lactamase, *Bambusa vulgaris*, essential oil, *Klebsiella pneumoniae*

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