Editorial

Current Approaches to Diagnostics and Therapies of Chronic Diseases: Focus on Molecular and Cell Biology

Chronic diseases, also known as non-communicable diseases, are long-lasting complex disorders. Worldwide, millions of people die each year from chronic diseases including cardiovascular, neurological, lung diseases, type II diabetes mellitus and cancer. This cause of death increases in rate both in developed and developing countries [1-3].

Chronic diseases are often characterized by similar features, such as pathophysiological mechanisms and molecular alterations. Reactive oxygen species production causing oxidative stress, mitochondrial dysfunction, inflammation, accumulated DNA damage, dysregulation of autophagy are the common features of many chronic diseases [4-6]. During the recent years, the search for new therapeutic targets for the treatment and diagnosis of chronic diseases led to the discovery of novel biomarkers and therapeutic targets. Thus, current approaches to diagnosis and therapy of chronic diseases are based on the researches in the fields of cell and molecular biology.

This special issue is focused on diagnosis and therapy of chronic diseases such as cancer, renal fibrosis, inflammatory bowel diseases, diabetes, atherosclerosis and others. The presented review papers authored by international experts in the field describe the current knowledge on therapy of chronic diseases and propose some unusual approaches such as traditional Chinese medicine.

Fu et al. in their review “The anticancer effect of Sanguinarine, a review” discussed the anti-cancer properties of alkaloid sanguinarine. Sanguinarine possesses anti-inflammatory, proapoptotic, antioxidant and growth inhibitory activities on tumor cells. “This paper describes various anti-cancer mechanisms, such as inhibition of erroneously activated signal transduction pathways, apoptosis and inhibition of tumour cell proliferation, exhibited by sanguinarine” [7].

Sun et al. in their review “Individualized Tacrolimus Therapy for Children with Nephrotic Syndrome: Mind both the Ontogeny and Pharmacogenetics of CYP3A” have focused on individualized tacrolimus therapy for children with nephrotic syndrome. Authors discussed the role of ontogeny and genetics in the individual dosing regimen of tacrolimus, whereas current guideline has recommended that the tacrolimus dosage should be adjusted according to the Cytochrome P450 3A5 genotype (i.e. genetics) [8].

International team from UK and China have presented a rather unusual review “Chinese herbal formulas and renal fibrosis: An overview” by Shen et al. have focused on the therapy of renal fibrosis by Chinese herbal formulas of traditional Chinese medicine. It has been shown that Chinese herbal formulas can act as anti-fibrosis agents due to their anti-oxidant, anti-inflammatory and anti-proliferative properties. “Chinese herbal formulas are determined according to traditional Chinese Medicine theory and this review highlights these formulas and suggests a possible mechanism for their use in the treatment of renal fibrosis” [9].

International team from Saudi Arabia and China in the review paper “IRW and IQW attenuate induced-1 DSS inflammatory responses in colitis mice” by Ma et al. focused mainly on the antibiotics therapy of inflammatory bowel diseases and discussed alternative therapy with bioactive peptides (IRW and IQW). The effects of bioactive peptides on intestinal inflammation were described. “Intracolic administration of IRW and IQW might be a novel option for preventing inflammatory bowel disease via regulating the level of serum amino acid and enhancing the intestinal immune defense” [10].

International team of authors from UK and Iran have presented a review paper “Immunosuppression-lipid metabolism interplay and medicinal plants in atherosclerosis: a review” by Moradi et al. focused on medicinal herbs treatment of atherosclerosis. The authors described the most important herbal effects effective on atherosclerotic lesions through impact on the immune system. Effects of such medicinal herbs as garlic, Ginkgo biloba, Quercus infectoria, Astragalus mongolicus Bunge and others were discussed [11].

Diemberger et al. (Italian group) in their review “Meta-analysis of sinus rhythm restoration and maintenance by electrical cardioversion or catheter ablation in patients with chronic kidney disease: atrial fibrillation recurrences, thromboembolic events and modification of glomerular filtration rate.” discussed non-pharmacological treatments for sinus rhythm restoration/maintenance by electrical cardioversion and catheter ablation in Chronic kidney disease patients. Efficacy of such therapy for Chronic kidney disease patients and non-chronic kidney disease patients was compared [12].

Yamagishi and Matsu from Japan in their review “Therapeutic potential of DNA-aptamers raised against AGE-RAGE axis in diabetes-related complications” focused on discussion of the current literature on the therapeutic potential of DNA-aptamers raised against the advanced glycation end products - a receptor for advanced glycation end products (AGE-RAGE) in various diabetes- and aging-related disorders. Particular attention was paid to diabetes-associated complications, especially focusing on vascular complications of diabetes and cancer [13].

International team from the USA and Russia in the review paper “Approaches to the NK cell modification for anti-tumor immunotherapy” by M.A. Streitsova et al. focused on the therapy by the genetically modified natural killer cells. Authors compared the efficiency of recognizing and destroying tumor targets by the genetically modified natural killer cells in comparison with the therapeutic T cells. The perspectives and advantages of various approaches to modification of natural killer cells were discussed [14].

International team of authors from UK and China (Xiao-Qin Li et al.) in their review “Chemical constituents and pharmacological activities of Stellera Chamaejasme” discussed anti-tumor effects of Stellera Chamaejasme. Authors mainly focused on the pharmacological properties
and the chemical composition of \textit{S. Chamaejasme}. The authors hypothesize that \textit{S. Chamaejasme} has anti-tumor activity. They discussed anti-liver cancer activity anti-lung cancer activity anti-leukemia activity and others [15].

International team from Pakistan, Saudi Arabia, Qatar and USA (Kaneez \textit{et al.}) in their review “The dual specificity role of transcription factor FOXO in type 2-diabetes and cancer” summarized information about the biology of Forkhead box O transcription factors. “The Forkhead box O transcription factors are implicated in several signaling pathways and play a vital role in various cellular and physiological processes include, for instance, ROS (reactive oxygen species) response, cell proliferation, regulation of programmed cell death, longevity, metabolism and cancer and regulation of cell cycle.” These proteins can be used for elaborating on novel therapeutic approaches to treat cancer [16].

The review “Sulfur mustard-related ocular complications: a review of proteomic alterations and pathways involved” by Panahi \textit{et al.} from Iran is focused on eye injuries caused by sulfur mustard. Sulfur mustard causes deficient of iron-dependent regulations and pathological changes in vascular endothelial growth factor expression. Furthermore, sulfur mustard related proteomic alterations and the association of the found proteins with other eye disorders and diseases were reviewed [17].

The remaining articles of this issue are devoted to current approaches to diagnostics of chronic diseases, new diagnostics targets were also discussed.

Yuan \textit{et al.} (Chinese group) in their review “The Mechanism of Exosomes Function in Neurological Diseases: a progressive review” discussed potential mechanisms of exosomes function in neurogenesis, angiogenesis and BBB delivery and differentiated various sources of exosomes in traumatic brain injury, Alzheimer’s disease, stroke and tumor. Moreover, authors focused on the potential application of exosomes in diagnostics and treatment of various diseases [18].

Hassan \textit{et al.} (Iranian group) in their review article “The role of epigenetic alterations involved in sepsis: An overview” focused on the diagnosis of sepsis based on detection of epigenetic alterations (DNA methylation pattern, histone modification). Authors also discussed drug targets validation for the treatment of sepsis. “Epigenetic mechanisms can provide a highly sensitive and accurate method for sepsis diagnosis using blood and other body fluids” [19].

Karagodin \textit{et al.} (Russian group) in their review “Diagnostics and Therapy of human diseases - Focus on sialidases” discussed diagnostics of sialidase-related disorders such as sialidosis, cancer, atherosclerosis and others. Therapeutic approaches by sialidase inhibition were also discussed. “Sialidases are involved in the pathogenesis of a whole range of diseases, so the knowledge and expertise gained from genetic defects leading to human sialidase inhibition can be used in the design of the drugs. \textit{In vitro} studies suggest that some sialidase inhibitors might be useful therapeutics for treating sialidosis, cancer, infections, immune diseases, atherosclerosis and other pathologies” [20].

Prasad from Canada in his review “Does HbA1c Play a Role in the Development of Cardiovascular Diseases?” compared diagnosis of diabetes by hemoglobin Alc and advanced glycation end products. Hemoglobin Alc is considerate as a useful marker for the diagnosis and management of diabetes. Author concluded that advanced glycation end products cannot replace HbA1c in the diagnosis of diabetes because there is no correlation between advanced glycation end products with serum glucose [21].

A research article “Tumor necrosis factor-α and C-C motif chemokine ligand 18 associate with atherosclerotic lipid accumulation in situ and in vitro” by Orekhov \textit{et al.} (Russian team) describes the expression of tumor necrosis factor-α and C-C motif chemokine ligand 18 under the accumulation of intracellular cholesterol in atherosclerosis. Authors assumed that the accumulation of intracellular lipid induces pro- and anti-inflammatory responses in the arterial cells. Authors did not discuss the direct clinical implementation of their results; however, perspective to use these results in the development of diagnostics of atherosclerosis and anti-atherosclerotic therapy is obvious [22].

We hope that the presented thematic issue will be of interest to our readers, as well as helpful for generalizing the current knowledge in various areas of clinical science.

\textbf{REFERENCES}


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