4th NPCPT

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Abstract Book

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4th International Conference on Natural Products for Cancer Prevention and Therapy
18–19 December 2021 KAYSERİ (ONLINE)
SCIENTIFIC PROGRAM

Saturday, December 18, 2021	
Session A	Chair: Prof. Dr. M. Betül Yerer Aycan
10:00-10:25	KY 1: Dr. Burçak Deniz Dedeoğlu Quality Standards of Herbal Supplements
10:25-10:40	OP 1: Dr. Stefania Moccia Anti-proliferative effect of phenolic compounds from *Castanea sativa* byproducts in malignant cell lines through the activation of autophagy
10:40-10:55	OP 2: Dr. Carmela Spagnuolo Aliophen®, a Formulation Based on Malts and Hops, with Antioxidant and Chemopreventive Properties
10:55-11:10	Break
11:10-11:50	PL 1: Dr. Ralph Ruehl A new vitamin, vitamin A5, for your immune system, mental health and cancer prevention / treatment options
11:50-12:30	PL 2: Asist. Prof. Hardeep Tuli Flavonoids Target in Cellular Processes of Cancer: Recent Trends and Advancement
12:30-13:05	Break
Session B	Chair: Assoc. Prof. Dr. Perihan Gürbüz
13:05-13:30	KY 2: Prof. Dr. M. Betül Yerer Aycan Nanoformulations of Natural Products
13:30-14:10	PL 3: Prof. Dr. Semra Demokan Anti-Cancer Drug Studies: Natural Compounds as Epigenetic Modulators
14:10-14:25	Break
14:25-15:05	PL 4: Prof. Dr. Amr Amin Saffron May Hold Keys for Novel Anticancer Drugs
15:05-15:20	OP 3: Dr. Claudio Ferrante Phytochemical profile and antiproliferative effects of *Epilobium hirsutum* extracts
15.20-16:00	PL 5: Prof. Dr. Bülent Özpolat Development of Novel targeted therapies in cancer
16:00-16:15	Break

Session C	Chair: Prof. Dr. Bülent Özpolat
16:15-16:55	PL 6: Prof. Dr. Ömer Küçük Integrative Oncology in Prostate Cancer Treatment
16:55-17:35	PL 7: Assoc. Prof. Jeremy Johnson Anti-cancer activity and pharmacokinetic properties of natural products
17:35-17:50	Break
Session D	Chair: Prof. Dr. Çiğdem Karakükcü
17:50-18:30	PL 8: Prof. Dr. Sanjay K. Srivastava Melanoma Therapy: Challenges and Options
18:30-18:45	OP 4: Dr. Cansu Ümran Tunç Gold Nanoparticle Based Combinational Gene and Chemotherapy
18:45-19:00	OP 5: Mehmet Emin Arayıcı Soluble and Insoluble Dietary Fibre and Colorectal Cancer Risk: A Meta-Analysis
19:00-19:15	OP 6: Merve Şensöz Turgut Use of the Montmorillonite as a Drug Delivery System in Cancer Therapy
19:15-19:30	OP 7: Yeliz Kaya Kartal Total phenolic content of methanolic extract of *L. officinalis*

Sunday, December 19, 2021	
Session E	**Chair: Assoc. Prof. Dr. Gökçe Şeker Karatoprak**
10:00-10:25	**KY 3: Assoc. Prof. Dr. Perihan Gürbüz** **Recent progress on some of the noteworthy plant derived sesquiterpene lactones in cancer research**
10:25-10:40	**OP 8: Dr. Faruk Saydam** **Anticancer properties of a new herbal combination as a potential lung cancer treatment candidate**
10:40-10:55	**OP 9: Hatice Şeyma Telkırat** **Investigation of the cytotoxic potential of *Crocus chrysanthus* (Herb.) Herb.**
10:55-11:10	**OP 10: Kevser Taban Akça** **Cytotoxic Activity Investigation of *Opopanax hispidus* (Friv.) Griseb.**
11:10-11:20	**Break**
11:20-12:00	**PL 9: Dr. Gian Luigi Russo** **Phytochemicals in cancer: towards a unified view of their mechanisms of action**
12:00-12:15	**OP 11: Nada Walweel** **The Effect of LC3 siRNA and Doxorubicin Dual treatment against Breast Cancer**
12:15-12:30	**OP 12: Çağla Kayabaşı** **Resveratrol targets leukemia stem cells without damaging hematopoietic stem cells**
12:30-13:30	**Break**
Session F:	**Chair: Dr. Gian Luigi Russo**
13:30-14:10	**PL 10: Assoc. Prof. Dr. Gautam Sethi** **Pharmacological modulation of transcription factor STAT3 for cancer therapy**
14:10-14:25	**OP 13: Dr. Efe Kurtdede** **Evaluation of the Combined Effects of Turkish Mad Honey and 5-Fluorouracil in Colon Cancer Model in Rats**
14:25-14:40	**OP 14: Dilek Kanarya** **Dual Therapy of Bcl-2 Gene and Cisplatin Drug to Overcome Multidrug Resistance of Ovarian Cancer**
14:40-15:20	**PL 11: Prof. Dr. Randolph Arroo** **Pharmacological potential of polymethoxy flavones from *Artemisia annua***
15:20-15:35	**Break**
Session G:	**Chair: Prof. Dr. Randolph Arroo**

15:35-16:00	**KY 4: Assist. Prof. Dr. Imge Kunter** **Chemical and biological activities of Cyprus endemic *Phlomis* and *Teucrium* species**
16:00-16:15	**OP 15: Ummugulsum Yılmaz** **Dopamine conjugated Polymer Nanoparticles for Active Targeting**
16:15-16:55	**PL 12: Prof. Dr. Anupam Bishayee** **Natural Products in Anticancer Drug Development: Advances and Opportunities**
16:55-17:10	**Break**
Session H:	**Chair: Prof. Dr. Anupam Bishayee**
17:10-17:50	**PL 13: Prof. Dr. Choi Seung-hoon** **East Asian Medicine, cancer and covid-19**
17:50-18:05	**OP 16: Dr. Ramazan Ceylan** **Antioxidant potentials of three *Sideritis* species and its main compounds α-pinene and β-pinene**
18:05-18:20	**OP 17: Dr. Hatice Bekçi** **Cytotoxic activity of *Momordica charantia* on A549 cell line**

PL 1

A new vitamin, vitamin A5, for your immune system, mental health and cancer prevention / treatment options

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Abstract: Recently vitamin A5 was identified as a new independent vitamin possessing structural similarities to vitamin A(1), but a distinct mechanism of activity associated with specific retinoid X-receptor (RXR)-activation precursor potential. In this lecture we show a summary of identification, activity determination and nutritional background regarding human relevance and occurrence in food. Its new activity seems of selective importance for RXR-signalling specific physiological signalling involved in the central and peripheral nervous system, the immune response as well as for cancer prevalence and prevention. We hope that the identification of this new vitamin is of global importance and opens novel application options for nutritional prevention as well as for pharmaceutical treatment of various cancer-subtypes comparable to synthetic RXR-ligands, which are currently used or in development

Keywords: Cancer; Vitamin A5; Immune system

PL 2

Flavonoids target in cellular processes of cancer: recent trends and advancement

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Abstract: Besides the availability of a variety of bioactive natural and synthetic molecules, the effective cancer therapy still needs to be developed. However, in the last few decades, the scientific community has discovered the immense potential of flavonoids in the management of dreadful diseases such as cancer. More so in order to design effective cancer treatment strategy, it is essential to understand the interactions of such metabolites with the recognized cellular target. Flavonoids have been known to mediate both intrinsic (mitochondrial) as well as extrinsic (Fas/FasL) apoptotic cell death in cancer cells. Previous studies have suggested the role of flavonoids to arrest cell cycle by regulating the expression of cyclin-dependent kinases (CDKs). In addition, the expression of metastatic proteins including matrix metalloproteinases (MMPs) has also been down-regulated by flavonoids. Metastasis is further supported by angiogenesis and flavonoids are well documented to inhibit neovascularization in the microenvironment of the tumor. Furthermore, the anti-tumor aspect of flavonoids can be correlated with their inhibitory effects on inflammatory mediators (IL-6, IL-8, IFN-γ, iNOS, COX-2, and TNF-α). Therefore, exploring the mechanistic insight of flavonoids (mitogen-activated protein kinase, phosphoinositide 3-kinase, serine/threonine protein kinase B (also known as Akt), mammalian target of rapamycin, nuclear factor-κB, matrix metalloproteinase (MMP)-2, MMP-9 and caspase-3, caspase-8, and caspase-9) will help us to understand the biology of cancer and to investigate novel anti-cancer strategies in the near future.

Keywords: Flavonoids; cancer; apoptosis; metastasis; angiogenesis; inflammation

PL 3

Anti-Cancer Drug Studies: Natural Compounds as Epigenetic Modulators

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Abstract: Cancer is a complex multifactorial and systemic disease in which genetic and epigenetic changes are observed together. Epigenetic mechanisms (methylation, histone modifications, RNA interference) play a role in the development and prognosis of cancer. With the chemical modifications observed in the histones, the promoter regions of genes and non-coding RNAs become ideal potential targets for anticancer drug strategies due to both of their contribution to carcinogenesis and their reversible nature as epigenetic modulators. Various natural product-based molecules have been produced for therapeutic purposes to ensure the normal activation of enzymes that play a role in epigenetic mechanisms in cancer. The natural products are mainly found in plants, bacteria, fungi and marine-derived compounds. These products act as powerful antioxidants and anti-carcinogens. It is known that natural products such as sulfophane, apigenin, resveratrol, genistein, curcumin, quercetin, epigallocatechingallate, luteolin, berberine, diallyl disulfide, grifolin, romidepsin and Trichostatin-A have direct and indirect effects in the treatment of cancer. Apart from epigenetic mechanisms, natural products also have an effect on cell cycle, DNA repair and modulation of gene expression. Many studies are still needed to investigate the effects of combinations of anti-neoplastic agents and natural products in the treatment of cancer.

Keywords: epigenetics 1; natural products 2; cancer therapy 3; anti-cancer drug studies 4

PL 4

Saffron may hold keys for novel anticancer drugs

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Abstract: Hepatocellular Carcinoma (HCC) is one of the most common cancers in the world. There are many risk factors for HCC including, viral infections, genetic disorders, alcohol consumption and smoking. Sorafenib, an oral multi-kinase inhibitor that acts by blocking cell surface kinase receptors, is the most commonly used and FDA approved anti-HCC drug. Sorafenib has exhibited its anti-cancer properties in different cell lines and is now being used for different types of cancers. Saffron has long been used as spice and food coloring agent, but it also has anti-depressant, anti-convulsant and anti-inflammatory properties. It has long been used as a medicine and studies have also shown its anti-cancer properties. Among its constituents are safranal which is a volatile oil present in the stigma of the flower and crocin that contributes its unique color. Previous studies have shown that both those biomolecules have anti-cancer properties against different types of cancer like Neuroblastoma. In this talk, I will share with you most recent anticancer effects of safranal and crocin individually and in combination with sorafenib both in vitro and in vivo.

Keywords: Saffron; Liver Cancer; Crocin; Safranal

PL 5

Development of Novel targeted Therapies in cancer

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Abstract: Cancer is one of the top two causes of deaths in the US and the world. Cancer therapy includes standard therapies such as surgery, chemotherapy and targeted therapies, by antibody and small molecule inhibitors, and immunotherapy (i.e., check point inhibitors). More recently RNA-based targeted therapeutics were approved by FDA. Although there are about more than 100 targeted therapies, due to significant heterogeneity in patient tumors even in the same subtype of cancers, only faction of patient can benefit from targeted therapies. After several decades of research our studies have focused on a kinase, Elongation Factor-2 kinase (EF2K) that we identified as a major oncogenic driver and molecular target and validated it as a therapeutic target in triple negative breast cancer. The talk will focus of development of novel targeted therapies in KRAS mutated cancers as well using noncoding RNAs (and small molecule-based targeted therapies for EF2K for triple negative breast cancer.

Keywords: Cancer; Elongation Factor-2 kinase (EF2K); targeted therapies

PL 6

Integrative Oncology in Prostate Cancer Treatment

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Abstract: Integrative oncology is a patient-centered, evidence-informed field of cancer care that utilizes mind and body practices, natural products, and/or lifestyle modifications from different traditions alongside conventional cancer treatments. Integrative oncology aims to optimize health, quality of life, and clinical outcomes across the cancer care continuum and to empower people to prevent cancer and become active participants before, during, and beyond cancer treatment. Natural products and botanicals may be useful as complementary therapies for the prevention of adverse effects of radiation and chemotherapy including prevention of second primary tumors, cognitive decline, cardiac toxicity, myelosuppression, pulmonary toxicity, neurotoxicity, nephrotoxicity, and hepatotoxicity. They also may increase the efficacy of chemotherapy and radiation therapy and targeted therapy. Natural and botanical products are generally safe and orally bioavailable. Epidemiologic studies show an inverse association between dietary lycopene and soy intake and prostate cancer risk. Genistein and daidzein are the most abundant isoflavones in soy. Genistein has activity against a variety of cancer cells in culture, animal model and clinical studies. Genistein's mechanisms of action include antioxidant effects preventing DNA damage, anti-inflammatory effects (IL-1, IL-6 inhibition), epigenetic effects through DNA demethylation and histone acetylation, inhibition of NFkB, RANKL, VEGF, MMP, and EMT. Healthy lifestyle, physical activity, stress reduction and botanicals may benefit prostate cancer patients before, during and after therapy

Keywords: Prostate cancer; integrative oncology; complementary therapy; genistein; soy

PL 7

Anti-cancer activity and pharmacokinetic properties of natural products

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Abstract: Rosemary (*Salvia rosmarinus*) has been reported to be used traditionally for centuries with more recent reports suggesting anti-inflammatory and anti-cancer properties. In the last several years standardized rosemary extract has been approved as a food preservative in the European union and a GRAS status by the Food and Drug administration. Rosemary is rich in a variety of phytochemicals including terpenes and flavonoids. Herein, we describe the anti-cancer activity of constituents from rosemary against prostate cancer. This work describes individual phytochemicals and extracts from our laboratory that are being evaluated for targeting the androgen receptor in prostate cancer. In addition, in vivo data supports the anti-cancer activity and slowing of tumor formation in xenograft mice. In addition, we described the pharmacokinetic properties of individual phytochemicals in rosemary and a standardized extract of rosemary. Next, we describe a platform for evaluating natural products in humans using a window of opportunity model in patients undergoing surgery for prostate cancer

Keywords: Rosemary; Prostate cancer; Phytochemical

PL 8

Melanoma Therapy: challenges and options

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Abstract: Melanoma harboring BRAF mutations frequently develop resistance to BRAF inhibitors, limiting the impact of treatment. Here, we establish a mechanism of resistance and subsequently identified a suitable drug combination to overcome the resistance. Single treatment of BRAF mutant melanoma cell lines with vemurafenib or dabrafenib (BRAF inhibitors) alone or in combination with trametinib (MEK1/2 inhibitor) resulted in overexpression of Mcl-1. Overexpression of Mcl-1 in A375 and SK-MEL-28 by transfection completely blocked BRAF and MEK1/2 inhibitor-mediated inhibition of cell survival and apoptosis. Melanoma cells resistant to BRAF inhibitors showed massive expression of Mcl-1 as compared to respective sensitive cell lines. Silencing of Mcl-1 using siRNA completely sensitized resistant melanoma cells to growth suppression and induction of apoptosis by BRAF inhibitors. *In vivo*, vemurafenib resistant A375 xenografts implanted in athymic nude mice showed substantial tumor growth inhibition when treated with a combination of vemurafenib and Mcl-1 inhibitor or siRNA. Immunohistochemistry and western blot analyses demonstrated enhanced expression of Mcl-1 and activation of ERK1/2 in vemurafenib-resistant tumors whereas level of Mcl-1 or p-ERK1/2 was diminished in the tumors of mice treated with either of the combination. Biopsied tumors from the patients treated with or resistant to BRAF inhibitors revealed overexpression of Mcl-1. Interestingly, piperlongumine significantly inhibited suppressed the growth of BRAF-inhibitor resistant cell lines as well as tumor growth in vivo by inhibiting Mcl-1 and its upstream regulator STAT-3.

Keywords: Melanoma; BRAF mutation; BRAF inhibitors; Mcl-1

PL 9

Phytochemicals in cancer: towards a unified view of their mechanisms of action

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Abstract: The current literature reports excellent and omni-comprehensive reviews on specific aspects of phytochemicals and cancer risk. It is well known the dichotomy that wanders in the field, i.e. the not uniform or, sometimes, controversial results deriving from experimental vs clinical studies. In general, convincing pre-clinical studies in cellular and animal models support the use of phytochemicals as chemopreventive candidate agents, while, on the other side, null or weak clinical indications arise from epidemiological and interventional studies. We all know that critical issues common to several classes of naturally-derived compounds are represented by their scarce bioavailability and their bioconversion in different organs. These obstacles can be easily bypassed in experimental settings, but represent a bottleneck in designing and interpreting clinical trials. An additional confounding factor is represented by the two-faced nature of several phytochemicals acting either as antioxidants or pro-oxidants. In the present lecture, I will bring examples on the ambiguity and the unexpected results deriving from the clinical and experimental studies with a focus on two classes of phytochemicals: phenolic compounds and carotenoids. I will discuss how their effects on cancer risk can be explained by understanding their capacity to modulate the cellular antioxidant response trying to propose a unifying mechanism of action that may help to understand the contribution of phytochemicals to the prevention of cancer.

Keywords: phytochemicals; carotenoids; phenolic compounds; cancer; antioxidants; pro-oxidants

PL 10

Pharmacological modulation of transcription factor STAT3 for cancer therapy

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Abstract : Signal Transducers and Activators of Transcription (STATs) constitute an important class of transcription factors that have been implicated in a wide variety of essential cellular functions related to proliferation, survival, and angiogenesis. Among various STAT members, STAT3 is often overexpressed in tumor cells as well as tissue samples, and regulates the expression of numerous oncogenic genes regulating various important hallmarks of cancer. the deregulation of STAT3 signaling has been found to be associated with the initiation and progression of both solid and hematological malignancies. Additionally, hyperactivation of STAT3 signaling can maintain the cancer stem cell phenotype by modulating the tumor microenvironment, cellular metabolism, and immune responses to favor drug resistance and metastasis. I will briefly discuss the importance of STAT3 as a potential target for cancer therapy and also provide novel insights into various classes of pharmacological inhibitors of this transcription factor developed by our group as potential anti-cancer drugs.

Keywords: Cancer therapy; STAT3; anti-cancer drugs

PL 11

Pharmacological potential of polymethoxy flavones from *Artemisia annua*

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Abstract: It is a truth universally acknowledged that a diet rich in fruit and vegetables can prevent some types of cancer. Flavonoids, notably polyhydroxy flavones that are abundantly present in fruit and vegetables, have shown promising antiproliferative and anti-inflammatory activity in in vitro experiments. Animal studies and human clinical trials have shown that polyhydroxy flavones show poor ADME (absorption, distribution, metabolism and excretion) properties. This makes that the amount these compounds that enter circulation is too low to ever reach the concentrations that are required to expect a clinical result. Just considering ADME properties, polymethoxy flavones would be better drug candidates; once they are absorbed, they remain in circulation for a sufficiently long period to cause an effect. However, in vitro tests have shown that polymethoxy flavones in general show much less biological activity than polyhydroxy flavones. We have shown that a range of cancer types overexpress CYP1 enzymes, and as a result can convert polymethoxy flavones to polyhydroxy flavones. We propose that polymethoxy flavones may act as pro-drugs that are selectively activated in hormone-dependent cancer cells. Polymethoxy flavones extracted from the medicinal plant *Artemisia annua* L. are currently tested for their pharmacological properties in different cell types, i.e. in cell types either expressing or not expressing CYP1 enzymes.

Keywords: polymethoxy flavones; chrysosplenetin; CYP1 ; pro-drugs

PL 12

Natural Products in Anticancer Drug Development: Advances and Opportunities

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Abstract: Cancer, the second leading cause of death in the world, represents a major health challenge. According to GLOBOCAN (International Agency for Research on Cancer), more than 19 million new cancer cases and nearly 10 million cancer deaths occurred in 2020. The overwhelming evidence based on preclinical and clinical studies clearly demonstrate that natural products, including bioactive phytocompounds, have enormous potential for cancer prevention and treatment. During the last few decades, an extraordinary number of phytochemicals, from dietary and non-dietary sources, have been investigated using cell culture assays, animal tumor models, and human subjects to understand their efficacy and mechanisms of action for cancer prevention and treatment. However, various limitations and challenges, including high cost, time constraint, limited source plant species, concern with intellectual property, poor solubility, stability and bioavailability, inefficient targeting, and unacceptable toxicity, limit discovery and development of natural product-based anticancer drugs. This presentation aims to capture recent advances in our knowledge on contemporary techniques (phytochemical purification, accelerated dereplication, hyphenated techniques, and molecular networking), biological assays (cell culture and animal models), and improved phytochemical bioavailability and delivery systems (micelles, microemulsions, nanoparticles, liposomes, exosomes, and antibody-drug conjugates) to realize the full potential of natural agents in cancer prevention and intervention.

Keywords: Cancer; prevention; treatment; phytochemicals; dereplication; analytical methods, molecular networking; biological assays; exosomes; nanoformulation.

PL 13

Cancer and COVID-19

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Abstract: East Asian medicine originated from ancient Chinese medicine that developed more than 2,000 years ago and is traditional medicine in China, Korea, Japan, and Vietnam. Acupuncture and herbal medicine are used as the main treatment methods, and it is currently evaluated as the most successful traditional medicine in the world as it is included in the ICD-11. East Asian medicine has focused on strengthening the human body's capacity to resist disease, that is, strengthening the immune system, rather than treating pathogenic factors. For this reason, East Asian medicine has been providing integrative medical treatment combined with chemotherapy, radiation therapy, and surgery for decades. In addition, China, Korea, and Japan recently have achieved remarkable results by actively applying herbal medicines for the prevention and treatment of COVID-19. This coincides with the rapid growth of the global herbal medicine market to strengthen immunity. In this study, the prevention and treatment of cancer and COVID-19 in East Asian medicine, and in the latter part, the Gamma treatment, which has excellent effects on anti-inflammatory, improving blood circulation, and nerve regeneration are introduced.

Keywords: East Asian Medicine; cancer, COVID-19; Gamma treatment

KY 1

Quality Standarts of Herbal Supplements

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Abstract: Introduction of thousands of chemicals into our lives every year after the industrial revolution, fast living habits and the inefficient use of natural sources began to effect our lives and health, negatively. The incidence of chronic and autoimmune diseases increased and the onset of these diseases regressed to childhood ages. Preventive healthcare practices and healthy living habits became very important and natural herbal supplements began to take their place in all branches of health. Eventually, the number of producers increased, a market with a variety of products but highly polluted has emerged. Under these circumstances, increasing the awareness of the public and health workers on this issue and producers' taking responsibility for production quality is very important. Supplements, which are not followed by strict legislation such as drugs, should be brought into use after appropriate processes ruled by international quality standards. These standarts include the selection of the plant, conscious agricultural practices, harvest, storage and transfer processes, laboratory applications, analysis and finally the production stages where the plant turns into the final product.

Keywords: Supplements; Quality; Herbal; Phytotherapy

KY 2

Nanoformulations of Natural Products

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Abstract: Conventional cancer therapeutic modalities, including surgery, chemotherapy, immunotherapy, radiotherapy has limited achievements since their features such as damage to healthy cells, systemic toxicity, long-term side effects and resistance. To increase the efficacy of the conventional therapies, to target the cancer cells or to cope with the resistance problems in cancer cells made the investigators to focus on the nanoformulations. Natural products have been shown to be effective to overcome the limitations of conventional cancer therapies in many in vitro and in vivo situations even in clinical trials. However, because of the solubility problems of the natural products the nanoformulations of these products were investigated to overcome these limitations. The nanoparticles can specifically target tumor cells, enhancing the specificity and efficacy of cancer therapeutic modalities which in turn improves patient response and survival.

Keywords: Nanoformulations, natural products, drug resistance, bioavailability, targeted therapies.

KY 3

Recent progress on some of the noteworthy plant derived sesquiterpene lactones in cancer research

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Abstract: Sesquiterpene lactones (SQLs) are a class of natural products (NPs) that contain 15 carbons and share the inclusion of three isoprenyl groups organized in a variety of distinct ring configurations, including one or more lactone rings. Due to the diversity of their structural skeletons and chemotaxonomic relevance, this class of terpenes has attracted substantial interest. Chemical characteristics include the reactivity of alkylating centers, lipophilicity, and molecule geometry and electrical properties. They possess a variety of significant bioactivities, including anticancer, insecticide, antibiotic, antiulcer, phytotoxic, and antiparasitic properties. Based on the structures of numerous antitumor sesquiterpene lactones, various analogues with increased efficacy have been identified as natural products or partly synthesized, and several prospective anticancer drugs have been thoroughly explored. With this background, artemisinin (a SQL endoperoxide), parthenolide, and thapsigargin, as well as their naturally occurring or synthetic derivatives with anticancer efficacy, draw attention. Artesunate, dimethylaminoparthenolide, and a peptide prodrug of thapsigargin (L12ADT) are now being studied in cancer clinical or preclinical research. By targeting particular signaling pathways, these drugs are selective for tumor and cancer stem cells, making them the lead molecules in cancer clinical trials [1, 2]. The latest status of these SQL derivatives and the potential of some medicinal plant sources related to SQLs have been revealed.

References

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Keywords: thapsigargin; artemisinin; sesquiterpene lactones; Asteraceae; natural products

KY 4

Chemical and biological activities of Cyprus endemic *Phlomis* and *Teucrium* species

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Abstract: Cyprus, located in the eastern Mediterranean Sea, bears all the characteristics of a semi-arid climate. The location of the island provides for rich biodiversity, and with a large number of endemic and rare species, it has one of the richest flora in the area. The Lamiaceae family, which is widely used in folk medicine in Cyprus has 24 endemic species. Nine of them belong to *Phlomis* and *Teucrium* species. The aim of this study is to find out the composition of *Phlomis brevibracteata* Turill (PBT), *Phlomis cypria* subsp. *cypria* Post (PCP) and *Teucrium divaricatum* subsp. *canescens* (TDC) and also discover the potential anti-carcinogenic activity of their methanol and sub-extracts. Chemical compositions were analyzed using LC/MS/MS and anticancer activities against hepatocellular carcinoma cell lines were evaluated using MTT and wound healing assays. Radical scavenging activities were evaluated via DPPH$^{\bullet}$ and ABTS$^{+\bullet}$, intercellular ROS scavenging activities were assessed by DCFH-DA assay. Seventy percent aqueous methanolic extracts of PBT and TDC have cytotoxic, motility inhibitory and intracellular ROS scavenging effects. These biological effects improved by sub-fractionation with n-hexane, n-butanol and ethyl acetate. Since extracts showed cytotoxic, antioxidant and motility inhibitory activities, and the fact that these activities can be enhanced using sub-fractionation, PBT and TDC can be considered as potential d candidates for further studies with the goal of new anticancer chemotherapeutic discoveries.

Keywords: Cyprus; Lamiaceae; phytotherapeutical; anticancer activity.

OP 1

Anti-proliferative effect of phenolic compounds from *Castanea sativa* byproducts in malignant cell lines through the activation of autophagy

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Abstract: Chestnuts (*Castanea sativa* Mill.) industry represents an important economic resource of European countries including Southern Italy, resulting in waste during the production chain, with a high impact on environmental quality. The recovery of chestnut byproducts can represent a strategy for the circular economy since they are rich in bioactive compounds, as phenolic compounds possessing potential chemopreventive activities. Here, we evaluated the anti-proliferative effect of phenolic extracts from the chestnut bark on HT29 and HL-60 cell lines, derived from human colorectal adenocarcinoma and leukemia, respectively. The phenolic enriched extracts were obtained by environment-friendly and/or conventional techniques. HPLC analysis detected the presence of several compounds including gallic and ellagic acids, castalagin. Chestnut bark polyphenol extract (CBp) significantly reduced HT29 and HL-60 cell number in a dose-dependent manner (50-150 and 1-10 μg/ml, w/v, respectively) after 72 h of incubation. Flow cytometer analysis showed that the population of cells in G2/M phase increased by 50% after CBp (100 μg/ml) treatment. This effect was associated with the activation of cytostatic autophagy, as confirmed by different autophagy markers (LC3II, p62). These results will be discussed through the multiple mechanisms triggered by CBp resulting in the arrest of proliferation in cancer cells associated with cytostatic autophagy.

Keywords: chestnut phenols; chestnut byproducts; cancer cell lines; autophagy

OP 2

Aliophen®, a Formulation Based on Malts and Hops, with Antioxidant and Chemopreventive Properties

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Abstract: Scientific evidence suggest a healthy effect of moderate consumption of beer, mainly due to the presence of bioactive compounds, such as polyphenols, vitamins, or fibers. Malts and hops are the principal ingredients of beer and are the main source of phenolic compounds. A patented process (WO/2019/038658 - PCT/IB2018/056283) led us to obtain a bioactive extract, named Aliophen®, from selected malts and hops. This formulation was chemically characterized and its antioxidant and chemopreventive properties were assessed by means of in vitro (low-density lipoprotein (LDL)-oxidation, hemolysis of erythrocytes, anti-proliferative effects on HL60 cells) and in vivo (azoxymethane (AOM) induced carcinogenesis in mouse) experimental approaches.
Compared to alcohol-free beer Aliophen® possessed a higher total phenolic content that was comparable to the one present in light and dark beers. We demonstrated that Aliophen® strongly reduced the LDL oxidation induced by CuSO4 and that Aliophen® pretreatment (1 mg/mL; w/v) in erythrocytes isolated from healthy donors significantly protected against HClO-induced hemolysis. To verify the anticancer effects of Aliophen®, we firstly assessed its anti-proliferative activity on the HL60 cell line, derived from human promyelocytic leukemia. A dose-dependent effect was measured, with a reduction of cell viability of 85–90% at the highest tested concentration (12.5 mg/mL; w/v). Subsequently, we extended the investigation to a mice model of chemical-induced carcinogenesis. Aliophen® was administered to mice before and during the treatment with AOM, a potent carcinogen, that induces the transformation of colon epithelial cells into ACF, adenomas, and malignant adenocarcinomas, similarly to the development of sporadic human colon cancer. Data obtained showed that Aliophen® at the dose of 3 mg/kg dose inhibited the formation of pre-neoplastic lesions, polyps, and tumors. At higher doses (300 mg/kg) the protective effect was measured in the first phase of the onset of cancer. The antioxidant property of Aliophen® was also observed in AOM-treated mice resulting in a significant increase in the serum antioxidant capacity.
These results represent an initial indication that Aliophen® formulation can find a space in future clinical trials addressed to prove its health effects, including the anticancer capacity presumably associated with its antioxidant properties.

Keywords: polyphenols; alcohol-free beer; antioxidant; colon cancer; chemoprevention

OP 3

Phytochemical profile and antiproliferative effects of *Epilobium hirsutum* extracts

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Abstract: *Epilobium hirsutum* is extensively used as a traditional remedy in folk medicine, especially against prostate inflammation. Therefore, we evaluated the chemical profiles and biopharmaceutical potentials of different extracts of E. hirsutum aerial parts and roots. Metabolomic, antioxidant, and enzyme inhibitory profiles were investigated. Human prostate cancer PC3 cells were exposed to the extracts to evaluate antiproliferative effects. Gene expression and bioinformatics analyses were performed to investigate anti-inflammatory mechanisms. Oenothein B and myricetin were prominent compounds in the extracts. In scavenging/reducing assays, the methanol, infusion, and methanol/water extracts exhibited similar activities. We also observed the reduction of PC3 viability occurring following exposure to methanol and methanol/water extracts. According to bioinformatics analysis, myricetin was predicted to interact with COX-2 and TNFα. The interaction between TNFα and oxo-dihydroxy-octadecenoic acid was predicted as well. Intriguingly, the gene expression of COX-2 and TNFα was reduced in PC3 cells after exposure to methanol and methanol/water extracts. These effects were paralleled by the decreased gene expression of IL-8 and NFkB and the inhibition of PGE2 release. Therefore, the present findings suggest the potential use of E. hirsutum for the management of the burden of inflammation and oxidative stress occurring in lower urinary tract diseases, including prostatitis.

Keywords: *Epilobium hirsutum*; oenothein B; myricetin; antioxidants; antiproliferative effects; gene expression; bioinformatics

OP 4

Gold Nanoparticle Based Combinational Gene and Chemotherapy

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Abstract: In recent years, combinational gene and chemotherapy has been widely investigated. A number of delivery strategies have been developed for co-delivery of siRNAs and chemotherapy drugs. However, majority of these approaches were limited by cytotoxicity and complex modification requirements. Here, we demonstrated a gold nanoparticle (AuNPs) based co-delivery vehicle for siRNAs against Bcl-2, which is an anti-apoptotic gene and doxorubicin drug. The successful loading of the therapeutics was established and characterized using UV/Vis spectroscopy and Dynamic Light scattering. The prepared multifunctional system showed no toxic effect by itself, while the drug loaded carrier provided effective decrease in cancer cell viability. Anti-cancer activity of the multifunctional carrier was investigated on breast cancer cells. Enhanced apoptosis, induced proliferation, and inhibition of colony formation of the triple negative breast cancer cells were provided by dual delivery of Bcl-2 siRNAs and doxorubicin using AuNPs compared to free doxorubicin alone. The study demonstrated a biocompatible and effective nano carrier system based on AuNPs for simultaneous delivery of siRNAs and chemotherapy drugs.

The authors acknowledge the financial support from Erciyes University Scientific Research Projects Coordination Unit (ERU-BAP) (Project number: **FDS-2020-9692**).

Keywords: Drug delivery; Gene therapy; AuNPs; Nanomedicine

OP 5

Soluble and Insoluble Dietary Fibre and Colorectal Cancer Risk: A Meta-Analysis

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Abstract: Dietary fibers, both soluble and insoluble, are essential for reducing the risk of Colorectal cancer (CRC). In this study, a meta-analysis was performed to examine the relationship between the soluble and insoluble dietary fiber consumption and CRC risk. For the design, analysis, and reporting of this meta-analysis, PRISMA guidelines were closely followed. Literature search, study selection, data retrieval and evaluations were conducted using PubMed/Medline, Web of Science, and Scopus databases. To determine publishing bias, the Egger test; assess study heterogeneity I2 statistics were used. Studies that reported adjusted relative risk estimates with 95% confidence intervals (Cl) for the associations of interest were included. The results reveal that the relationship between soluble and insoluble fiber intake and the risk of CRC is almost equal [The total fiber ES = 0.75 (95% CI = 0.66–0.86), soluble fiber ES = 0.78 (95% CI = 0.66–0.92), insoluble fiber ES = 0.77 (95% CI = 0.67–0.88)]. Both soluble and insoluble fiber consumption appear to be protective against CRC, with a clinically significant reduction in CRC risk. It is critical to identify preventive steps to avoid the CRC development, especially by leading a healthier lifestyle that includes healthy diet.

Keywords: dietary fiber; soluble dietary fiber; insoluble dietary fiber; colorectal cancer; meta-analysis

OP 6

Use of the Montmorillonite as a Drug Delivery System in Cancer Therapy

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Abstract: Montmorillonite (MMT) is a compound obtained by purification of bentonite clay. Thanks to sodium (Na^{+}) and calcium (Ca^{+2}) ions it contained, MMT has a high hydration capacity and this helps to absorb drugs. Since Na-MMT is better hydrated, it has higher capacity for drug transport-delivery. MMT can be modified with organic cations, anions, cation-anion mixture and non-ionic surfactants depending on the substance to be loaded. Natural products (like curcumin) intercalated with MMT has an in vitro antiapoptatic effect on cancer cell lines. Thus, it is aimed that drug should be at a low dose so that it doesn't harm to the surrounding tissues. As a result, it is known that MMT clay has no toxic effects on humans and animals and it can be used in cancer treatment by taking advantage of its drug carrying capacity. In this way, It is thought that it may be effective in prolonging the half-life and reducing the side effects of natural molecules to be used for treatment.

Keywords: Montmorillonite; Cancer, Drug Delivery System; Natural Compunds

OP 7

Total phenolic content of methanolic extract of *L. officinalis*

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Abstract: *L. officinalis*, known as cherry laurel, are commonly used fruits with important health benefits such as anti hyperglycemic and anticancerogenic effects. This fruit, which grows in Turkey, especially in places where the Black Sea climate is dominant, has gained more importance recently due to its antioxidant properties. The aim of this study was to determine the total phenolic compound of L. officinalis. Total phenolic contents of the fruits of *L. officinalis* were carried out using Folin-Ciocalteu's reagent and it was found 3 mg/g. Gallic acid was used as standard. These results provide that *L. officinalis* is enriched with phenolic contents that possess significant antioxidant effects. The presence of this phenolic content provides the pharmacological basis that may be effective in various disorders. After the determination of the total phenolic substance, it is important to determine the content with more detailed and sensitive measurements and to reveal the antioxidant effect, to know the antioxidant properties of the important phenolic substances contained in cherry laurel.

Keywords: Antioxidant; Phenolic Compunds; *L. officinalis*

OP 8

Anticancer properties of a new herbal combination as a potential lung cancer treatment candidate

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Abstract: Cancer remains a common health problem with increasing mortality rates. We aimed to investigate whether there are in vitro anticancer properties of a commercially available polyherbal formulation (PHF) against lung cancer. PHF is an ethanol extract of multiple herbs including *Commiphora myrrha, Curcuma zedoaria, Elettaria cardamomum, Olea europaea, Eryngium campestre, Illicium verum, Cinnamomum verum, Myristica fragrans, Crocus sativus.* We determined the effects of PHF on viability, colony forming ability, migration and apoptosis of non-small cell lung cancer cells, A549 and human retinal epithelial cells, ARPE-19 as a non-cancerous control. We examined the cytotoxic effect of PHF on cell proliferation in comparison with cisplatin and both showed significant cytotoxic effects on A549 cells. PHF treatment resulted in a relatively mild cytotoxic effect against ARPE-19 cells compared to cisplatin treatment. The inhibition of growth in more than 50% of A549 cells was noted with either 1:25 dilution of PHF or 24 μM of cisplatin treatments. PHF caused a more effective suppression of cell migration compared to cisplatin ($P<0.001$). Both PHF and cisplatin at IC50 doses effectively inhibited colony formation and induced apoptosis. The mechanisms underlying the anticancer properties of PHF need to be elucidated more comprehensively to confirm its potential.

Keywords: non-small cell lung cancer; polyherbal formulation; cisplatin

OP 9

Investigation of the cytotoxic potential of *Crocus chrysanthus* (Herb.) Herb.

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Abstract: It is known some difficulties of synthetic drugs use in cancer therapy because of side effects and interactions nowadays. *Crocus* L. is one of the most diverse genera of Iridaceae family. The genus comprises of 132 taxa, of which 108 are endemic to Turkey. One of them is *Crocus chrysanthus*. In this study, the cytotoxic effect of methanol extract and petroleum ether, ethyl acetate, *n*-buthanol and water sub-extracts from *C. chrysanthus* flowers were evaluated on MCF-7 and HepG2 cell lines. In a result, it was shown that methanol extract and ethyl acetate sub-extract were cytotoxic both cancer cell lines. But further studies will be needed to investigate the mechanism of action for the cytotoxic effects of the extracts.

Keywords: *Crocus*; Iridaceae; Cancer; Cytotoxicity

OP 10

Cytotoxic Activity Investigation of *Opopanax hispidus* (Friv.) Griseb.

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Abstract: Medicinal plants and phytochemicals stand out in the search for new and effective compounds against cancer prevention and treatment. Coumarin and coumarin derivatives are natural compounds found in many plant species. These compounds have numerous biological activities including anticancer. *Opopanax hispidus* (Friv.) Griseb. belongs to Apiaceae family and has coumarin-type compounds. In the literature, there is no cytotoxic activity study on *O. hispidus*. This study aims to investigate the cytotoxic activity of *O. hispidus* methanol extract and sub-extracts which are partitioned with water and extracted with *n*-hexane, dichloromethane, ethyl acetate, *n*-butanol, respectively. Cytotoxic activity was investigated by MTT assay on HeLa, HepG2, MCF-7, and A549 as well as BEAS-2B cell lines for determining selectivity. According to the results IC_{50} values of the methanol extract on MCF-7, HeLa, A549, HepG2, BEAS-2B were 21.44±2.01 μg/mL, 49.53±2.77 μg/mL, 40.78±2.54 μg/mL, 77.68±5.84 μg/mL, 36.82±2.01 μg/mL, respectively. Among the sub-extracts, *n*-hexane and dichloromethane extracts exhibited strong cytotoxic activity on cancer cell lines (IC_{50} ranges: 2.16-10.90 μg/mL). Thus these extracts can be promising for cytotoxic activity-guided isolation studies.

Acknowledgments: This study was supported by Scientific Research Projects Unit of Gazi University. (02/2020-09)

Keywords: Apiaceae; anticancer; *Opopanax hispidus*; cytotoxic activity; coumarin

OP 11

The Effect of LC3 siRNA and Doxorubicin Dual treatment against Breast Cancer

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Abstract: Autophagy is a multistep lysosomal degradation process that results in degrading and removing dysfunctional cytoplasmic materials, which supports nutrient recycling and metabolic adaptation. Autophagy represents a solid tool that cells employ in order to escape stress, being known as a process that supports cancer. Accordingly, inhibiting autophagy would result in improving therapeutic outcomes in cancer patients. In recent study, a combined treatmentof doxorubicin (DOX) and microtubule-associated light chain 3 siRNA (siLC3) was utilized for cancer therapy using a "smart" nanoparticle system, according to our hypothesis that this combination will lead into enhanced effects of DOX. We demonstrated that siLC3 delivery in a "smart" nanoparticle system can effectively silence the autophagy-related gene LC3, inhibit cellular autophagy and exhibit improved anticancer effects. In addition, co-administration of siLC3 and DOX was more efficacious for the treatment of breast cancer in the highly aggressive and metastatic triple-negative breast cancer (TNBC) MDA-MB-231 cell line than either agent alone. That was evident by the significant suppression of cell proliferation, colony formation and migration in MDA-MB-231 cells. Taken together, our data highlighted the synergistic efficacy of the combination of autophagy inhibition and chemotherapy delivered by "smart" nanoparticles for breast cancer therapy.

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Keywords: Triple-negative breast cancer, Autophagy, LC3 siRNA, Doxorubicin, Synergistic efficacy

OP 12

Resveratrol targets leukemia stem cells without damaging hematopoietic stem cells

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Abstract: Targeting leukemia stem cells (LSC) in therapy is essential to achieve full-recovery in leukemia. Quiescent hematopoietic stem cells (HSC) enter cell-cycle followed by chemotherapy, and contribute to regeneration by proliferating and differentiating. Resveratrol, naturally occurring polyphenol in plants, has potential as chemotherapeutics. We aimed to investigate anti-leukemic effects of resveratrol on LSCs and simultaneous side-effects on HSCs. Apoptotic effects of resveratrol(16.7µM, unpublished data) on LSC(CD44+/CD133+/CD38-) and HSC(CD34+/CD38-) cells (Celprogen) were measured by flow-cytometry after AnnexinV/PI, DNA-fragmentation, active-caspase-3 stainings. We investigated DNA-damage by γH2AX-assay, cell-cycle regulations using BD-Cycletest-Kit, proliferation by CFSE-staining. $CFSE^{max}$ was identified by colcemid-treatment and CD133+-cells in the undivided $CFSE^{max}$ compartment were designated as quiescent (G_0) stem cells. In LSC, resveratrol induced apoptosis 1.6-fold, activated caspase-3 2.8-fold and DNA-fragmentation 3.2-fold and elevated γH2AX levels by 12.2%. In HSC, resveratrol did not induce apoptosis and caused slight γH2AX elevation. Resveratrol blocked both CD133+ and total LSC proliferation 2-fold, caused modest G_2/M arrest, and did not cause significant differences in quiescent G_0-fraction. Resveratrol slowed the proliferation of HSC(CD133+) 2.2-fold, increased proliferating-HSC cells by 5%, elevated HSC cells in S-phase by 9.1%, and expanded quiescent G_0-population from 1% to 4.9%.Resveratrol has *in vitro* anti-leukemic potentials on LSC, meanwhile, triggers HSC differentiation and expands quiescent HSC pool that provides regeneration.

Keywords: Resveratrol, Leukemia stem cells; Hematopoietic stem cells; Cell-cyle, Proliferation, Regeneration, Quiescence, Apoptosis; DNA damage

OP 13

Evaluation of the Combined Effects of Turkish Mad Honey and 5-Fluorouracil in Colon Cancer Model in Rats

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Abstract: The aim of this study, in the experimental colon cancer modeling in rats, was to evaluate the effects of grayanotoxin-rich Turkish mad honey and 5-fluorouracil on the histopathologic findings and on the levels of serum biochemical and oxidative stress parameters. The 30 rats used in this study were divided into 5 groups of 6 rats each: control group (CG), cancer control group (CCG), Turkish mad honey given group (HGG), 5-FU given group (FUGG), and 5-FU and Turkish mad honey combined group (FU-HGG).In the statistical evaluations, it was determined that serum LDH, TOS and total protein values determined in rats in CCG were significantly lower than the values determined in CG, and serum Bcl-2 and survivin levels were found to be significantly higher. The presence of anaplasic epithelial cells, vascularization, precancerous changes and inflammatory infiltration detected in the colon and small intestine of the rats in FU-HGG, FUGG and HGG were less intense ($p<0.05$) compared to the findings in the rats in CCG. It is concluded that in an experimental colon cancer model in rats the combined use of grayanotoxin-rich Turkish mad honey and 5-fluorouracil may be an alternative method in the treatment of colon cancer.

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Keywords: Colon Cancer Modeling; 5-fluorouracil, Histopathology; Oxidative Stress and Apoptosis; Turkish Mad Honey

OP 14

Dual Therapy of Bcl-2 Gene and Cisplatin Drug to Overcome Multidrug Resistance of Ovarian Cancer

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Abstract: Multidrug resistance (MDR) commonly reduces the cytotoxic effects of chemotherapeutics and renders cancer cells immune to standard treatments of many anticancer agents and is a major challenge in cancer therapy. Cisplatin is an effective chemotherapy medication used to treat ovarian cancer and it works by binding to DNA and inhibiting its replication. However, a number of cancer types show resistance to cisplatin. Bcl-2 is the first apoptosis regulator identified in organisms, which causes drug resistance by inducing evasion of apoptosis. The aim of this study is to investigate combinational siRNA and drug delivery for treatment of ovarian cancers using a novel nanocarrier system. Anti-Bcl-2 siRNA carrier nanoparticle is consisting of "smart" copolymer and poly(ethylene glycol), which is formed by using β-cyclodextrin as the main carrier platform. The molar ratio of the carrier to siRNA (N/P) was investigated by gel electrophoresis and the optimum N/P was found as 4/1. The size of nanocarrier with different N/P ratios was determined between 150-300 nm and zeta-potential was increased by increasing N/P ratio due to the positively charged groups of the carrier. Cisplatin-resistant cells (A2780cis) were effectively treated with dual combination therapy resulting in sensitivity to the drug with increased apoptosis and inhibited proliferation.

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Keywords: Bcl-2; Ovarian cancer; β-Cyclodextrin; Cisplatin resistance; Gene therapy

OP 15

Dopamine conjugated Polymer Nanoparticles for Active Targeting

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Abstract: Over the last several decades, a variety of polymer-based nanoparticle systems have been used in different stages of clinical trials for the controlled delivery of anti-cancer drugs. These delivery systems improve the efficiency of the encapsulated drugs by enhancing the solubility of hydrophobic anti-cancer drugs, prolonging the circulation time and by reducing systemic side effects. Nevertheless, non-specific drug release on healthy cells due to lack of targeting ability of these systems still limit the therapeutic efficacy of anti-cancer drugs. To overcome this limitation, conjugation of active ligands, that can target tumor tissues/cells, on the drug delivery systems became the focus of considerable interest. As a result of above-mentioned reasons, in this study we designed and synthesized novel dopamine conjugated polymeric nanoparticles as targeted drug delivery systems for cancer. First, a series of diblock co-polymers were synthesized using the reversible addition−fragmentation chain transfer (RAFT) polymerization. Biocompatible poly (methyl methacrylate) (PMMA) is selected as the hydrophobic block (first block) in co-polymer library. The hydrophilic block (second block) of the polymer library comprise the statistical co-polymers of biocompatible oligo (ethylene glycol)-methacrylate (OEGMA) and a dichloromaleimide functional monomer (DCMMA). Then, nanoprecipitation technique was utilized for the self-assembly of the synthesized block co-polymer library and resulting nanoparticles were characterized by DLS and TEM. Finally, dopamine was conjugated on the surface of the nanoparticles by taking advantage of the fact that DCMMA monomer reacts very rapidly with amine-bearing molecules in high efficiency and under easy conditions.

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Keywords: Reversible Addition-Fragmentation Chain Transfer Polymerization-RAFT; Nanoparticles, Active Targeting; Dopamine

OP 16

Antioxidant potentials of three *Sideritis* species and its main compounds α-pinene and β-pinene

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Abstract: Monoterpene hydrocarbons such as α-pinene and β-pinene are the main constituents of the *Sideritis* genus. The present study shows, antioxidant of essential oils (EOs) of *S. argyrea* (SA), *S. brevidens* (SB), S. lycia (SL) and its main components α-pinene and β-pinene. Gas chromatography-mass spectrometry (GC-MS) analysis demonstrated that a total of 60 compounds were identified from three *Sideritis*, including 49 from SA, 41 from SB, and 51 from SL. The main components of three *Sideritis* EOs were α-pinene (10.5-22.8%) and β-pinene (16.5-28.2%). Also, EOs showed antioxidant activity at the different ranges by using various antioxidant test systems (radical scavenging, reducing power, metal chelation, and total antioxidant capacity). In ABTS radical scavenging activity, SL indicated the highest antiradical activity with value of 6.33 mg TEs/g oil, while SA and SB indicated lower effect (3.02 mg TEs/g oil and 2.90 mg TEs/g oil, respectively). This study show that the three *Sideritis* EOs and α- and β- pinene could be useful for further investigation aimed at pharmaceutical area.

Keywords: *Sideritis*; Essential oils; Antioxidant; Pinene

OP 17

Cytotoxic activity of *Momordica charantia* on A549 cell line

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Abstract: For many years, herbal medicines have been used for the treatment of cancer and other diseases. In addition, many plant compounds in modern pharmacy have an important place in the production of pharmaceutical raw materials or new drug candidates. Researchers have identified some plant species with anticancer properties, focusing on plants used for medicinal purposes in developing countries. *Momordica charantia* is one of these plants and since all parts of the bitter melon plant are bitter, it is also called as "bitter melon" or "bitter gourd". In many studies on bitter melon, it has been stated that this plant has antidiabetic, cholesterol-lowering effects, antioxidant, antimicrobial, antitumor, and anti-inflammation effects. The effectiveness of bitter melon in the treatment of diabetes is known worldwide. In our study, the effect of mature seed, mature fruit, and unmature fruit extracts on non small cell lung cancer cells (A549) was evaluated with a real-time cell analyzer. According to our preliminary results, the most effective result was obtained in mature seeds in a concentration dependent manner. In our further studies we will be investigating its effects on healthy lung epithelial cells. Furthermore it is being tested for its cytotoxic activity in other cancer cell types.

Keywords: *Momordica charantia*; Antitumor Activities; Bitter Melon