

РЕЗЮМЕТА

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ХАБИЛИТАЦИОНЕН ТРУД

1. Primo Vascular System as a New Morphofunctional Integrated System

Miroslav Stefanov, Jungdae Kim

J. of Acupuncture and Meridian Studies, 2012, 5 (5): 193-200.

Abstract

The purpose of this review is to describe the methodology, instruments, and subject animals used until now for studies of the meridian (Kyungrak) system and the primo vascular system (PVS). The PVS is observed as an anatomical system distributed in cavities, organs, and tissues throughout the body. We analyzed the most important points of the PVS based on the results obtained until the present. Our main effort has been directed to describing the main thesis relating to the morphological structures and their topography, the functional mechanisms of the PVS, and possible roles of the PVS in pathological processes. The substance of the PVS in all its aspects is as a system covering the whole body and regulating and coordinating the biological processes that are the basis for life. In conclusion, we suggest that the finding of the PVS represents the discovery of a new integrated morphological-functional system.

2. Critical review and comments on B.H. Kim's work on the primo vascular system. J. of Acupuncture and Meridian Studies, 2012, 5 (5): 241-247.
Stefanov, M.

Abstract

Two periods of primo vascular system (PVS) discovery exist. The first one includes the five reports of B. H. Kim made from 1962 to 1965. The second one is from 2002 until the present time and includes reports made mainly by the Seoul National University group using modern methods. The purpose of this article is to describe the claims in B. H. Kim's reports, to comment on the most important points of his claims, and to offer hypotheses for the morphological architecture and the function of the PVS. The PVS integrated the cardiovascular, nervous, and hormonal systems. Thus, the particularities of the various

body systems are combined in the PVS. The PVS is not a simple circulatory system like the cardiovascular system. Its influence on all body systems is a combination of not only substances and signals but also energy and information. The primordial PVS is like a matrix for the vascular and the nervous systems, which are formed around the PVS. The PVS is duplicated by the vascular and the nervous systems in the very early stage of body development. This is the reason why the PVS combines the features of the vascular, the nervous, and the hormonal systems. Subsequently, all embryonic body systems have developed, the primordial PVS remains connected to them, but dominates and controls them as the primeval functional system.

3. Primo Vascular System as New Anatomical System.

Stefanov, M., M. Potroz, J. Kim, J. Lim, R. Cha, M. Nam
J. of Acupuncture and Meridian Studies, 2013, 6(6): 331-338.

Abstract

Traditional Eastern medicine has had a successful existence for a long time and has provided functional paths for curing disease. However, some scientists do not accept acupuncture, primarily because the meridian system lacks a physical anatomical basis. To date, scientific theories have not been able to explain the functional paths used by traditional Eastern medicine to cure disease. According to Western medicine, no known anatomical foundation exists for the meridians and unknown nervous, circulatory, endocrine, and immune mechanisms mediate the effects of acupuncture. In the early 1960s, only one hypothesis was proposed to explain the anatomical basis of the meridians. By using different experimental approaches during the past 10 years, the number of scientific papers that report the discovery of different anatomical and physiological evidence confirming the existence of an anatomical basis for the meridian system has increased. Morphological science is greatly challenged to offer a new biomedical theory that explains the possible existence of new bodily systems such as the primo vascular system (PVS). The PVS is a previously unknown system that integrates the features of the cardiovascular, nervous, immune, and hormonal systems. It also provides a physical substrate for the acupuncture points and meridians. Announcements of the morphological architectonics and the function of the PVS fundamentally changed the basic understanding of biology and medicine because the PVS is involved in the development and the functions.

4. New approach of corrosion casting using direct injection of Mercor into the parenchyma of different organs.

Stefanov, M., J. Kim, M. Nam, K. Soh
The Anatomical Record, 2013, 296: 724-725.

Abstract

Methacrylate resins, such as commercial MercorVR, have been used to visualize vascular and lymphatic vessels and structures of different body cavities and lumens. The routine protocol requires full maceration with subsequent evaluation of the casts by stereomicroscopy and scanning electron microscopy. The purpose of this report is to present a completely new approach using corrosion casting materials with partial preservation of the surrounding tissues in order to show the relation between all structures of the organs or tissues of interest. The method described

here could facilitate investigations of various tissues in relation to associated vessels, channels, and ducts. This approach also has some advantages over full corrosion casting because of the partial preservation of the surrounding organ and tissue structures, permitting an improved approach to study relationships between these various tissue structures.

СТАТИИ

5. Distinct vascular zones in the canine prostate.
Stefanov, M., N. Martin-Alguacil and R. Martin-Orti
Microsc Res and Tech, 2000, 50: 169-175

Abstract

The vascular bed of canine prostate was studied and detailed distinct vascular zones were visualized on corrosion casts by scanning electron microscopy. This study was performed because of scarce information about the zonal vascularization of the prostate gland in dogs. There are no studies for three-dimensional microvascular distribution of the capsular vessels and the capsular microvascular trabeculae. SEM (vascular corrosion casting method) was used to show 3D angioarchitecture of the prostate gland. The lobules on the dorsal and lateral surface of the gland were numerous but small. Their small size is probably due to the abundant blood supply in the region. Few but large ventral lobules were observed. Three prostatic zones were clearly defined: capsular, parenchyma, and urethral. The diameter of the venous blood vessel compared to arterial vessels of the capsule was smaller. Two types of arteries were observed in trabeculae: direct and branched. The direct arteries were straight, with only a few branches. The branched arteries contained many bifurcations, with the vessel's diameter decreasing gradually. The trabeculae capillary network formed loops, with frequent sphincter-like constrictions and pouch-like protuberances.

6. Extraglandular and intraglandular vascularization of canine prostate

Miroslav Stefanov

Microsc Res Tech, 2004, 68 (4): 188-197

Abstract

The literature on the vascularization of the canine prostate is reviewed and the clinical significance of prostate morphology is described. Scanning Electron Microscopy (SEM), combined with improved corrosion casting methods, reveal new morphological details that promise better diagnostics and treatment but also require expansion of clinical nomenclature. A proposal is made for including two previously unnamed veins in Nomina Anatomica Veterinaria (NAV). The canine prostate has two lobes with independent vascularization. Each lobe is supplied through the left and right a. prostatica, respectively. The a. prostatica sprouts three small vessels (cranial, middle, and caudal) towards the prostate gland. A. prostatica is a small-size artery whose wall structure is similar to the arteries of the muscular type. V. prostatica is a small-size valved vein. The canine prostate has capsular, parenchymal, and urethral vascular zones. The surface vessels of the capsule are predominantly veins and the diameter of arterial vessels is larger than that of the veins. The trabecular vessels are of two types: direct and branched. The prostate parenchyma is supplied by branches of the trabecular vessels. The periacinary capillaries are

fenestrated and form a net in a circular pattern. The processes of the myoepithelial cells embrace both the acini and the periacinar capillaries. In the prostate ductal system, there are spermatozoa. The prostatic part of the urethra is supplied by an independent branch of a. prostatica. The prostatic urethral part is drained by v. prostatica, the vein of the urethral bulb and the ventral prostate veins. M. urethralis begins as early as the urethral prostatic part. The greater part of the white muscle fibers in m. urethralis suggest an enhanced anaerobic metabolism.

7. Experimental mycotoxicosis in chickens induced by Ochratoxin A and Penicillic Acid and intervention with natural plant extracts.
Stoev, S., **M. Stefanov**, St. Denev, B. Radic, and A.M. Domijan, M. Peraica

Vet Res Commun, 2004, 28: 727-746.

Abstract

The combined toxic effect of ochratoxin A (OTA) and penicillic acid (PA) on the body mass, the weight and pathomorphology of some internal organs was studied in 85 broiler chickens fed a mouldy diet containing 130, 300 or 800 ppb OTA and 1000–2000 ppb PA. The main pathomorphological changes were cloudy swelling and granular degeneration in the epithelium and mononuclear cell proliferation and activation of capillary endothelium in the kidney and liver; degenerative changes and depletion of lymphoid cells in lymphoid organs (bursa of Fabricius, thymus and spleen) were also seen. Protective effects of 5% total water extract of artichoke and a new natural phytosubstance Rosallsat against these pathomorphological changes were observed. A significant decrease in body mass and relative weight of lymphoid organs was found after 6 weeks of exposure and a greater decrease after 10 weeks of exposure to OTA and PA, and a protective effect of artichoke extract and a slight effect of Rosallsat against that decrease was observed. A significant increase in relative weight of liver and kidneys was also observed as well as a protective effect of artichoke extract against that increase. The quantity of OTA and the percentage of positive samples were significantly lower in tissues of chickens treated with artichoke extract or Rosallsat in addition to OTA than in those treated with only OTA.

8. Ultrastructural localization of Protein Gene Product 9,5 and Neuron Specific Enolase in normal dog prostate.

Stefanov, M., D. Vladova, R. Dimitrov, N. Lazarov
Comp. Ren. Acad. Bulg. Sci., 2010, 63 (3): 450-460.

Abstract

Five healthy dogs of unspecified breed, aged between 1,5 and 5 years, weighing 20 kg were used for this study. Routine electromicroscopy and immunohistochemistry for protein gene product (PGP) 9,5 and neuron specific enolase (NSE) were performed. Neuroendocrine cells in clinically healthy dogs with a normal prostate were differentiated and investigated. They represent the third type of epithelial cells together with the luminal and basal cells. Slight immunoreactivity for PGP 9,5 and NSE in the neuroendocrine cells and in the nerve fibres running throughout the prostate was established. Conversely, the smooth muscle cells, myoepithelial cells, stromal cells as well as parenchyma of the normal dog prostate were immunonegative for both studied peptides.

9. Ultrasonography-aided anatomical investigation of the heart and some pelvic organs.
Vladova, D., **M. Stefanov**
Bulg J Agric Sci, 2010, 16 (1): 99-104

Abstract

Echography or ultrasonography is commonly utilized in imaging anatomy and diagnostics of internal diseases; Echography has enhanced the process of diagnostics, increased the options for morphological and functional evaluation of organs, has replaced other techniques of examination and allowed the performance of diagnostic and therapeutic manipulations under real-time ultrasound-guided control. The ultrasonographic images depict the cross sectional anatomy of a given anatomical area or organ. Echocardiography is a technique using ultrasound for examination of the heart and the large blood vessels. The identification of cardiac structures and other organs is important for achieving a general picture, localization of a specific process and deviations from the normal image of the organ. Ultrasonography is a non-invasive technique for visualization of benign and malignant lesions of accessory sex glands in both animals and men. The early detection of abnormalities of prostate and bulbourethral glands in cats is essential for the normal reproduction in this carnivore species.

10. Computed Tomographic Imaging of Vesicular Glands in rabbits.
Journal of Animal and Veterinary Advances, 2011, 10(1): 55 – 59.

Dimitrov, R., Y. Toneva, D. Vladova, K. Stamatova, **M. Stefanov**

Abstract

The study was carried out with the purpose to demonstrate the anatomo-topographic features of rabbit vesicular glands by computed axial tomography imaging (CT). Eight sexually matured, clinically healthy male white New Zealand rabbits, 12 months of age and weighing 2.8-3.2 kg were used. CT scans of the pelvis were performed in the transverse planes from the seventh Lumbar (L7) vertebra to the first Sacral vertebra (S1), with a section thickness of 2 mm. The cranial border of the vesicular glands was visualized in the transverse plane between L7 and S1 while the caudal part of the glands was observed in scans of the pelvic inlet in the transverse plane through the caudal part of S1. In the transverse scans of the pelvic inlet halfway S1, the vesicular glands appeared as transversely ovoid, homogeneous and relatively hypodense structures as compared to the adjacent soft tissues. The glandular areas were relatively hypodense compared to the urethral and rectal walls. The density of the rabbit vesicular glands was that of the soft tissues, ranging from 31 ± 0.33 HU in precontrast imaging and 78 ± 0.33 HU in postcontrast imaging.

11. Anatomical computed tomographic study of the heart and some mediastinal vessels of the rabbit (*Oryctolagus cuniculus*).

Dimitrov, R., D. Vladova, K. Stamatova, D. Kostov, **M. Stefanov**
Bulgarian Journal of Agricultural Science, 2012, 18(5): 784-788.

Abstract

The aim of the study is to utilize the computed tomography the anatomical study of the rabbit heart and some of its mediastinal vessels. We investigated seven sexually mature, healthy male white New Zealand rabbits, aged 12 months. The animals were anesthetized. The bodies of the thoracic vertebrae were used as bone markers when performing the imaging. At the level of the third and fourth thoracic segment were found only vascular structures. At the fifth thoracic vertebrae a partial heart silhouette was observed, and the complete one – at the seventh. At the third, fourth and fifth thoracic vertebrae an image of the ascending aorta was found, at the third and fourth one – aortic arch, at the fifth segment – the beginning of the descending aorta. The results confirm the thesis, that the rabbit is a suitable biological model for morphological and functional studies of the heart.

12. Comparative imaging anatomical study of the heart and selected mediastinal vessels in the rabbit (*Oryctolagus cuniculus*).

Istanbul Universitesi Veteriner Fakultesi Dergisi, 2014, 40 (1): 20-28.

Dimitrov, R., D. Vladova, K. Stamatova- Yovcheva, P. Yonkova, D. Kostov, **M. Stefanov**

Abstract

The aim of the study was to prove analogy of the results from ultrasonographic, computed tomographic and post mortem transverse study of the rabbit heart and select mediastinal vessels. Ten sexually mature, healthy New Zealand White rabbits, aged 12 months, with a body weight of 2.8 kg to 3.2 kg were investigated. Two - dimensional transthoracic echocardiography was performed in right and left lateral recumbency. The transducer was placed on the thorax for imaging the heart in standard planes (short and long axis). Transverse computed tomography of the thorax was carried out before and after intravenous contrast administration. The animals were positioned in ventrodorsal recumbency. The post mortem transverse frozen cuts of the thorax were 10 mm thick. By the ultrasonographic study the centrally situated hypoechoic lumen of the ascending aorta was found. The hypoechoic left and right atria (proventricles), parts of the right ventricle and pulmonary ostium with the pulmonary valve were visualized peripherally. The entire heart silhouette was observed via computed tomography. The atrioventricular septum was seen as a hypo attenuating structure. The heart ventricles, atria, ascending and descending aorta, esophagus and trachea were visualized. The four heart cavities and major vessels were marked by the post mortem transverse frozen study. The comparative analysis of the data from the ultrasonographic, computed tomographic and post mortem transverse frozen study of the rabbit heart and its mediastinal vessels showed that the results could be applied in the interpretation and diagnosis of the heart and vascular lesions in this species.

13. Tracing Mercox Injected at Acupuncture Points in Mice's Skin under the Protocol of Partial Body Macerations.

Kim, J., **M. Stefanov**, M. Nam, S. Kim

J Acupuncture and Meridian studies, 2015, 8 (6): 314-320.

Abstract

We used for the first time a vascular casting material to take advantage of a simple tracing procedure and to isolate the peculiar features of acupuncture point injections. The polymer Mercox was injected into the skin of a dead mouse at acupuncture points along the bladder meridian lines. After a partial maceration of the whole body with a potassium-hydroperoxide solution, we anatomized it under a stereomicroscope to trace the injected Mercox. Many organs were checked to determine whether or not they contained some Mercox tracing. Connections between the injection sites along the acupuncture points were observed. Two to three layers of Mercox in a plate shape were found under the skin at the acupuncture points, and Mercox travelled throughout the adipose tissue, the fascia, and the parietal and visceral serous membranes inside the organ's parenchyma. The casting material Mercox used with a modified partial maceration procedure is a promising method for visualizing the routes of the meridian system and the primo vascular system. The routes for Mercox are different from those of the blood and lymphatic vessels.

14. Visualizing the Peripheral Primo Vascular System in Mice Skin by Using the Polymer Mercox

Miroslav Stefanov, Jungdae Kim

Journal of Pharmacopuncture 2015;18(3):075-079

Abstract

Objectives: As the peripheral part of the primo vascular system (PVS) is difficult to visualize, we used a vascular casting material Mercocox injected directly into the skin to take advantage of a simple procedure to visualize PVS structures as primo vessels (PVs) and primo nodes (PNs) in the skin. **Methods:** Two colors of the polymer Mercocox were injected into mouse skin. After a partial maceration of the whole body with potassium hydroperoxide solution, we anatomized it under a stereomicroscope to trace the Mercocox that had been injected into the PVS. **Results:** Injection of Mercocox directly into the skin allowed the PVs and the PNs to be visualized. This approach can fill the PVS when the material is ejected out of the PVs or PNs. The shapes, sizes, and topographic positions of the nodes and the vessels are the hallmarks used to identify the PVS in skin when Mercocox is used as a tracer. **Conclusion:** The direct injection of the casting material Mercocox into skin, with modified partial maceration procedures, is a promising method for visualizing the PVs and the PNs in the peripheral part of the PVS in skin. The polymer Mercocox can penetrate through the primo pores of the primo vascular wall and fill the PVs and the PNs. The data prove that PVs and PNs exist on the hypoderm layer.

15. Fatty acid composition of subcutaneous and visceral fat depots in New Zealand white rabbits.

Yonkova, P., G. Mihaylova, S. Ribarski, V. Doichev, R. Dimitrov, **M. Stefanov**

Bulg J of Vet Med, **2017**, 20 (3): 204-214.

Abstract

The aim of this study was to identify the differences in the fatty acid composition of subcutaneous and visceral fat depots in healthy New Zealand White rabbits. Twelve clinically healthy rabbits with an average weight of 3.00 ± 0.03 kg were used. The fatty acid composition of interscapular, inguinal, pericardial, perirenal and omental fat depots was determined by gas chromatography. The palmitic (C16:0) and linoleic (C18:2) acids, followed by oleic acid (C18:1) prevailed in all fat depots. The highest percentage of palmitic acid (C16:0) was detected in subcutaneous depots: inguinal ($41.05 \pm 1.80\%$) and interscapular ($38.30 \pm 0.73\%$), whereas the highest percentage of linoleic acid (C18:2) was found in the visceral depots: perirenal ($44.26 \pm 0.96\%$) and pericardial ($42.77 \pm 1.19\%$). Among the saturated fatty acids, myristic (C14:0) and stearic acid (C18:0) were established in higher content in subcutaneous depots than in visceral ones. Palmitoleic acid (C16:1) content in the pericardial fat depot was $10.63 \pm 2.60\%$, while in the interscapular, perirenal, omental and inguinal FD it was almost twice lower ($P < 0.001$). In the omental depot, α -linolenic acid (C18:3) content was significantly higher only vs the interscapular depot ($P < 0.05$). The high content of saturated fatty acids in the subcutaneous depots determined their higher atherogenic and saturation index, unlike visceral ones, where a significantly higher content of unsaturated fatty acids was reported. Differences in fatty acid composition of subcutaneous and visceral fat depots proved the specific metabolism in each of them. On the other hand, this led to differences in the nutritional value of various parts of rabbit carcass.

16. Western medicine versus Eastern medicine – do both have a common root, scientific background and world-wide recognition?

Stefanov, M., S. Stoev, T. Kim, S. Kim

Alternative therapies in health and medicine, 2020, 26 (2): 38-44.

Abstract

This review is designed to initiate a discussion we believe is necessary for the biomedical community, because of some recent evidences for existing of a new body anatomical system, or the primo vascular system (PVS), which could be the missing link in the scientific explanation of the unknown mechanism of action of acupuncture. Some important questions for the medical society, (eg, "What is the main source of the mistrust of Western medicine toward traditional Oriental medicine and could it be overcome?" or "Is the PVS a real one and what is its distribution, formation, and function?" or "Are there scientific proofs for intimate relationships of the PVS with meridian system and whether the PVS would be the physical basis of meridians?") are deeply studied and appropriately answered. Various pieces of knowledge are now combined to achieve a better understanding and to provide an acceptable explanation about the functions of such new system and to explain the functional path used by traditional Eastern medicine to cure diseases. Some possibilities to use this PVS for development of some innovative therapies to treat some diseases are also discussed (eg, pharmacopuncture as a new innovative drug delivery method that combines acupuncture therapy with medication by injecting pharmacological substances into target acupoints).

17. Some Indian herbs having protective effects against deleterious effects of ochratoxin A in broiler chicks.

Stoev, S., K. Dimitrov, N. Grozeva, I. Zarkov, T. Mircheva, D. Zaprianova, I. Valchev, S. Denev, S. Chobanova, **M. Stefanov**, R. Arora

World mycotoxin journal, 2021, 14 (4): 525-538.

Abstract

Abstract

A protective effect of two herbs, *Glycyrrhiza glabra* and *Tinospora cordifolia*, given as feed additives was observed against the growth inhibitory effect of ochratoxin A (OTA) and associated immunosuppression and biochemical or pathomorphological changes. The feed levels of 3 mg/kg OTA and fine powder of one of both herbs were given during a period of 32 days to female broiler chicks divided into 3 experimental and 1 control groups (14 chicks per group). The observed pathological and biochemical changes, the changes in relative organs' weight and body weight, and the decrease of antibody titer against Newcastle disease were more pronounced in the OTA-treated chicks without herbal supplementation, and less pronounced in the chicks treated additionally with *G. glabra* or *T. cordifolia* as was shown by the better feed performance and the higher body weight in the chicks treated with the herbs. The higher relative weight of lymphoid organs of the chicks supplemented with both herbs revealed their beneficial effects on the immune system. The hepatoprotective effect of both herbs was evident, being stronger in the chicks additionally supplemented with *G. glabra* shown by the pathomorphological findings and by the lower levels of aspartate transaminase (131.1 U/l) compared to chicks given only OTA (156.0 U/l). A protective effect of *T. cordifolia* on the bone marrow and kidneys was found as was shown by the lower levels of uric acid (382.9 $\mu\text{mol/l}$) compared to chicks given only OTA (466.9 $\mu\text{mol/l}$).

18. Primo Vascular System: Before the Past, Bizarre Present and Peek After the Future

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Miroslav Stefanov

Introduction: Is Primo Vascular System (PVS) a paradox? Finding the connection between PVS as a carrier of information and the body's reactions at the micro and macro levels will be the starting point in understanding the meaning of life as such. Before the past of PVS knowledge: The initial phase of medicine in all cultures is reduced to the transfer of specific energy by special pathways throughout the body! This is the case in China, India, Japan, Korea, Tibet, etc. Undoubtedly, the five articles by B. H. Kim published in the early 1960s are considered to be the past of PVS. Strange present: PVS studies after 2002 are accepted as a present. Most of the articles on the topic are in journals with editors-in-chief originating and/or accepting the achievements of Eastern medicine. Is the science of PVS local since its research is in journals that publish mainly articles on Eastern medicine? Why few of the articles concerning PVS are in Western medicine journals? PVS: after the future or some conclusions and proposals: All substances, objects, biological objects generate a weak electromagnetic radiation typical for each of them which is a passport of the information. PVS has all the data to be the main carrier of information. Information medicine and Quantum Biology can serve as a basis for medicine and biomedical sciences, and it should explain the processes that exist for the change of DNA and organisms in general, in accordance with and in response to external causes and internal changes.