



ABSTRACT BOOK



6th Life Sciences Congress



6th Life Sciences Congress



The Role of Propolis and Perga Treatments on Cell Viability and Chemotherapeutic Response in Lung Cancer Cells

Merve BAŞAR^{1,5}, Sema ÇIKIN^{1,5}, Filiz Beyza EKİNCİ^{2,5}, Abdulrahman ALTURKİ^{2,5}, Sezin ÖZDEMİR^{1,5}, Eray ERGİN^{1,5}, İrem ERCAN^{2,5}, Armağan AKKUŞ^{4,5}, Müge Gülcihan ÖNAL^{3,5}

¹Gevher Nesibe Genome and Stem Cell Institute, Department of Molecular Biology and Genetics, Erciyes University, Kayseri, TÜRKİYE

²Institute of Health Sciences, Department of Medical Biology, Erciyes University, Kayseri, TÜRKİYE

³Faculty of Medicine, Department of Medical Biology, Erciyes University, Kayseri, TÜRKİYE

⁴Faculty of Medicine, Department of Biophysics, Erciyes University, Kayseri, TÜRKİYE

⁵Betül-Ziya Eren Genome and Stem Cell Center (GENKOK), Erciyes University, Kayseri, TÜRKİYE

E-mail: dytmservebasar@gmail.com

Lung cancer is one of the leading causes of cancer deaths worldwide, and its treatment is of significant importance. However, mutation-related side effects and drug resistance are important factors limiting treatment. Therefore, the importance of natural bioactive components on cancerous tissue fragments, which are frequently used in treatment processes, is gaining importance, and treatment with natural bioactive components that can enhance their processes and potentially reduce side effects is becoming crucial. Propolis and perga, which have been successfully marketed as bee products with antioxidant, anti-inflammatory and anticancer properties, are being tested to determine their effects on proliferation and viability in lung cancer. The effects of propolis and perga bee products on the viability of lung cancer cell lines A549 were determined using the MTT method, both individually and in combination, in different regions. Simultaneously, the combined effects of these bee products on A549 cell line viability were evaluated in conjunction with the chemotherapeutic drug etoposide. The findings showed that propolis and perga applications increased cell viability in lung cancer. Furthermore, when combined with etoposide, which is naturally harmful, the cytotoxic effect of etoposide was reduced, and cell viability was preserved and increased. These effects suggest that propolis and perga possess strong antioxidant and cytoprotective properties. In conclusion, this study reveals that natural products like propolis and perga may have the potential to increase cell viability and regulate chemotherapeutic agents in lung cancer. The study emphasizes the potential for further research into the use of these natural products in cancer treatment, including modifications and distribution of the natural product's application.

Keywords: Lung cancer, Propolis, Perga, Etoposide

References:

- 1)Caner A., Onal M. G., Silici S. MOLECULAR BIOLOGY REPORTS, cilt.48, sa.3, ss.2299-2306, 2021.
- 2)Demir S, Aliyazicioglu Y, Turan I, Misir S, Mentese A, et al. Nutr Cancer. 2016; 68(1): 165-72.

NEW TREATMENT APPROACHES IN LUNG CANCER

Sema ÇIKIN^{1,5}, Merve BAŞAR^{1,5}, Filiz Beyza EKİNCİ^{2,5}, Abdulrahman ALTURKİ^{2,5}, Sezin ÖZDEMİR^{1,5}, Eray ERGİN^{1,5}, İrem ERCAN^{2,5}, Armağan AKKUŞ^{4,5}, Müge Gülcihan ÖNAL^{3,5}

¹Gevher Nesibe Genome and Stem Cell Institute, Department of Molecular Biology and Genetics, Erciyes University, Kayseri, TÜRKİYE

²Institute of Health Sciences, Department of Medical Biology, Erciyes University, Kayseri, TÜRKİYE

³Faculty of Medicine, Department of Medical Biology, Erciyes University, Kayseri, TÜRKİYE

⁴Faculty of Medicine, Department of Biophysics, Erciyes University, Kayseri, TÜRKİYE

⁵Betül-Ziya Eren Genome and Stem Cell Center (GENKOK), Erciyes University, Kayseri, TÜRKİYE

E-mail: semanurcikin38@gmail.com

Cancer is a group of diseases characterized by uncontrolled proliferation and metastatic potential resulting from disruptions in cellular growth and death mechanisms. Lung cancer is one of the leading causes of cancer-related deaths, with non-small cell lung cancer (NSCLC) accounting for the majority of cases. KISS1 is identified as a metastasis suppressor gene in lung cancer, and low KISS1 expression is associated with increased invasion, metastatic potential, and poor prognosis. Ganoderma lucidum (G. lucidum), also known as Lingzhi or Reishi, is a medicinal mushroom reported to possess immunomodulatory, anti-inflammatory, and anticancer properties. However, the effects of administering G. lucidum in combination with chemotherapeutic agents on cancer cells are still unclear. In this study, the effect of G. lucidum on the KISS1 gene was evaluated in the A549 NSCLC cell line and the BEAS cell line, which consists of healthy lung cells. The effect of combining etoposide, a commonly used chemotherapeutic agent in NSCLC treatment, with G. lucidum on the KISS1 gene was evaluated. The changes observed in the Ct values of the KISS1 gene suggest that this proliferative response may be linked to metastasis-related molecular regulatory mechanisms. Analyses showed that the KISS1 gene was suppressed by the administered substance. This suppression of the gene leads to increased cell migration and metastatic capacity.

In conclusion, this study demonstrates that the use of G. lucidum in combination with etoposide in NSCLC cells, unlike the anticancer effects frequently reported in the literature, can modulate cancer cell proliferation and KISS1 gene expression. The findings emphasize the need for careful evaluation of combinations of natural products with chemotherapy and the importance of further studies to elucidate the underlying molecular mechanisms.

Keywords: Cancer; Ganoderma lucidum; KISS1, A549 and BEAS cell line

References:

1) Ferreira, I. C. F. R.; Heleno, S. A.; Reis, F. S.; et al. Phytochemistry 2015, 114, 38–55. Chemical Features of Ganoderma Polysaccharides with Antioxidant, Antitumor and Antimicrobial Activities.

2) Sauta, E.; Reggiani, F.; Torricelli, F.; et al. Cancers (Basel) 2021, 13, 1234.

CSNK1A1, KDM2A, and LTB4R2 Are New Druggable Vulnerabilities in Lung Cancer.

Effects of *Ganoderma lucidum* on INA Gene Expression and Cytoskeletal Structure in Lung Cancer Cells

Eray ERGİN^{1,5}, Merve BAŞAR^{1,5}, Filiz Beyza EKİNCİ^{2,5}, Abdulrahman ALTURKİ^{2,5}, İrem ERCAN^{2,5}, Sezin ÖZDEMİR^{1,5}, Sema ÇIKIN^{1,5}, Armağan AKKUŞ^{4,5}, Müge Gülcihan ÖNAL^{3,5}

¹Gevher Nesibe Genome and Stem Cell Institute, Department of Molecular Biology and Genetics, Erciyes University, Kayseri, TÜRKİYE

²Institute of Health Sciences, Department of Medical Biology, Erciyes University, Kayseri, TÜRKİYE

³Faculty of Medicine, Department of Medical Biology, Erciyes University, Kayseri, TÜRKİYE

⁴Faculty of Medicine, Department of Biophysics, Erciyes University, Kayseri, TÜRKİYE

⁵Betül-Ziya Eren Genome and Stem Cell Center (GENKOK), Erciyes University, Kayseri, TÜRKİYE

E-Mail : erayergin027@gmail.com

Lung cancer is a leading cause of global mortality, presenting clinical challenges like metastasis and drug resistance due to its heterogeneity. Conventional therapies are often limited by severe side effects, necessitating research into natural compounds with selective cytotoxicity. This study utilized A549 and BEAS-2B cell lines to represent alveolar cancer and normal bronchial epithelium, respectively. A key parameter examined was the INA gene, which encodes alpha-internexin; although typically neuronal, INA is ectopically expressed in lung tumors, contributing to cytoskeletal dynamics. *Ganoderma lucidum* extracts demonstrated selective cytotoxicity, triggering cell death in cancer cells without damaging healthy tissue. The extract physically inhibited metastatic potential by targeting the cytoskeleton, inducing actin polymerization, and disrupting INA-mediated networks. While *Ganoderma lucidum* alone suppressed INA expression in both cell lines relative to controls, its combination with chemotherapy (etoposide) resulted in increased INA expression compared to the extract monotherapy.

Keywords: Lung cancer, *Ganoderma lucidum*, INA gene

References:

Ganoderma triterpenoids attenuate tumour angiogenesis in lung cancer tumour-bearing nude mice (DOI:10.1080/13880209.2020.1839111)

Ganoderma lucidum extracts inhibit growth and induce actin polymerization in bladder cancer cells in vitro (DOI:10.1016/j.canlet.2004.06.022)

Investigation of the Effect of Bisphenol A (BPA) on Ferroptosis in Lung Cancer Cells

Abdulrahman ALTURKI^{1,5}, Merve BAŞAR^{2,5}, Sema ÇIKIN^{2,5}, Filiz Beyza EKİNCİ^{1,5}, Sezin ÖZDEMİR^{2,5}, İrem ERCAN^{1,5}, Eray ERGİN^{2,5}, Armağan AKKUŞ^{4,5}, Müge Gülcihan ÖNAL^{3,5}

¹Institute of Health Sciences, Department of Medical Biology, Erciyes University, Kayseri, TÜRKİYE

²Gevher Nesibe Genome and Stem Cell Institute, Department of Molecular Biology and Genetics, Erciyes University, Kayseri, TÜRKİYE

³Faculty of Medicine, Department of Medical Biology, Erciyes University, Kayseri, TÜRKİYE

⁴Faculty of Medicine, Department of Biophysics, Erciyes University, Kayseri, TÜRKİYE

⁵Betül-Ziya Eren Genome and Stem Cell Center (GENKOK), Erciyes University, Kayseri, TÜRKİYE

E-Mail: a.alturki.tr@gmail.com

Bisphenol A (BPA), which is widely used as a key component in the production of industrial polycarbonate plastics and epoxy resins, is a common environmental pollutant present in a broad range of products from food packaging to medical devices, and exposure may also occur via inhalation.^{1,2,3,4} Although the endocrine-disrupting properties of this compound have been extensively documented in the literature, its toxic effects on lung tissue and the underlying programmed cell death mechanisms remain a current topic of research.^{1,2,3} While BPA has been reported to induce cell death through apoptosis, necrosis, or autophagy, whether it can trigger cell death via ferroptosis remains unclear.³ In this study, the effects of Bisphenol A (BPA) exposure on ferroptosis, an iron-dependent form of regulated cell death, were investigated using the human lung adenocarcinoma cell line A549. Within the experimental design, A549 cells were treated with a fixed dose of BPA for 48 hours and harvested at the end of the incubation period. In the initial stage of the molecular analyses, total RNA was isolated from BPA-treated and control A549 cells. Following the assessment of RNA purity and concentration, cDNA synthesis was performed using reverse transcriptase for subsequent gene expression analyses. The primary focus of the study was the expression levels of the GPX4 (Glutathione Peroxidase 4) gene, a key enzyme that protects cells against lipid peroxidation during the ferroptosis process. Changes in GPX4 gene expression were quantitatively analyzed by real-time PCR (qPCR) using the synthesized cDNA samples. The results demonstrated that 48-hour BPA exposure led to a significant reduction of approximately 80% in GPX4 gene expression in A549 cells compared with the control group. This pronounced decrease in GPX4 levels indicates that BPA markedly weakens cellular antioxidant defense mechanisms, thereby rendering cells more susceptible to oxidative damage and ferroptosis.

References:

- 1) Czarny-Krzywińska, K.; Krawczyk, B.; Szczukocki, D. *Chemosphere* 2023, 315, 137763.
- 2) Ďurovcová, I.; Kyzek, S.; Fabová, J.; Makuková, J.; Gálová, E.; Ševčovičová, A. *Environ. Pollut.* 2022, 306, 119346.
- 3) Li, L.; Wang, M. Y.; Jiang, H. B.; Guo, C. R.; Zhu, X. D.; Yao, X. Q.; Zeng, W. W.; Zhao, Y.; Chi, L. K. *Asian J. Androl.* 2023, 25(3), 375-381.
- 4) Zhang, Y.; Guo, X.; Chen, D.; Xie, X. *Ecotoxicol. Environ. Saf.* 2025, 306, 119275.

Improving Raman Signal Sensitivity Using Silver Nanoparticle-Coated Substrates for Biological Analysis

Sezin ÖZDEMİR^{1,2}, Merve BAŞAR^{1,2}, Filiz Beyza EKİNCİ^{2,3}, Sema ÇIKIN^{1,2}, Abdulrahman ALTURKİ^{2,3}, İrem ERCAN^{2,3}, Eray ERGİN^{1,2}, İshak Afşin KARİPER⁴, Müge Gülcihan ÖNAL^{2,5}, Armağan AKKUŞ^{2,6}

¹Gevher Nesibe Genome and Stem Cell Institute, Department of Molecular Biology and Genetics, Erciyes University, Kayseri, Türkiye.

²Genom and Stem Cell Center (GENKOK), Erciyes University, Kayseri, Türkiye.

³Institute of Health Sciences, Department of Medical Biology, Erciyes University, Kayseri, Türkiye.

⁴Education Faculty, Erciyes University, Kayseri, Türkiye.

⁵Faculty of Medicine, Department of Medical Biology, Erciyes University, Kayseri, Türkiye.

⁶Faculty of Medicine, Department of Biophysics, Erciyes University, Kayseri, Türkiye.

E-Mail : sezinozdemir0@gmail.com

Raman spectroscopy is a powerful, label-free analytical technique that provides detailed molecular information from biological samples. However, its sensitivity is often limited due to the inherently weak Raman scattering signal. Nanostructured metallic surfaces, particularly those incorporating silver nanoparticles (AgNPs), interact strongly with incident light and can enhance spectroscopic signals through localized electromagnetic effects. In this study, we evaluated the potential of silver nanoparticle-coated glass substrates to improve Raman signal detection from biological specimens. Glass slides were coated with silver nanoparticles to create a nanostructured surface that could facilitate stronger light-matter interactions. As a biological test system, cultured cells were seeded onto both AgNP-coated substrates and uncoated control glass slides. Raman spectra were collected under identical acquisition parameters to assess differences in signal intensity and spectral quality.

Samples measured on AgNP-coated surfaces showed increased spectral intensity and sharper peaks than those on standard glass. Signal differences were particularly noticeable in spectral regions associated with major biomolecular components, including proteins, lipids, and nucleic acids. While the enhancement mechanism was not directly characterized in this study, the observed spectral amplification suggests that silver nanoparticle coatings may promote stronger electromagnetic interactions at the sample-substrate interface.

These findings suggest that silver nanoparticle-coated substrates have the potential to function as signal-enhancing interfaces for Raman spectroscopic analysis of biological samples. The use of such nanostructured surfaces may improve spectral sensitivity and signal clarity, thereby supporting the broader application of label-free vibrational spectroscopy in biological and biomedical studies.

Keywords: Raman spectroscopy, Silver nanoparticles, Nanostructured surfaces, Signal enhancement

References:

1) Jones, R.R., Hooper, D.C., Zhang, L. et al. Raman Techniques: Fundamentals and Frontiers. *Nanoscale Res Lett* 14, 231 (2019). <https://doi.org/10.1186/s11671-019-3039-2>

2) Butler HJ, Ashton L, Bird B et al (2016) Using Raman spectroscopy to characterize biological materials. *Nat Protoc* 11:664–687 <https://doi.org/10.1038/nprot.2016.036>

Gold Nanoparticle-Coated Surfaces as Advanced Interfaces for Enhanced Raman Detection of Biological Samples

Filiz Beyza EKİNCİ^{1,2}, Merve BAŞAR^{2,3}, Sezin ÖZDEMİR^{2,3}, Sema ÇIKIN^{2,3}, Abdulrahman ALTURKİ^{1,2}, İrem ERCAN^{1,2}, Eray ERGİN^{2,3}, İshak Afşin KARİPER⁴, Armağan AKKUŞ^{2,5}, Müge Gülcihan ÖNAL^{2,6}

¹Institute of Health Sciences, Department of Medical Biology, Erciyes University, Kayseri, Türkiye.

² Genom and Stem Cell Center (GENKOK), Erciyes University, Kayseri, Türkiye.

³ Gevher Nesibe Genome and Stem Cell Institute, Department of Molecular Biology and Genetics, Erciyes University, Kayseri, Türkiye.

⁴Education Faculty, Erciyes University, Kayseri, Türkiye.

⁵ Faculty of Medicine, Department of Biophysics, Erciyes University, Kayseri, Türkiye.

⁶ Faculty of Medicine, Department of Medical Biology, Erciyes University, Kayseri, Türkiye.

E-Mail :beyzaeknc40@gmail.com

Raman spectroscopy is a label-free analytical technique capable of revealing detailed molecular information from biological samples, yet its practical sensitivity is often limited by inherently weak scattering signals. Nanostructured metallic surfaces, particularly those incorporating noble metal nanoparticles, are known to influence light-matter interactions and may improve spectral detection. In this study, we investigated the use of gold nanoparticle (AuNP)-coated glass substrates as potential signal-enhancing platforms for Raman spectroscopic analysis of biological materials. Glass slides were coated with gold nanoparticles to produce a nanostructured metallic interface designed to promote stronger optical interactions at the sample surface. As a biological test system, cultured cells were seeded onto AuNP-coated substrates and uncoated glass controls. Raman spectra were acquired under identical experimental conditions to evaluate differences in signal intensity, spectral clarity, and peak definition.

Samples measured on AuNP-coated surfaces exhibited noticeable variations in spectral intensity and improved definition of characteristic Raman bands compared to measurements on standard glass. Differences were observed in regions associated with major biomolecular constituents such as proteins, lipids, and nucleic acids. While the precise enhancement mechanism was not directly characterized, the presence of gold nanoparticles appears to influence spectral signal behavior, potentially through nanoscale electromagnetic interactions at the cell-substrate interface. Overall, these findings suggest that gold nanoparticle-coated substrates may contribute to improved Raman signal detection from biological samples. The stability and biocompatibility of gold-based nanostructured surfaces further support their potential use in developing sensitive, label-free spectroscopic platforms for biological and biomedical applications.

Keywords: Raman spectroscopy, Gold nanoparticles, Nanostructured surfaces, Signal enhancement

References:

- 1) Jones, R.R., Hooper, D.C., Zhang, L. et al. Raman Techniques: Fundamentals and Frontiers. *Nanoscale Res Lett* 14, 231 (2019). <https://doi.org/10.1186/s11671-019-3039-2>
- 2) Butler HJ, Ashton L, Bird B et al (2016) Using Raman spectroscopy to characterize biological materials. *Nat Protoc* 11:664–687 <https://doi.org/10.1038/nprot.2016.036>