

# Serbian Biochemical Society

**President:** Marija Gavrović-Jankulović

**Vice-president:** Suzana Jovanović-Šanta

**General Secretary:** Jelica Milošević

**Treasurer:** Milica Popović

## Organization Committee

Vladimir Mihailović

Aleksandar Ostojić

Nevena Đukić

Jelena S. Katanić Stanković

Marko Živanović

Nikola Srečković

Stefan Marković

Slađana Đorđević

Nataša Simin

Milan Nikolić

Milica Popović

Jelica Milošević

## Scientific Board

Marija Gavrović-Jankulović

Suzana Jovanović-Šanta

Marina Mitrović

Tatjana Jevtović Stoimenov

Ivan Spasojević

Snežana Marković

Melita Vidaković

Natalija Polović

Aleksandra Zeljković

Romana Masnikosa

Radivoje Prodanović

## Proceedings

**Editor:** Ivan Spasojević

**Technical support:** Dragana Robajac

**Cover design:** Zoran Beloševac

**Publisher:** Faculty of Chemistry, Serbian Biochemical Society

**Printed by:** Colorgrafx, Belgrade

Serbian Biochemical Society

Tenth Conference

with international participation

24.09.2021. Kragujevac, Serbia

***“Biochemical Insights into Molecular Mechanisms”***

# PROGRAMME

- 10:00-10:15      Opening ceremony
- 10:15-10:50      Samo Kreft  
Faculty of Pharmacy, University of Ljubljana, Slovenia  
**Phytochemical, pharmacological and clinical investigations of the extract from the branches of *Abies alba***  
(FEBS3+ Lecture)
- 10:50-11:10      Dragica Selaković  
Faculty of Medical Sciences, University of Kragujevac  
**Molecular mechanisms of platinum-based chemotherapeutics-induced behavioral manifestations of neurotoxicity – a beneficial role of antioxidant supplementation**
- 11:10-11:30      Simeon Minić  
University of Belgrade - Faculty of Chemistry  
**Bioactive properties of Spirulina-derived phycobiliproteins and phycobilins**
- 11:30-12:00      Coffee break
- 12:00-12:20      Nikola Gligorijević  
Institute for Application of Nuclear Energy, University of Belgrade  
**Ligand binding to fibrinogen influences its structure and function**
- 12:20-12:40      Ivan Čapo  
Faculty of Medicine, University of Novi Sad  
**New aspects of vitamin C during prenatal period of development**

- 12:40-13:00 Milan Dragičević  
Institute for Biological Research "Siniša Stanković", University of Belgrade  
**Arabinogalactan protein mining and diversity - the case of *Centaurium erythraea***
- 13.00-14.00 **Poster session**
- 14.00-15.00 Cocktail / Lunch break
- 15:00-15:20 Miloš Prokopijević  
University of Belgrade - Institute for Multidisciplinary Research  
**Natural polymers: suitable carriers for enzyme immobilization**
- 15:20-15:40 Ana Ninić  
University of Belgrade - Faculty of Pharmacy  
**Link between resistin, low-grade systemic inflammation and obstructive sleep apnea**
- 15:40-16:00 Branka Đorđević  
Faculty of Medicine, University of Niš  
**Blood-retinal barrier breakdown in diabetic retinopathy – the protective role of melatonin**
- 16:00-16:30 Coffee break
- 16:30-17:00 Poster awards and closing ceremony

## Poster Session

Tamara Antonić

Faculty of Pharmacy, University of Belgrade

**Prognostic capability of uric acid on the development of hypertensive complications during pregnancy**

Miloš Avramov

Faculty of Sciences, University of Novi Sad

**Protein disorder determination and expression of hsp genes during diapause and cold acclimation in the European corn borer *Ostrinia nubilalis* (Hbn.)**

Dejana Bajić

Faculty of Medicine, University of Novi Sad

**Levothyroxine: biochemical aspects and consumption in Serbia**

Ana Marija Balaž

Institute of Chemistry, Technology and Metallurgy, University of Belgrade

**Horseradish peroxidase C1A wild type gene and its variants expressed in *Pichia pastoris* KM71H strain**

Vedrana Bazović

Faculty of Chemistry, University of Belgrade

**Screening of potential inhibitors of recombinant S-adenosyl-L-homocysteine hydrolase from banana**

Sofija Bekić

Faculty of Sciences, University of Novi Sad

**Heterologous expression, purification and enzymatic activity of aldo-keto reductase 1D1**

Stefan Blagojević

Faculty of Science, University of Kragujevac,

**Impact of gold(III) and ruthenium(II) complexes on miRNA expression involved in metastasis on primary ovarian cell culture isolated from ascites**

Dragica Bulajić

Faculty of Medicine, University of Novi Sad

**Cytotoxicity of pulp-capping materials NeoMTA Plus, ProRoot MTA, and Biodentine on human deciduous dental pulp stem cells**

Sunčica Buljević

Faculty of Medicine, University of Rijeka

**The impact of CD26 deficiency on peptide YY and substance P expression patterns in Crohn's disease**

Marina Crnković

Faculty of Agriculture, University of Novi Sad

**Effect of soil liming on phenolic compounds in soybean**

Jelena Danilović Luković

University of Belgrade - Institute for Multidisciplinary Research

**The effect of increased nickel concentrations on *Chlorella sorokiniana* culture**

Srdana Đorđević

Faculty of Sciences, University of Novi Sad

**The effect of spermidine on the malondialdehyde levels in honey bees (*Apis mellifera* L.)**

Nevena Đukić

Faculty of Science, University of Kragujevac

**Accumulation of malondialdehyde in different varieties of *Triticum aestivum* L. under conditions of heat stress**

Jovana Drljača

Faculty of Medicine, University of Novi Sad

**Glioblastoma-associated microglia as a new target and strategy to fight with**

Yaraslau U. Dzichenka

Institute of Bioorganic Chemistry of National Academy of Sciences, Minsk

**Modified steroids as modulators of cholesterol level in humans by acting on CYP7A1 and CYP7B1**

Sonja Filipović

Faculty of Sciences and Mathematics, University of Niš

**The unanticipated monoterpene quantities variation in the Montenegro *J. oxycedrus* essential oil specimens**

Sonja Filipović

Faculty of Sciences and Mathematics, University of Niš

**The first antifungal activity assessment of *M. juliana* essential oil against crop pathogen *Colletotrichum acutatum* J.H. Simmonds**

Azra Guzonjić

Faculty of Pharmacy, University of Belgrade

**Relative telomere length and oxidative stress in patients with idiopathic pulmonary fibrosis, mesothelioma and non-small cell lung cancer**

Jasmina Ivanišević

Faculty of Pharmacy, University of Belgrade

**Redox status in patients with obstructive sleep apnea**

Anđelka M. Isaković

Institute of Medical and Clinical Biochemistry, Faculty of Medicine, University of Belgrade

**ADAM10, CEA, and CA19-9 as triad biomarkers of colorectal cancer response to neoadjuvant chemoradiotherapy**

Jovana D. Jagodić

Faculty of Chemistry, University of Belgrade

**Elemental composition of healthy adrenals and adrenal adenomas: whole blood and solid tissue analysis**

Natalija Jonić

Institute for Biological Research "Siniša Stanković, University of Belgrade

**Promoting the pro-inflammatory phenotype in macrophages by blocking the aryl hydrocarbon receptor**

Jelena S. Katanić Stanković

Institute for Information Technologies Kragujevac, University of Kragujevac

**Meadowsweet extract-mediated green synthesis of silver nanoparticles: A promising bioactive tool**

Teodora Knežić

Biosense Institute, University of Novi Sad

**Expression of *cs*, *ast*, *alt* and *ldh* genes during diapause of the European corn borer *Ostrinia nubilalis* (Hbn.)**

Milica Kojadinović

Institute for Medical Research, University of Belgrade

**The supplementation with fish and evening primrose oils improves fatty acid status in breast cancer patients receiving aromatase inhibitors**

Jelena Korać Jačić

University of Belgrade - Institute for Multidisciplinary Research

**The impact of pH on coordination chemistry of tetracycline and Fe(III) in water**

Lela Korićanac

Vinča Institute of Nuclear Sciences, University of Belgrade

**Antitumor effect of Ru(II) complexon A375 and HeLa cell growth, migration and adhesion ability**

Ana Kostić

Institute for Biological Research "Siniša Stanković", University of Belgrade

**Sclareol, a natural compound, inhibits P-glycoprotein activity in cancer cells**

Iva Lakić

Faculty of Biology, University of Belgrade

**Rat brown adipose tissue thermogenic markers are modulated by estrus cycle phases and short term fasting**

Milica Lazarević

Institute for Biological Research „Siniša Stanković“, University of Belgrade

**The effect of novel rosmarinic acid derivative on the pathogenesis of experimental autoimmune encephalomyelitis in rats**



Ivana Lukić

Institute of Virology, Vaccines and Sera – Torlak, Belgrade

***Lactobacillus reuteri* alleviate the severity of chemically-induced colitis in mice**

Jovan Luković

Faculty of Medical Sciences, University of Kragujevac

**Cytotoxic effect of chalcone analogue on tumor cells of murine and human origin**

Tatjana Majkić

Faculty of Sciences, University of Novi Sad

**Hypoglycemic effect of Cabernet Sauvignon wine**

Aleksandra Margetić

University of Belgrade – Institute of Chemistry, Technology and Metallurgy

**Antibacterial activity of polypyridinearene ruthenium(II) complexes**

Marija Marin

Faculty of Biology, University of Belgrade

**Effect of the *Thymus lykae* Degen et Jav. methanol extract on the erythrocyte membrane**

Stefan Marković

Faculty of Science, University of Kragujevac

**Heat-induced accumulation of proline and yield components in different cereal varieties**

Miloš Matić

Faculty of Science, University of Kragujevac

**Effects of cadmium on oxidative metabolism and motility of human placental cells in chemically-induced hypoxia**

Nenad Mićanović

Faculty of Agriculture, University of Belgrade

**Antioxidant and antidiabetic potential of hawthorn (*Crataegus mopsogyna* Jacq. L.) fruits originating from Serbia**

Tijana Mićović

Institute for Medicines and Medical Devices of Montenegro, Podgorica

**Promising anti-inflammatory potential of methanol extracts of *Hyssopus officinalis* L. subsp. *aristatus* (Godr.) Nyman (*Lamiaceae*)**

Vladimir Mihailović

Faculty of Science, University of Kragujevac

**Selected medicinal plant extracts as a potential preservative in cosmetic products**

Marija Mihajlović

Faculty of Pharmacy, University of Belgrade

**Relationship between single nucleotide polymorphism TNF- $\alpha$  -308 G>A (rs1800629) and TNF- $\alpha$  gene expression levels in colorectal cancer patients**

Nemanja Mijin

Faculty of Chemistry, University of Belgrade

**Amyloid fibril formation of ovalbumin in the presence of heavy metal ions, lead and cadmium**

Marijana Milanović

Medical Faculty of the Military Medical Academy, University of Defense, Belgrade

**Exogenous alpha-ketoglutarate impair differentiation and maturation of human dendritic cells**

Sonja Milić Komić

Institute for Multidisciplinary Research, University of Belgrade

**Efficient production of highly purified Late Embryogenesis Abundant (LEA) protein from *Arabidopsis thaliana* by recombinant DNA technology**

Milorad Miljić

Faculty of Sciences, University of Novi Sad

**The profile of carotenoids and phenolic compounds in 20 different varieties of pumpkin pulp cultivated in Serbia**

Sara Milojević

Faculty of Science, University of Kragujevac

**Evaluation of pathophysiological effects of clinical concentrations of proinflammatory interleukin-6 detected in patients with COVID-19 on homeostasis of human trophoblast cells**

Jelica Milošević

Faculty of Chemistry, University of Belgrade

**Bioinformatic analysis of ovalbumin and HEWL amyloidogenic peptides**

Maja Milošević

Faculty of Technology, University of Novi Sad

**Use of acid-extracted fiber from butternut squash pulp for complex coacervate preparation**

Marija Milošević

Faculty of Science, University of Kragujevac

**Testicular toxicity induced by chlorpyrifos and imidacloprid: Comparative study**

Tamara Milošević

Clinical Hospital Center „Zvezdara“, Belgrade

**High lactate dehydrogenase activity is significant mortality predictor in a 6 months study on end stage renal disease patients**

Milan Mišić

Faculty of Chemistry, University of Belgrade

**Antioxidant potential and protein interactions of four tea plant extracts**

Maja Mladenović

University of Belgrade – Faculty of Chemistry

**Optimization of expression, purification and HRMS characterization of recombinant N-protein fragment from SARS-CoV-2**

Jovana Muškinja

Institute for Information Technologies, University of Kragujevac

**Synthesis of ferrocenyl-based pyrazoline derivatives and their biological evaluation**

Aleksandra Nikezić

Faculty of Science, University of Kragujevac

**Anticancer potential of *Alchemilla vulgaris* L. on triple negative breast cancer cell lines**

Ivana Nikolić

Faculty of Medical Sciences, University of Kragujevac

**Biological effects of vanillin derivatives (enones) on HeLa cells in vitro**

Ana Obradović

Faculty of Science, University of Kragujevac

**Molecular mechanisms of antitumor activity 3-(4-chlorobenzyl)-5-isopropyl-5-phenylhydantoin in human breast cancer MDA-MB-231 cells**

Miloš Opačić

Institute for Multidisciplinary Research, University of Belgrade

**Distribution of high-affinity copper transporter CTR1 in sclerotic hippocampi of mTLE patients**

Dejan Orčić

Faculty of Science, University of Novi Sad

**A novel HPLC-DAD method for quantification of dominant lignans in cow parsley (*Anthriscus sylvestris* (L.) Hofm.)**

Ana Pantelić

Faculty of Chemistry, University of Belgrade

**Characterization of the late embryogenesis abundant (LEA) proteins family in hydrated and desiccated *Ramonda serbica* Panc. leaves**

Jelena Pantović

Faculty of Chemistry, University of Belgrade

**Expression, purification and characterization of recombinant L-phenylalanine dehydrogenase**

Milica G. Paunović

Faculty of Science, University of Kragujevac

**Estimation of redox potential of novel Pt(IV) complexes in the blood of rats**

Kasja Pavlović

Clinic for Endocrinology, Diabetes and Metabolic Diseases, University Clinical Center of Serbia

**Response of muscle cells to metformin depends on glucose availability in cell culture medium**

Marija Pavlović

Vinča Institute of Nuclear Sciences, University of Belgrade

**Highly active pectinases from newly isolated *Aspergillus tubingensis* strain**

Milica Pavlović

Faculty of Science, University of Kragujevac

**Bioaccumulation coefficient as an indicator of the ability to accumulate heavy metals of plant species on tailings**

Milica Perović

Faculty of Technology, University of Novi Sad

**Preparation and characterization of protein nanoparticles from chickpea protein isolates**

Nevena Planojević

Faculty of Science, University of Kragujevac

**The influence of newly synthesized Au(III) and Ru(II) complexes on gene expression on primary ovarian cancer cell culture from ascites**

Lena Platanić Arizanović

University of Belgrade - Faculty of Chemistry

**Atypical antipsychotics clozapine, sertindole, ziprasidone, and erythrocytes: Friends or foes?**

Dušica J. Popović

Faculty of Medicine, University of Novi Sad

**Inhibition of tumor vasculature production by metformin treatment of cancer inoculated to hamsters**

Kosta J. Popović  
Faculty of Medicine, University of Novi Sad  
**Nitroglycerin reduces no production in hamster fibrosarcomas**

Aleksandra Popović  
Faculty of Medicine, University of Novi Sad  
**The effects of Karnozin EXTRA® on mitochondrial bioenergetics in healthy fibroblasts**

Iva Potočnjak  
Faculty of Medicine, University of Rijeka  
**Oleanolic acid induces mitophagy and chemosensitises human colon carcinoma cells**

Tanja Radisavljević  
Faculty of Science, University of Novi Sad  
**Chemical characterization and antioxidant capacity of decaffeinated coffee extracts**

Milena Rašeta  
Faculty of Sciences, University of Novi Sad  
**Phenolic profile and biological activity of fungal species *Volvopluteus gloiocephalus* (DC.) Vizzini, Contu & Justo 2011**

Marina Ristović  
Institute of Chemistry, Technology and Metallurgy, University of Belgrade  
**Diffusion screening method for estimation potential fungal producers of xylanase responsible for xylooligosaccharides production**

Dragana Robajac  
Institute for the Application of Nuclear Energy, University of Belgrade  
**Changes in serum glycans in pregnant women with gestational diabetes mellitus**

Milena Simić  
Faculty of Pharmacy, University of Belgrade  
**Activity and phenotype of paraoxonase 1 enzyme in pediatric patients on hemodialysis**

Miron Sopić

Faculty of Pharmacy, University of Belgrade

**Short telomeres in peripheral blood leukocytes are associated with the presence and the severity of lung cancer**

Nikola Z. Srećković

Faculty of Science, University of Kragujevac

**Green synthesis, characterization, and biological evaluation of silver nanoparticles synthesized using *Salvia pratensis* L. extracts**

Ana Stančić

Institute for Biological Research "Siniša Stanković", University of Belgrade

**Ferroptosis as a novel determinant of  $\beta$ -cell death in diabetic conditions**

Marija Stanišić

Faculty of Chemistry, University of Belgrade

**Biomimetic mineralisation of periodate oxidized glucose oxidase**

Marijana Stanojević Pirković

Faculty of Medical Sciences, University of Kragujevac

**Cytotoxicity of enone sodium salts on human colon cancer cells (HCT-116) *in vitro***

Aleksandra Stefanović

Institute for Oncology and Radology of Serbia, Beograd

**Methylenetetrahydrofolate reductase C677T and A1298C polymorphic variants in rectal cancer: significance for cancer risk and response to chemoradiotherapy**

Olgica Stefanović

Faculty of Science, University of Kragujevac

**Phenolic compounds content and antibacterial activity of selected medicinal plants growing in Serbia**

Olgica Stefanović

Faculty of Science, University of Kragujevac

**Antibacterial and cytotoxic activity of *Tanacetum macrophyllum* extracts**

Branko Subošić

University Children's Hospital, Belgrade

**Childhood obesity: metabolic disorder and liver function**

Emilija Svirčev

Faculty of Sciences, University of Novi Sad

**Identification of compounds with antioxidative properties in alpine bistort (*Bistorta vivipara* (L.) Delarbre) ethanol extracts**

Biljana Šmit

Institute for Information Technologies Kragujevac, University of Kragujevac

**Synthesis and antimelanogenic activity of N3-arylidene-2-thiohydantoin derivatives**

Marinela Šokarda Slavić

Faculty of Chemistry, University of Belgrade

**Production of polyglutamic acid by *Bacillus* sp: strains selection, optimization, batch fermentation and characterization**

Marinela Šokarda Slavić

Faculty of Chemistry, University of Belgrade

**A search for nature's robust proteases with zein as a substrate**

Filip Štrbac

Faculty of Agriculture, University of Novi Sad

**Chemical composition of thyme essential oil and its anthelmintic properties**

Jovana Šućur

Faculty of Agriculture, University of Novi Sad

**Allelopathic effect of ragweed (*Ambrosia trifida* L.) on soybean phenolic compounds**

Miloš Šunderić

Institute for the Application of Nuclear Energy, University of Belgrade

**Interaction between alpha-2-macroglobulin and phycocyanobilin – structural and physiological implications**



Marija Takić

Institute for Medical Research, University of Belgrade

**Associations between zinc intake and status with biochemical and antropometric parameters in hemodialysis patients**

Nada Tokodi

Faculty of Sciences, University of Novi Sad

**Biochemical, molecular and histological insight into cyanobacterial effects on *Cyprinus carpio* from Kis-Balaton, Hungary**

Jovana Tubić Vukajlović

Faculty of Science, University of Kragujevac

**The effect of acetone extract of *Lenzites betulinus* mushroom on peripheral blood lymphocytes genome in patients with acute coronary syndrome *in vitro***

Mirela Ukropina

Faculty of Biology, University of Belgrade

**Possible protective role of probiotic bacteria on intestinal epithelium after chronic CdCl<sub>2</sub> intake**

Iva Uzelac

Faculty of Sciences, University of Novi Sad

**Expression of heat shock protein genes in response to unusually high temperatures during winter diapause in the European corn borer *Ostrinia nubilalis* (Hbn.)**

Snežana Vojvodić

Institute for Multidisciplinary Research, University of Belgrade

**Redox changes in microalga *Chlorella sorokiniana* exposed to high concentrations of Mn(II)**

Sanja Vujčić

University of Belgrade - Faculty of Pharmacy

**Triglyceride-glucose index and oxidative stress biomarkers in patients with type 2 diabetes mellitus**

Srđan Vujinović

Faculty of Sciences, University of Novi Sad

**Chemical composition and antioxidant activity of pomegranate (*Punica granatum* L.) peel and pulp**

Iva Vukelić

Faculty of Medicine, University of Rijeka

**Luteolin ameliorates experimental colitis in mice through ERK-mediated suppression of inflammation, apoptosis and autophagy**

Anđela Vukojević

University of Belgrade - Institute for Biological Research “Siniša Stanković”,

**Effects of fermented food on the body weight and behavior after repeated LPS administration in mice**

Irina Vulin

Faculty of Sciences, University of Novi Sad

**Effect of caffeine on cell proliferation and key elements of neurotransmitter pathways in human neuroblastoma SH-SY5Y cell line**

Milan Zarić

Faculty of Medical Sciences, University of Kragujevac

**Selective cytotoxicity of melittin against human cervical cancer cells**

Gordana Zavišić

Faculty of Pharmacy, University of Academy Business, Novi Sad

**Effect of probiotic consumption on serum glucose and lipid levels in mice**

Milica Zeković

Institute for Medical Research, University of Belgrade

**Omega-3 index and anthropometric indices among testicular cancer survivors**

Milena Zlatanova

Faculty of Chemistry, University of Belgrade

**Small molecules attenuate activation of the NF- $\kappa$ B signaling in epithelial cells by Act d 1 kiwifruit allergen**

Nenad Zlatic

Faculty of Science, University of Kragujevac

**Monoterpenes variability in *Teucrium montanum* L. essential oils**

Alma Zuković

Faculty of Pharmacy, University of Belgrade

**Biomarkers of oxidative stress in pediatric patients with type 1 diabetes mellitus**

Dragan Živančev

Institute of Field and Vegetable Crops, Novi Sad

**The use of the handheld grain quality analyzer for determination protein content in wheat cultivars**

Katarina Živić

Institute for Oncology and Radiology of Serbia, Belgrade

**Prevalence of somatic *BRCA1* gene methylation in patients with ovarian cancer**

Kristina Živić

Institute for Oncology and Radiology of Serbia, Belgrade

**Anti-migratory properties of Nischarin agonist rilmenidine in pancreatic ductal adenocarcinoma**

---

# Antitumor effect of Ru(II) complexon A375 and HeLa cell growth, migration and adhesion ability

---

Jelena Žakula, Maja D. Nešić, Milica Matijević, Milutin Stepić, Marijana Petković, Lela Korićanac\*

*Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia, University of Belgrade, Belgrade; Serbia*

\*e-mail: lela@vin.bg.ac.rs

Platinum-based complexes represent the mainstay of treatment for various cancer types. However, their usage is often restricted by numerous side effects or intrinsic and acquired resistance. Therefore, significant research efforts have focused on developing therapeutics based on other transition metals, such as ruthenium<sup>1,2</sup>. In this study, effects of transition metal complex, cis-dichlorobis (2,2'-bipyridyl-4,4'-dicarboxylic acid)ruthenium(II) (Ru(II) complex) were analyzed on A375 human melanoma and HeLa cell growth, adhesion ability and migration. Cell viability assay indicated significant antitumor activity of Ru(II) complex on A375 (~60% of control) up to 72 h after treatment, but not on HeLa cells. However, analysis by clonogenic assay showed that growth of both cell lines was decreased 7 days after treatment. Growth inhibition was followed by G<sub>1</sub> phase cell cycle arrest (5–10% G<sub>1</sub> increase for A375 and 5–8% for HeLa cells compared to control). Moreover, Ru(II) complex increased adhesivity of A375 and HeLa cells by 11 and 16 % respectively and decreased cell migration, as shown by scratch assay. The obtained results indicate that the analyzed Ru(II) complex is a promising metallodrug, as it induced growth inhibition of A375 and HeLa cells through induction of G<sub>1</sub> arrest and decreased metastatic potential of these cells through the increase of adhesivity and decrease of cell migration.

## Acknowledgments

This study was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Grant No. 451-03-9/2021-14/200017).

## References

1. Berndsen RH, et al. Combination of ruthenium(II)-arene complex [Ru(η<sup>6</sup>-p-cymene)Cl<sub>2</sub>(pta)] (RAPTA-C) and the epidermal growth factor receptor inhibitor erlotinib results in efficient angiostatic and antitumor activity. *Sci Rep* 2017;7:43005.
2. Tan J, et al. Nuclear permeable ruthenium(II) β-carboline complexes induce autophagy to antagonize mitochondrial-mediated apoptosis. *Med Chem* 2010;53:7613–24.