

## ***Резюме на научните трудове на Илия Желев Славов:***

### **Статии:**

#### **1. Някои съвременни аспекти на приложение на $\gamma$ -лъчи в медицината**

**Ил. Желев**, Д. Обрешкова, Ек. Петкова, Л. Пейкова, Ст. Пъпанов  
Български Медицински Журнал, 2009, 3(1): 14-17

Гама лъчите са форма на електромагнитно лъчение с много малка дължина на вълната, висока чистота и силно йонизиращо действие, получаващи се при радиоактивно превръщане. Действието им върху микроорганизмите намира приложение за стерилизация в медицината, фармацевтиката, козметичната промишленост, като тази стерилизация не променя химичната структура на лекарствените вещества.

#### **2. Начинът на хранене - рисков и протективен фактор за развитието на хроничните неинфекциозни заболявания**

Ст. Пъпанов, **Ил. Желев**, Ек. Петкова, В. Проичев, Б. Кузманов, Н. Трайкова, Р. Симова, К. Джамбазов, Ив. Трайков, Й. Марчев, П. Каснакова  
Социална Медицина, 2009, 1/2, 37-38

Нерационалното хранене може да бъде рисков и протективен фактор за възникване на различни болестни състояния. Нормалният растеж, развитие и здравно благополучие на индивида са свързани с адекватното хранене. Представяме един епидемиологичен проект за начинът на хранене, като рисков и протективен фактор за развитие на хронични неинфекциозни заболявания.

#### **3. Организация на упражнението „Кумарини - обща характеристика. Дроги, съдържащи кумарини”, по учебната дисциплина „Фармакогнозия” – подходи на преподавателския мениджмънт**

**Ил. Желев**, Ст. Пъпанов, Ек. Петкова  
Сестринско дело, 2009, Год. XLI, 2: 18-21

В настоящата разработка, представяме организацията на упражнението по учебната дисциплина „Фармакогнозия”, на тема – „Кумарини - обща характеристика. Дроги, съдържащи кумарини”, за студенти от специалност Фармация при Медицински университет – Пловдив.

#### **4. Ескулин – синтез и биологично действие**

Пенчева Ив., Д. Обрешкова, **Ил. Желев**, Ек. Петкова, В. Хаджидекова, Ст. Пъпанов  
Български медицински журнал, 2009, 4: 7-19

Ескулинът е биологично активно вещество, подобно на витамин Р, с широко приложение в медицината, както като чисто вещество, така и като съставка на 5 български и над 40 европейски лекарствени продукта. Поради това, ние представяме обобщено синтеза на ескулин, биологичното му действие, лекарствени продукти които го съдържат, както и методите за неговия анализ.

## **5. Влияние на екологичните условия върху натрупването на общи полифеноли и флавоноиди при видове от род *Carduus* L.**

**Илия Ж. Славов**, Димитрина Ж. Желева-Димитрова, Иванка Ж. Димитрова-Дюлгерова  
Plantarum, 2011, 41: 177-188

The content of total watersoluble polyphenols and total flavonoids in the flower heads of four *Carduus* species has been investigated. Samples from 21 localities of 7 floristic Bulgarian regions have been collected during the flowering seasons of 2010 and 2011. The quantitative accumulation of flavonoids depended on the localities' ecological conditions. High concentrations of total flavonoids have been determined in plants from mountain regions with altitude over 900-1000 m and herbaceous places with optimum water and soil regime. Total polyphenol content has not been significantly influenced by ecological conditions.

## **6. Някои малко познати афродизиаци в българските магазини**

**Илия Желев**, Емил Милев, Калоян Георгиев  
Варненски медицински форум, 2012, 1(1): 141-144

An aphrodisiac is defined as a drug that arouses sexual instinct, induces venereal desire and increases pleasure and performance. Erectile dysfunction or (male) impotence is a sexual dysfunction characterized by inability to develop or maintain an erection of the penis. Cardiovascular diseases, diabetes mellitus as well as some other factors such as stress, pollution, low-quality food, unhealthy eating habits, tobacco smoking, etc are the underlying causes of this medical condition. There are physiological or psychological reasons for erectile dysfunction. Ethno medicine is an alternative source of remedies nowadays. There are many herbal drugs that have been used by men with erectile dysfunction with changeable success. They present with a very low degree of unwanted effects. The following herbal aphrodisiacs are well-known in Bulgaria: puncturevine (*Tribulus terrestris*), pink (*Syzygium aromaticum*), cinnamon (*Cinnamomum verum*), nutmeg (*Myristica fragrans*), onions (*Allium cepa*), garlic (*Alium sativum*), ginkgo biloba (*Ginkgo biloba*), belladonna (*Atropa belladonna*), black henbane (*Hyoscyamus niger*), hemp (*Cannabis sativa*) and oats (*Avena sativa*). The aims of the study are to examine three electronic data-bases up to 2012 and to present an overview of the current knowledge on medicinal plants and drugs with aphrodisiac effect as well as to focus on those which are commercially available in Bulgaria. The results of this survey indicate directions for further research on the biologically active compounds of these plants. Furthermore, the study of the pharmacological activity will expand and enrich our knowledge and will allow a more precise use of these medicinal plants as aphrodisiacs.

## **7. Съдържание и фармакологични ефекти на полифенолни съединения в различни видове чай**

**И. Желев**, К. Георгиев, С. Георгиева  
Варненски медицински форум, 2013, 2(3): 234-239

Природните феноли са обичайни съставки в растенията. Те повлияват различни физиологични и биохимични процеси в човешкото тяло. Съдържанието им може да е различно в зависимост от начина на култивиране, събиране и приготвяне. Целта на настоящото изследване е да се определи количественото съдържание на полифенолите в различните видове чай. Разгледани са подробно и механизмите, по които те осъществяват ефектите си. За определянето на различни класове фенолни съединения са използвани методи от VI Европейска фармакопея и XI Руска фармакопея. Растителният материал е закупен от търговската мрежа. В проучваните растителни субстанции се установяват високи стойности на тотални фенолни съединения (от 1,99% до 8,03%) и значителни стойности на останалите класове фенолни съединения -

флавоноиди, фенолни киселини и антоциани. Получените резултати са съпоставени с тези от научната литература. Настоящото изследване показва високи нива на полифеноли в различните видове чай, предлагани на българския пазар. Необходими са допълнителни изследвания, потвърждаващи ползите от тяхната консумация.

#### **8. Проучване на активните съставки на Годжи Бери (*Lycium barbarum*)**

Калоян Георгиев, Илия Желев, Светлана Георгиева  
Варненски медицински форум, 2013, 2(3): 229-233

Поради ефективни маркетингови стратегии, използвани в целия свят, популярността на продуктите, съдържащи плодове от годжи, се увеличи през последните години. Годжи е ново име, дадено на *Lycium barbarum* и *L. Chinense*, два близки вида, използвани от години като лекарства и храна в Източна Азия и особено - в Китай. Научните изследвания са насочени върху съдържащите се в плодовете протеоглици, наречени "Lycium barbarum полизахариди", които притежават антиоксидантни свойства и проявяват интересни фармакологични свойства при заболявания, свързани с възрастта - атеросклероза, захарен диабет и рак. Целта на изследването е да се проучи съдържанието и действието на основните активни съставки в плодовете от годжи - скополетин и 2-O- $\beta$ -D-глюкопиранозил-L-аскорбинова киселина (AA -2 $\beta$ G). За екстрахирането, изолирането и охарактеризирането на полизахаридите в *L. barbarum* са използвани методи от VI Европейска фармакопея и XI Руска фармакопея. В плодовете на годжибери се установяват високи нива на активни съставки - скополетин и AA -2 $\beta$ G. Те притежават широка биологична активност, установена в множество клинични и *in vitro* и *in vivo* проучвания. Необходими са допълнителни изследвания за установяване на точните механизми, по които се осъществяват различните им ефекти.

#### **9. Лечебни растения и техните активни съставки в терапията на онкологични заболявания.**

К. Георгиев, И. Желев  
Варненски медицински форум, 2014, 3(4): 257-262

Ракът е втората водеща причина за смърт в развиващите се страни. Поради значително изразените странични ефекти на химиотерапията, усилията са насочени към свеждане до минимум на неблагоприятните ефекти чрез използване на вещества от растителен произход. Значителен брой растения са показали многообещаваща противотуморна активност *in vitro* и *in vivo*, но все още не е проучен активния принцип на този ефект. Необходимо е обединяване на усилията в областите фармакогнозия, фармакология и химия за откриване и въвеждане в клиничната практика на нови противотуморни агенти от растителен произход. В това ревю ще обобщим данните от литературата за някои нови потенциални противоракови молекули от растителен произход, техните предполагаеми молекулярни мишени, както и оценка на тяхната *in vitro* и *in vivo* активност.

#### **10. Фитохимично проучване на цветове от *Koelreuteria paniculata* Laxm в България** И. Желев, С. Иванов, А. Черенкова, А. Абдухакова, И. Димитрова-Дюлгерова Варненски медицински форум, 2014, 3(4): 312-316

*Koelreuteria paniculata* Laxm. е популярно декоративно растение, познато у нас под името китайски мехурник. В съцветие на това дърво са доказвани следните групи биологично-активни вещества: протеини, слюзни вещества, флавоноиди, танини, сапонини, антрахинони и каротеноиди. Сред тях танините са с най-голямо съдържание (4,68%),

следвани от фенолните киселини (1,04%) и флавоноидите (0,82%). Минимално е съдържанието на антрахиноните (само 0,11%), доказани за първи път в това растение, заедно с каротеноидите.

#### **11. Фенолни съединения в съцветия от албиносна форма на *Carduus thoermeri*.**

Димова Г., Георгиева П., Бекаров П., **Желев И.**, Димитрова-Дюлгерова И.  
Варненски Медицински Форум, 2015, 4(3): 505-509

*Carduus thoermeri* Weinm е растение от семейство Asteraceae, известен като „Термеров магарешки бодил“. Целта на настоящото изследване е да се проучи количественото съдържание на основни класове фенолни съединения в съцветия от албиносна форма на *C.thoermeri*, като се сравнят данните с установените до момента в научната литература за същия вид притежаващ обикновено розово-лилава багра на венчелистчетата. В резултат на направените изследвания се установи съдържание на тотални водоразтворими полифеноли - 1,45%, флавоноиди – 4,08%, фенолни киселини – 1,04%, и антоцианите – 0,11%. Направеното изследване показва, че липсата на антоциани в цветовете на *Carduus thoermeri* не повлиява съдържанието на другите класове феноли и те остават в границите на вече установеното за вида, като флавоноидите са групата фенолни съединения с най-високо съдържание.

#### **12. Биологично активни вещества в Пу-ер чая и предполагаеми антиобезни механизми.**

Георгиева П., Бекаров П., Димова Г., **Желев И.**, Георгиев К.  
Варненски Медицински Форум, 2015, 4(3): 510-515

**Въведение:** Наднорменото тегло (затлъстяването) представлява повишено съдържание на телесни мазнини в организма и се свързва с множество инвалидизиращи и животозастрашаващи заболявания като сърдечно-съдови, метаболитни и много други. Потенциалните ползи за намаляване на телесното тегло чрез консумирането на хранителни добавки или чайове, приготвени от чаения храст *Camellia sinensis*, са обект на повишено научно изследване. Целта на изследването е да се съберат и обсъдят данни за биологично активните съставки на Пу-ер чая, а така също и молекулярните механизми, които участват в редуциране на телесното тегло. Възможните молекулярни механизми на антиобезната активност включват повлияване на ацетил-КоА карбоксилазната активност чрез модулиране на АМПК (АМФ-активирани протеин кинази), инхибиране на GPDH (глицерол-3-фосфат дехидрогеназата), а също така повлияване на стеароил-КоА дезатураза (SCD), което определя Пу-ер чая като алтернатива за контрол на телесното тегло.

#### **13. Influence of the extraction conditions over the antioxidant activity of *Carduus thoermeri* L.**

D. Mihaylova, L. Georgieva, **I. Zhelev**, I. Dimitrova-Dyulgerova  
Bulgarian Journal of Agricultural Science, 2013,19(2): 1-4

The influence of the extraction technique over the antioxidant properties of *C. thoermeri* Weinm. water extracts, expressed as Trolox equivalent antioxidant capacity (TEAC), was studied using DPPH (2,2-diphenyl-1-picrylhydrazyl) scavenging, ABTS (2,2'-azino-bis-3-ethylbenzothiazoline-6-sulfonic acid) scavenging and reducing power assays. The phenolic concentration in the examined extracts, calculated as mg gallic acid equivalent (GAE)/g dry weight (DW), ranged from  $7.65 \pm 0.91$  to  $19.57 \pm 1.06$  mg GAE/g DW. The results from the total phenolics assay and the antioxidant activity tests were significantly correlated. Among

the different *C. thoermeri* water extracts the decoct shows higher antioxidant activity and content of total phenolic compounds, which suggested that polyphenols were responsible for the antioxidant abilities.

#### 14. Quantitative determination of methylxanthines and polyphenols in plant substances

Tanya Topalova, Iliya Jelev, Svetlana Georgieva

Управление и Образование, 2013, 9(5): 110-114

The use of legal psychoactive substances determined by the challenges of modern life is constantly growing. Caffeine-containing herbal substances possess a major role in this relation. The development of trade and the supply of exotic plant substances and products in recent years allow sale of a very broad range of products containing caffeine. The aim of our work is to determine the amount of total methylxanthines and caffeine as well as valuable polyphenols and flavonoids in five most commonly used caffeine-containing drugs: black tea, green tea, yerba mate, coffee and guarana berries.

#### 15. Content of phenolic compound in the genus *Carduus* L. from Bulgaria.

I. Zhelev, I. Dimitrova-Dyulgerova, D. Belkinova, R. Mladenov

Ecologia Balkanica, 2013, 5(2): 13-21

Phytochemical screening of the content of total polyphenols, flavonoids, phenolic acids and anthocyanins in Bulgarian *Carduus* L. species was carried out. The plant materials (inflorescences) from all of the 14 species found in Bulgaria has been collected from natural habitats from different floristic regions, during the period 2011-2013. Chemical analysis of the specimens was carried out in accordance with 11 Russian and 7 European Pharmacopoeia. For some of the plant species the obtained results are the first published data about content of phenolic compounds. The content of flavonoids (1,8-3,2%) and total phenols(1,7-2,3%) was higher in comparison with this of phenolic acids (0,6-2,4%) and anthocyanins (0,5-1,5%). The highest content of total phenols and anthocyanins was determined in the *Carduus thracicus*. The three species *Carduus thoermeri*, *Carduus nutans* and *Carduus candicans* ssp. *globifer* were characterized with the highest content of flavonoids. The highest content of phenolic acids was determined in the *Carduus armatus*.

#### 16. Lipid Composition of *Carduus thoermeri* Weinm., *Onopordum acanthium* L. and *Silybum marianum* L., growing in Bulgaria

I. Zhelev, P. Merdzhanov, M. Angelova-Romova, M. Zlatanov, G. Antova, I. Dimitrova-Dyulgerova, A. Stoyanova

Bulgarian Journal of Agricultural Science, 2014, 20: 622-627

Seed oil chemical composition of wild growing *Carduus thoermeri* Weinm., *Onopordum acanthium* L. and *Silybum marianum* L. were studied for the first time in Bulgaria, by using GC, HPLC, TLC and spectrophotometrical methods. The major components of fatty acids were oleic (342 - 530 g.kg<sup>-1</sup>), linoleic (176 - 511 g.kg<sup>-1</sup>) and palmitic (99 - 150 g.kg<sup>-1</sup>).  $\alpha$ -tocopherol was the main component in the tocopherol fraction of *O. acanthium* seeds (911 g.kg<sup>-1</sup>). In the sterol fraction the main components were  $\beta$ -sitosterol (546 - 632 g.kg<sup>-1</sup>) and campesterol (128 - 156 g.kg<sup>-1</sup>). Phosphatidylinositol was with the highest concentration in the phospholipid fraction (317 g.kg<sup>-1</sup> in *C. thoermeri* and 320 g.kg<sup>-1</sup> in *O. acanthium*). Due to content of unsaturated fatty acids, tocopherols and phytosterols, the seeds of these widespread species (especially *O. acanthium*) could be utilized as a valuable oil source for human consumption.

### **17. Total phenolic compounds and tannins content of *Banacha* green tea (*Camellia sinensis*) depending of extraction conditions**

Kaloyan Georgiev, Iliya Zhelev, Svetlana Georgieva

Scripta Scientifica Pharmaceutica, 2014, 1: 48-51

The effect of different extraction conditions of prepared infusions on the content of bioactive compounds of *Banacha* green tea (*Camellia sinensis* L.) were investigated. The content of total phenols, tannins and methylxanthines were determined spectrophotometrically. The highest content of total phenolic compounds and tannins were determined on the 30th minute of infusion – 7,71% and 4,49% respectively. The conditions with the most valuable (higher content of polyphenols) and the most healthy (lowest of tannins) combination is in the 10th minute of extraction – 7.47% and 3,84%. The tea also contained low percentages of methylxanthines (0,66%) and caffeine (0,09%).

### **18. Study of the liver metabolic activation of some plant phenolic compounds**

Iliya Zhelev, Yana Koleva, Ivanka Dimitrova-Dyulgerova, Svetlana Georgieva

Scripta Scientifica Pharmaceutica, 2014, 1: 52-57

Phenolic compounds form one of the main classes of secondary metabolites. The widespread use of flavonoids and phenolic acids necessitates the study of their metabolism. The aim of this work is to predict the possible metabolites of some plant phenolic compounds by a specialized software (*OECD (Q)SAR Application Toolbox*). Analysis of data reveals that after metabolic activation in liver (observed pathways) for five of the six plant phenolic compounds liver metabolism was not observed. Only for one compound (Luteolin) metabolic activation in liver (observed pathways) was observed.

### **19. Conventional and herbal drugs for asthma treatment**

Tanya Topalova, Iliya Jelev, Svetlana Georgieva

Управление и Образование, 2014, 10(5): 107-112

Asthma is one of the most common chronic diseases in modern society and there is increasing evidence to suggest that its incidence and severity are growing. That is the reason why many patients with chronic allergic conditions seek complementary and alternative medicine with medicinal plants. Natural remedies have been developed to provide gentle, safe and effective relief from respiratory symptoms such as shortness of breath, tight chest and wheezing or persistent cough induced by an allergic reaction or the common cold. It is important to select natural remedies for asthma that treat all the symptoms and provide ongoing support and relief. The combinations of individual herbs in natural remedies for asthma are often selected for their complementary and additive effect. In the present article an attempt has been made to review antiasthmatic medicinal plants, to show which are their active constituents as well as to predict the possible therapy with conventional drugs and herbal drugs.

### **20. The impact of decaffeinating process on polyphenolic content in green tea (*Camellia sinensis* L. "Sencha tea")**

Iliya Jelev, Kaloyan Georgiev, Svetlana Georgieva

Управление и Образование, 2014, 10(5): 67-70

The impact of decaffeinating process on polyphenolic content of green tea (*Camellia sinensis* L., "Sencha tea") was investigated. The content of total phenols, phenolic acids, flavonoids, anthocyanins and tannins were determined spectrophotometrically. We also determined the

content of total methylxanthines and caffeine in simple and decaffeinated “Sencha ” green tea. The results have shown that the process of decaffeinating slightly affects the other biologically active components of green tea.

## 21. Phenolic profile and antioxidant activity of methanolic extract of *Carduus acicularis* Bertol. (Asteraceae)

**Iliya Zh. Slavov**, Ivanka Zh. Dimitrova-Dyulgerova, Rumen Mladenov  
Ecologia Balkanica, 2016, (in press)

Phenolic acid and flavonoid profiles of *Carduus acicularis* were investigated for the first time. Eleven phenolic acids and eight flavonoids were identified and quantified in the inflorescences, by high performance liquid chromatography. The main phenolic compounds were found to be: sinapic acid ( $930.41 \pm 21.72 \mu\text{g/g dw}$ ), chlorogenic acid ( $582.66 \pm 13.60 \mu\text{g/g dw}$ ), rutin ( $545.65 \pm 12.82 \mu\text{g/g dw}$ ), apigenin ( $478.75 \pm 11.38 \mu\text{g/g dw}$ ), luteolin ( $288.46 \pm 6.86 \mu\text{g/g dw}$ ) and myricetin ( $276.32 \pm 5.21 \mu\text{g/g dw}$ ). The antioxidant activity of methanolic extract of inflorescences has been investigated, employing four different established testing systems: scavenging activity on 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis-(3-ethyl-benzothiazoline-6-sulfonate (ABTS) radical cation decolorization assay, ferric reducing antioxidant power (FRAP) and copper reduction antioxidant assays (FRAP). The highest antioxidant activity values were measured by the ABTS assay, among all performed methods.

## 22. Antioxidant activity of some *Carduus* species growing in Bulgaria

Dimitrina Zheleva-Dimitrova, **Iliya Zhelev**, Ivanka Dimitrova-Dyulgerova  
Free Radicals and Antioxidants, 2011,1(4): 15-20

Species of genus *Carduus* are traditionally used in Bulgarian folk medicine as diuretic, cardiogenic and antihemorrhoidal remedies. *C. candicans* ssp. *globifer* and *C. kernerii* ssp. *austro-orientalis* are Balkan endemic, whereas *C. acanthoides*, *C. nutans*, *C. thoermeri* *C.* are invasive alien weeds in the Americas, Australia and New Zealand, and causes major economic losses. The aim of the present study was to screen some *Carduus* species growing in Bulgaria for radical scavenging and inhibition of lipid peroxidation in order to discover new natural sources of antioxidants for further investigation. The highest concentrations of total water soluble polyphenols and flavonoids were found in *C. thoermeri* ( $2.06 \pm 0.03 \text{ g /100 g dw}$  and  $3.31 \pm 0.12 \text{ g /100 g dw}$ , respectively), followed by *C. nutans* ( $1.88 \pm 0.01 \text{ g/100 g dw}$ ;  $2.60 \pm 0.09 \text{ g /100 g dw}$ , respectively) and *C. candicans* ssp. *globifer* ( $1.85 \pm 0.04 \text{ g/100 g dw}$ ). All tested extracts demonstrate significant antioxidant activity moreover *C. thoermeri*, *C. nutans* and *C. candicans* ssp. *globifer* were found to be the most potent and can be a good new source of natural antioxidants.

## 23. Phenolic Acids, Flavonoid Profile and Antioxidant Activity of *Carduus thoermeri* Weinm. Extract

**I. Slavov**, D. Mihaylova, I. Dimitrova-Dyulgerova  
Oxidation Communications, 2014, 37(1): 247–253

Phenolic acid and flavonoid profiles of flower heads of *Carduus thoermeri* Weinm. were investigated. Ten phenolic acids and five flavonoids were identified and quantified by high performance liquid chromatography (HPLC). Sinapic acid ( $3356.02 \pm 211.26 \mu\text{g/g dry weight (DW)}$ ), ferulic acid ( $2689.45 \pm 194.68 \mu\text{g/g DW}$ ), chlorogenic acid ( $564.14 \pm 11.33 \mu\text{g/g DW}$ ), luteolin ( $543.66 \pm 81.97 \mu\text{g/g DW}$ ) and hyperoside ( $485.04 \pm 73.6 \mu\text{g/g DW}$ ) were

found to be the major phenolic compounds in the species. The antioxidant capacity of the studied extract was also established toward DPPH and ABTS- free radicals.

#### **24. Chemical composition of *Carduus candicans* W.&K. ssp. *globifer* (Vel.) Kazmi and *Carduus thoermeri* Weinm. essential oils**

**Iliya Zhelev**, Ivanka Dimitrova-Dyulgerova, Pavel Merdzhanov, Albena Stoyanova  
Journal of Essential Oil Bearing Plants, 2014, 17(2): 196 – 202

Chemical composition of the essential oils from flower heads of *Carduus candicans* W.&K. ssp. *globifer* (Vel.) Kazmi and *Carduus thoermeri* Weinm., collected from Bulgaria, was determined by GCMS. The main components of *Carduus candicans* ssp. *globifer* essential oil were benzaldehyde (22.1 %), palmitic acid (8.9 %), methyl salicylate (7.3 %), heptacosane (6.3 %), tricosane (6.1 %), pentacosane (5.6 %), Z-12-pentacosene (3.5 %) and  $\beta$ -caryophyllen (3.2 %). The oil of *Carduus thoermeri* contained mainly palmitic acid (17.9 %), methyl salicylate (14.8 %), benzaldehyde (13.2 %), *trans*-nerolidol (4.7 %), p-cymen-8-ol (4.5 %) and tricosane (2.7 %).

#### **25. Antitumor effects of pu-erh tea catechins in human cancer cell lines and evaluation of combination effects with oxaliplatin**

Kaloyan Georgiev, Ivan Iliev, **Iliya Jelev**  
World Journal of Pharmaceutical Research, 2015, 4(6): 438-444

In this study we investigated the effects of catechin fraction extracted from the Pu-erh tea leaves against human colon carcinoma cell line HT-29, human breast carcinoma cell line MDA-MB-231 and healthy cell lines – BALB/3T3 and BJ. We added different concentrations of the catechin fraction (2 – 1000  $\mu$ g/ml) to the cultured cells and incubated them for 24 and 72 h. To detect cytotoxic and antiproliferative effects, we used MTT assay. The catechin fraction extracted from Pu-erh tea slightly exerted a direct cytotoxic effect; while the anti-proliferative action was concentration-dependent on forth used cell lines. Combination of Pu-erh catechins with oxaliplatin did not result in synergistic effects.

#### **26. Evaluation of antitumor effect of methylxanthine fraction isolated from pu-erh tea**

Kaloyan Georgiev, Ivan Iliev, **Iliya Jelev**  
World Journal of Pharmaceutical Research, 2015, 4(7): 2236-2242

In this study we investigated the effects of methylxanthine fraction extracted from the Pu-erh tea leaves against human colon carcinoma cell line HT-29, human breast carcinoma cell line MDA-MB-231 and healthy cell lines – BALB/3T3 and BJ. We used different concentrations of the methylxanthine fraction (2 – 1000  $\mu$ g/ml) on the cultured cells and incubated them for 24 and 72 h. The cytotoxic effects were measured by the MTT dye reduction assay. The methylxanthine fraction extracted from Pu-erh tea has shown concentration-dependent cytotoxicity on colon and breast carcinoma cell lines. The combination of methylxanthine fraction and oxaliplatin did not result in synergism.

#### **27. Phenolic Profile and *in vitro* Antioxidant Activity of Endemic Bulgarian *Carduus* Species**

Ivanka Dimitrova-Dyulgerova, **Iliya Zhelev**, Dasha Mihaylova  
Pharmacognosy Magazine, 2015, 11(44): 575-579

The present study investigates the phenolic profile and the antioxidant potential of different extracts obtained from four endemic *Compositae* herbs, growing wild in Bulgaria: *Carduus armatus* Boiss and Heldr., *Carduus candicans* Waldst. et Kit ssp. *globifer* (Velen.) Kazmi., *Carduus rhodopaeus* Velen. and *Carduus thracicus* (Velen.) Hayek. Eleven phenolic acids and eight flavonoids were quantified in the inflorescences. Sinapic ( $2760.72 \pm 15.68 \mu\text{g/g}$  dry weight [dw]), chlorogenic ( $2564.50 \pm 19.73 \mu\text{g/g}$  dw) and ferulic acids ( $1648.71 \pm 19.57 \mu\text{g/g}$  dw), as well as luteolin ( $2345.45 \pm 18.61 \mu\text{g/g}$  dw) and apigenin ( $1332.75 \pm 12.05 \mu\text{g/g}$  dw) were found to be the predominant compounds. The above contents are the highest values found in *C. candicans* ssp. *globifer*. The highest established antioxidant activity (AOA) was in favor of the ethanolic extracts, and the extract of *C. rhodopaeus* affirmed with the highest AOA among the investigated plant species. All identified phenolic compounds were reported for the 1st time in the studied endemic *Carduus* species, as well as their antioxidant capacities. The present study revealed that these plant species could be used as sources of antioxidants with potential medicinal properties.

## **28. Carotenoid profile of *Ailanthus altissima* stem bark, in-vitro antioxidant and antineoplastic activities**

**Iliya Zhelev**, Kaloyan Georgiev, Ivanka Dimitrova-Dyulgerova

World Journal of Pharmaceutical Research, 2016, 5(3): 1816-1825

*Ailanthus altissima* (Mill.) Swingle (tree of heaven) is a fast-growing invasive species for Bulgaria and Europe and it belongs to the family *Simaroubaceae*. Carotenoid fraction from stem bark of *Ailanthus altissima* was isolated for the first time for this plant species, as well as lutein and lycopene. The main components identified and quantified by HPLC analysis were as follows:  $\beta$ -carotene –  $4389.96 \pm 120.7 \mu\text{g/g}$  extract, lutein –  $2515.11 \pm 95.66 \mu\text{g/g}$  extract and lycopene –  $154.77 \pm 42.15 \mu\text{g/g}$  extract. The better antioxidant activity of total carotenoid extract was measured by ABTS assay. Antineoplastic effects of carotenoids on BJ, HepG2 and MDA-MB-231 cell lines were investigated, too. High quantities of pure carotenoids exhibited mainly antiproliferative activity, and MDA-MB-231 cell line was the most sensitive.

## **29. Chemical composition, cytotoxicity and antioxidant activity of essential oil from *Vitex agnus-castus* fruits, growing in Bulgaria**

**I. Zhelev**, T. Batsalova, L. Georgieva, B. Dzhambazov, A. Stoyanova, I. Dimitrova-Dyulgerova

Oxidation Communications, 2016, 39(1): 145-155

Fruit essential oils from *Vitex agnus-castus* L. growing in Bulgaria were obtained by water distillation and were analysed by gas chromatography. Thirty-five components were identified in a sample isolated from fruit material from Southern Bulgaria, with 1% oil content and main constituents (up to 3%): 1,8-cineole (20.39%),  $\alpha$ -pinene (15.12%),  $\beta$ -pinene (9.40%), (Z)- $\beta$ -farnesene (6.88%), bicyclogermacrene (6.08%),  $\beta$ -caryophyllene (5.27%) and terpinyl acetate (4.13%). Thirty-three components were identified in the essential oil sample from Northern Bulgaria, with 0.5% oil and main constituents: (Z)- $\beta$ -farnesene (16.38%), bicyclogermacrene (12.26%), limonene (7.51%),  $\alpha$ -pinene (6.24%), germacrene (4.12%), eicosane (4.03%), heneicosane (3.97%),  $\beta$ -pinene (3.99 %) and nonadecane (3.66%). The cytotoxicity of the essential oil from Southern Bulgaria against three human adenocarcinoma cell line LS180, cervical adenocarcinoma cells, lung adenocarcinoma cell lines (LS180, HeLa, A549) as well as normal amniotic cell line were investigated. *V. agnus-castus* fruit essential oil exhibited cytotoxic effects against all four tested cell lines. HeLa cell line showed the strongest sensitivity, suggesting a potential use of *Vitex agnus-castus* fruit essential oil as a

chemotherapy agent for cervical cancer. The essential oil antioxidant activity measured by ABTS assay showed better values than those obtained with the DPPH assay.

**30. In-vitro antioxidant and antineoplastic activities of carotenoids from flowers of *Koelreuteria paniculata***

**Iliya Zhelev**, Kaloyan Georgiev, Ivanka Dimitrova-Dyulgerova  
World Journal of Pharmaceutical Research, 2016, 5(5): 53-60

Isolation and quantification by HPLC analysis of carotenoid fraction from flowers of *Koelreuteria paniculata* were done for the first time.  $\beta$ -carotene (2899.95  $\mu\text{g/g}$  extract) were the compound with the highest concentration, followed by lycopene (569.87  $\mu\text{g/g}$  extract) and lutein (538.34  $\mu\text{g/g}$  extract). The tested extract showed a good *in-vitro* antioxidant activity by ABTS method ( $368.86 \pm 39.58$  mMTE/g extract), whereas antineoplastic potential was weak on all tested cell lines.