MERIT RESEARCH JOURNALS
www.meritresearchjournals.org

Merit Research Journal of Medicine and Medical Sciences (ISSN: 2354-323X) Vol. 5(3) pp. 187-191, March, 2017
Available online http://www.meritresearchjournals.org/mms/index.htm

Original Research Article

Anatomical study of potential connection between the acupuncture point LU5 and sympathetic reaction of spinal nerves

***František Dorko, Radka Durďáková and Radomír Durďák**

Department of Anatomy, Faculty of Medicine, University of Ostrava, Syllabova 19, Czech Republic

***Corresponding Author's E-mail: frantisek.dorko@osu.cz**

Abstract

The acupuncture is one of the most widely known methods of Chinese medicine. The essence of acupuncture is the insertion of special needles into acupuncture points, which are located on energetic pathways called meridians. In this paper, we have focused on the lung meridian, specifically on the possible influence of acupuncture point LU5 stimulation by an acupuncture needle on bronchial asthma. Our study focuses on locating the points, their projection on the upper limb, and dissection of surrounding areas in thin layers and finding of possible ways of their influence on a human organism. By dissection of these points and subsequent evaluation of surrounding structures, which could be influenced by the insertion, it is possible to determine the potential way how the given meridian can influence functions of organs, which are assigned to it.

Keywords: Acupuncture, Anatomy, Bronchial asthma, Cadaver, Meridian, Physiology, Traditional Chinese Medicine

INTRODUCTION

The Chinese traditional medicine represents a group of therapeutic methods, which includes phytotherapy, breathing exercises and curative gymnastics (as Tai-chi, five animals, etc.) and Zhēnjiǔ, which is known throughout the European area in its Latin name: acupuncture (acus = needle and punctura = puncture). The acupuncture is known to man at least since 3 thousand years BC, but its age is estimated to 7 thousand years, and this surmise is confirmed by finding of stone and bone needles.

The first written reference is dated 80 BC, in which are described 6 apertures for practicing of acupuncture. These points are located on limbs and are named in analogy with the watercourse of a river, translated as the Spring, Brook, Place from which watercourse is navigable by a ship, Stream, River Mouth, and Delta. In the tomb of Han dynasty, which ruled in China in the time period of 200 BC – 900 AD, wooden figurines with marked paths were found. These paths are called meridians, and the life energy – qi, is flowing in them and according to teaching of the traditional Chinese medicine, this energy springs to the surface in acupuncture points. Meridians also create a connection between surface parts of the body and inner organs. Qi consists of 2 opposite components, Jin and Jang. Their mutual relationship and balance or imbalance subsequently affects the state of a disease or health state of an individual. Superiority of one and minority of the other one on the contrary, affects the actual state of and individual and his homeostasis. The essence of acupuncture is the insertion of a special acupuncture needle into exactly determined points found on the human body. According to teachings of the acupuncture, these specific points are located on energetic paths, so called meridians, and life energy "qi" is flowing in them. Injury of these energetic canals causes imbalance, which gives rise to several health problems according to the severity of the injury and the characteristic of a particular meridian. More acupuncture points were attached to initial paths and points over the years, these points are called extra points, and thus 361

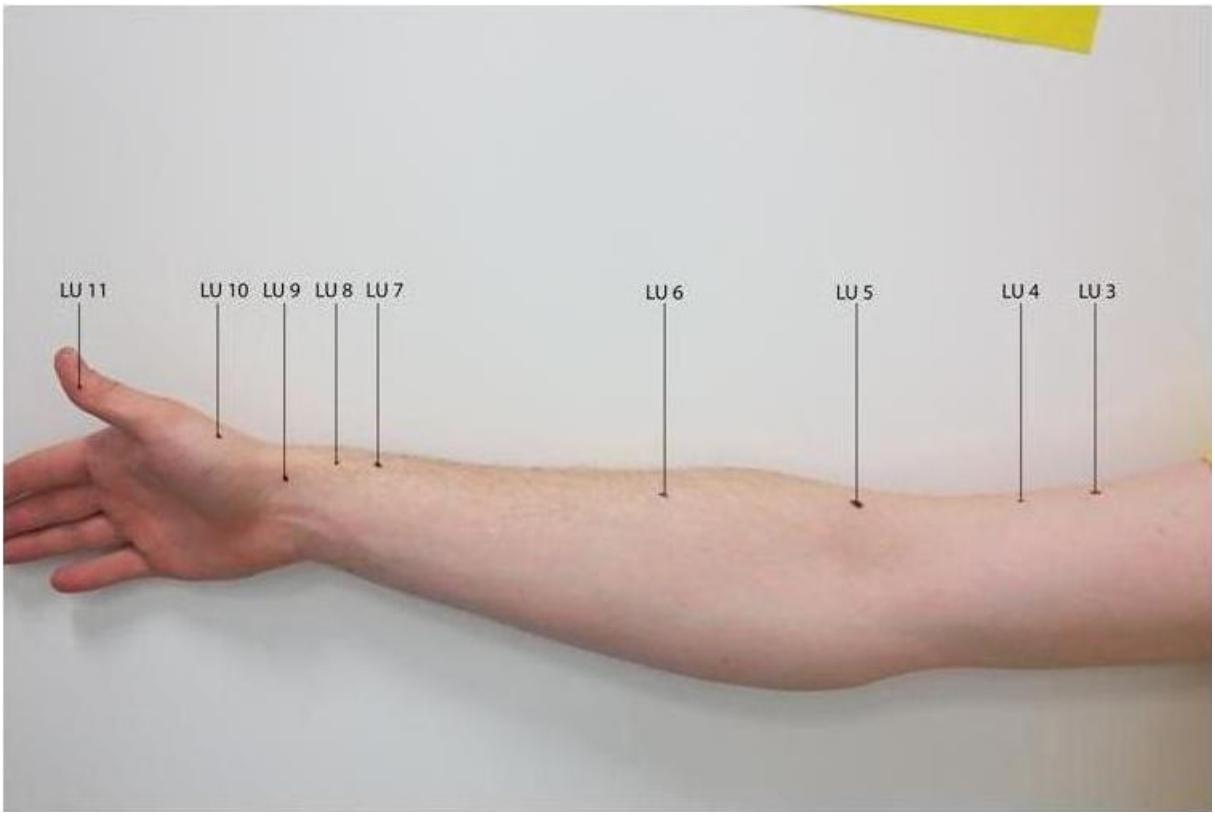

Fig 1. Projection of lung meridian acupuncture points on the cadaver upper limb

points localized on 12 main and 8 side paths are used in today's practice. For some meridians or their points were already proven connections with particular organs and their functions, when by the insertion of special needles or by another source of irritation, we can affect the intended organ or the whole organism as well, causing purposeful stimulation or inhibition.

The fifth point of the lung meridian, called also LU5 is in Chinese called Chi ze. This name comes from its assignment to water elements, but it's mainly derived from its position, since this point is located 1 chi (Chinese unit of measurement, approximately 30.5cm or 1 foot) from Cunkou, which is a place where the pulse is measured. Literally it means "1 foot away from the bog".

The LU5 is according to the Chinese teaching of acupuncture a master point with calming effects, and according to this teaching, it is a very important point for analgesia and should have sedative effects. According to the acupuncture theory, it is also one of the 5 transition points – posing as the connection point on the lung path. Its position is described in the middle of the elbow fold on the radial side of the tendon of biceps brachii muscle.

MATERIAL AND METHODS

The study was carried out on 10 upper limbs of cadavers fixated using the prescribed fixation using the formal method at the Department of Anatomy, Faculty of Medicine by University of Ostrava, which were obtained from donors via written agreement on use of their bodies for purposes of medicine, research or for education. The prescribed fixation of the cadaver was performed by the dissection of the femoral artery and subsequent introduction of fixating solution into the bloodstream; in this case the solution was a mixture of phenol, formaldehyde, ethanol, acetone, glycerin, and water. Through both optical canals was using long needles performed fixation of the brain. We have studied the topographical structure of structures near points of insertion and dissected the individual nerves and veins which pass through a given point. We have inserted the needles perpendicularly to the skin surface into depth of 1-33mm.The lung meridian has 11 points spread over the upper limb. We have split the research into 3 phases for the purpose of better accuracy and verification. In the first phase, we have used special training models and training mats to learn how to properly insert the acupuncture needle. With the help of expert recommended literature and exact drawings we have trained the exact placement and localization of points on the human body and subsequently the correct insertion of the needle into these specific acupuncture points into the prescribed depth and under the correct angle. In the second phase

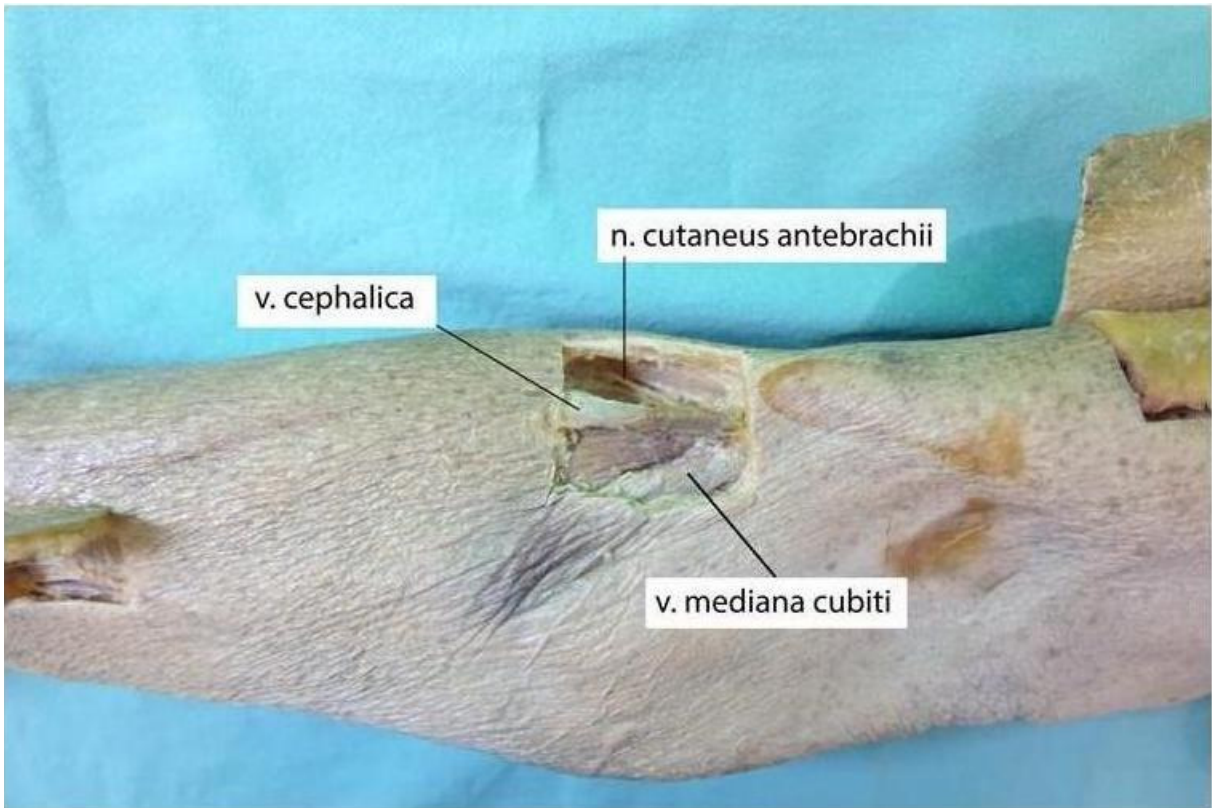

Fig 2. Acupuncture point LU5 and its anatomical structures

of the research we have localized acupuncture points of the lung meridian on a live human model and tried inserting needles into ourselves to verify that there is a nerve ending in the specific point, which we proved by irritation of the point by the acupuncture needle. We have decided to undertake this step in order to achieve the best possible projection of points on the cadaver, since cadavers used in our research were before the dissection properly treated with the prescribed fixation method, and after the stabilization in fixation solutions are occurring micro deformations of tissues, so it is not possible to ensure an entirely neutral position of the cadaver, and therefore we have tried to determine the insertion point as exactly as possible in order to obtain the most convincing results. (Fig 1)

In the last phase, we marked acupuncture points on cadavers. After marking the position of selected acupuncture points we began the dissection. The dissection was carried out in the place of the acupuncture point in the necessary depth of insertion according to the teachings of acupuncture. Tissues were separated into layers, respecting anatomical structures belonging to the given area with special regards to careful dissection of veins and nerve structures in the location of anatomic structures along the lung meridian. Acupuncture points on the lung meridian were studied and after comparison of individual dissections we have found no serious anatomical deviations between various cadavers. In the end, we have made photographic documentation and description.

RESULTS

The lung meridian contains the point LU5, in Chinese Chize, which is a sedative point. In the area of the acupuncture point LU5 were dissected multiple important anatomical structures. With respect to the fact, that in practice is by the practicing physician or healer deemed necessary after the insertion of a needle the feeling of “qi” (described as tingling, itching, etc.), the most efficient structure of each acupuncture point should be more important nerve, which passes through this location. In this case, we have found that in this location it is the lateral cutaneous antebrachial nerve, which a sensitive nerve is passing between the biceps brachii muscle and brachialis muscle on the arm, where the cephalic vein joins it after passing through the fascia, which can also be seen on the picture from the dissection. It is probable that after the insertion of the acupuncture needle may be irritated not just the nerve, but also the cephalic vein, because the effect of acupuncture is described not only by affecting nerves, but also venous formations, fascia and muscles as well as direct muscular insertions. (Fig 2)

The lateral antebrachial cutaneous nerve branches

from the musculocutaneous nerve, root innervation of which is in the area C5 – C7 from the lateral fascicle, the nerve then passes through the coracobrachialis muscle on the arm and subsequently through the biceps brachii muscle and is a part of the infraclavicular brachial plexus.

Based on the dissection of acupuncture points was found a possible way of the effect of irritation of the acupuncture point LU5 by insertion of an acupuncture needle, when the irritation caused by the insertion of the acupuncture needle near the lateral antebrachial cutaneous nerve probably spreads through the musculocutaneous nerve into its root innervation in C5-C7 region.

DISCUSSION

Traditional Chinese Medical Science (TCMS), which is based on the acupuncture meridian system (AMS) (UNSCHULD et al., 2003) has been used in clinical practice for > 2500 years (Zhao, 2015).

A study of acupuncture points on cadavers was already performed (Kim et al., 2015) with emphasis on the point LI11 at PC6 (Joo et al., 2012). Acupuncture is one of the most common complementary therapies in many countries and is considered as a relatively safe procedure (White, 2004). Many acupuncture points on limbs are located in close proximity to peripheral nerves (Joo et al., 2012; Kessler and Streitberger, 2008; Sato et al., 2003). We have performed acupuncture of the point LU5 by insertion of an acupuncture needle, which we inserted under an angle into depth of 0,17 – 0,33 cm. Acupuncture of this point is used for respiratory diseases (acute and chronic bronchitis, incipient bronchopneumonia, pleuritis, TBC, bronchial asthma, breathlessness, chest pain with coughing, hemoptysis, angina), neurosis, depression, urinary incontinence, psychosis; chorea, hysterical cramps of children; issues with motoric and sensory function of the upper limb, joint swelling, hemiplegia, quadriplegia, paresis of facial nerve, writer's cramp, Dupuytren's contracture, omarthrosis (Šmirala, 2005). The indication of acupuncture, more precisely its lung meridian is recommended by (Hecker, 2010). The positive influence of acupuncture on children affected by bronchial asthma is described by (Scheewe et al., 2011; Joos et al., 1997).

It appears to be especially effective in case of children and adolescents in light of disease patters and experience with the disease (Creer et al., 1993), there seems to be an evidence-based exploration of advanced therapy options, such as the acupuncture (Martin et al., 2002), for example for asthma is by the WHO listed acupuncture. While there have been indications for positive effects of needle acupuncture in asthma for adults (Medici et al., 2002), there is only a limited number of controlled studies in the field of pediatric pneumology (Chow et al., 1983; Fung et al., 1986; Gruber et al., 2002; Ng et al., 2004).

The root innervation of lateral antebrachial cutaneous nerve comes from C5-C7. From the anatomical standpoint, the musculocutaneous nerve C5 – C7 roots in lateral fascicle and travels down through the arm, where it passes through coracobrachialis muscle and then passes through an aperture between biceps brachii muscle and deeper brachialis muscle; it gives motor innervation to muscles on the front side of the arm (biceps brachii muscle, coracobrachialis muscle, brachialis muscle); after separation of motor muscular branches it continues as lateral antebrachial cutaneous nerve, which is a sensitive nerve; between the biceps brachii muscle and the brachialis muscle it travels down to the forearm and after passing the fascia it joins the cephalic vein; it innervates the skin of the lateral half of the forearm (on palmar and dorsal side).

The medial cervical sympathetic ganglion is usually at the level of the prominence on the 5th cervical vertebra, usually on the spot where the sympathetic trunk crosses with the inferior thyroid artery. The medial cervical ganglion sends postganglionic fibers - gray *rami communicantes* into C4 and C5 nerves, and its preganglionic fibers are travelling through ganglion of the sympathetic trunk from the dividing line of the cervical and thoracic spinal cord (Čihák, 2004; Netter, 2012).

By performing the dissection, we have proven that in the vicinity of the insertion point passes the lateral antebrachial cutaneous nerve. Based on results of the dissection was found a probable way of spreading of the nerve impulse. After intentional irritation of the point LU5 through the musculocutaneous nerve, root innervation of which is in the same spinal area as grey *rami communicantes* of the medial cervical ganglion, irritation of the sympathetic nervous systemoccurs. We can assume that there will be irritation of postganglionic fibers, which would subsequently lead to the binding of neurotransmitters with specific membrane receptors. Effects of postganglionic neurotransmitters are the result of the binding of a neurotransmitter with specific protein type membrane receptors, which cause conformational change of the protein molecule structure and subsequently increase the permeability for certain ions, or activate an enzyme on the other side of the receptor. The change of permeability and transfer of ions causes the creation of an action potential in the smooth muscle, and contraction. A similar phenomenon occurs in glands, where the change of the state of membrane in combination with a neurotransmitter causes secretion. Relaxation of the tracheal muscle then occurs through the beta 1 receptor, in addition to that occurs also inhibition of bronchial glands. Bronchi are therefore governed by the autonomous nervous system. The parasympathetic system causes bronchial constriction through the vagusnerve, the sympathetic system causes bronchial dilatation through beta1 receptors.

In practice is widely accepted the fact that asthma causes an inflammation of bronchi and subsequent pathologic over limit secretion, and the treatment of this disease is performed using pharmaceutics (Wen et al., 2005) which cause dilatation of bronchi during an asthmatic attack. Therefore, it is highly probable, that treatment using acupuncture uses mechanisms which result in the dilatation of bronchi, and we have found a nervous pathway which may cause activation of the sympathetic nervous system, though it is impossible to rule out other possible effects of the acupuncture. Effects of local inflammation or other theories of effects of the acupuncture may have their part on the effect as well.

The beginning of the acceptance of acupuncture into western medicine was the integration of some therapeutic procedures into practice which are applied in foreign countries (Zheng, 2014). Several acupuncture points are proven to be positioned in the vicinity of various nerve structures. The lung pathway, which we are researching, should have a positive effect on lung and respiratory diseases, asthma, diseases caused by cardiac congestion in lungs, facial edema, pain along the pathway of the meridian, lesions of the eye and skin.

CONCLUSION

We have proven that the lateral antebrachial cutaneous nerve travels through the area of point LU5. This nerve branches from musculocutaneous nerve, which has root innervation in C5-C7. We have proven a connection between the nerve path in point LU5 and a possibility of irritation of postganglionic sympathetic fibers.

Conflict of Interest

The authors declare that they have no conflicts of interest and no financial interests related to the material of this manuscript.

Funding

The study was financed under LF OU project financing, project SGS16/LF/2016.

REFERENCES

Chow OK, So SY, Lam WK, YuDY, Yeug CY (1983). Effect of acupuncture on exercice induced asthma. Lung.;161:321-26.

Čihák, R (2004). Anatomy 2, modified and supplemented edition Prague: Grada,;ISBN 80-247-1132-X.

Creer TL, Wigal JK, Kotses H, Hatala JC, McConnaughy K, Winder JA (1993). A life activities questionnaire for childhood asthma. J Asthma.;30(6):467–73.

Fung KP, Chow OK, So SY (1986). Attenuation of exercise-induced asthma by acupuncture. Lancet.; 2:1419–22.

Gruber W, Eber E, Malle-Scheid D, Pfleger A, Weinhandl E, Dorfer L, Zach MS (2002). Laser acupuncture in children and adolescents with exercise induced asthma. Thorax.; 57(3): 222–5.

Hecker HU (2010). Pocket textbook Acupuncture: Body Points, Ear and startup. Prague: Grada; p. 285.

Joo Oh H, Ko YK, Cho SS, Yoon SP (2012). A cadaveric study of needle insertion at PC6 in eight wrists of four subjects and an understanding of the anatomy. Acupunct Med;30(1):44–6.

Joos, Martin E, Zu H (1997). Akupunktur in der Behandlung des Asthmabronchiale. In : Maric-Oehler W, Hunten K eds. 1. Mainzer Akupunktur-Symposium, Akupunktur undUniversität. Stuttgart: Hippokrates,:72–83.

Kessler J, Streitberger K (2008). Perforation of the median nerve with an acupuncture needle guided by ultrasound. Acupunct Med;26(4):231–3.

Kim J, Oh HJ, Yoon SP (2015). A cadaveric study of needle insertion at LI11. AcupunctMed ;33(6):497-9.

Martin J, Donaldson AN, Villarroel R. Parmar MK, Ernst E, Higginson IJ (2002). Efficacy of acupuncture in asthma: systematic review and meta-analysis of published data from 11 randomised controlled trials. Eur. Respir.J.;20,4:846–52.

Medici TC, Grebski E, Wu J, Hinz G, Wüthrich B (2002). Acupuncture and bronchial asthma: a long-term randomized study of the effects of real versus sham acupuncture compared to controls in patients with bronchial asthma. J AlternComplem Med; 8(6): 737-50.

Netter FH (2012). Atlas of Human Anatomy. 2nd ed. Prague: CPress;. p. 131-2.

Ng DK, Chow P, Ming SP, Hong SH, Lau S, Tse D, Kwong WK, Wong MF, Wong WH, Fu YM, Kwok KL, Li H, Ho JC (2004). A double-blind, randomized, placebo-controlled trial of acupuncture for the treatment of childhood persistent allergic rhinitis. Pediatrics; 114(5):1242-7.

Sato M, Katsumoto H, Kawamura K, Sugiyama H, Takahashi T (2003). Peroneal nerve palsy following acupuncture treatment. A case report. J Bone Joint Surg Am;85-A(5):916–8.

Scheewe S, Vogt L, Minakawa S, Eichmann D, Welle S, Stachow R, Banzer W (2011). Acupuncture in children and adolescentswithbronchialasthma: arandomisedcontrolled study. ComplementTher Med;19(5), 239–46.

Šmirala J (2005). Compendium of Acupuncture 1. Martin: Osveta;, p. 447th.

UNSCHULD, Paul U. Huang Di neijingsu wen (2003). Nature, Knowledge, Imagery in an Ancient Chinese Medical Text. Berkeley and Los Angeles, California : University of California Press. ISBN 0-520-23322-0.

Wen MC, Wei CH, Hu ZQ, Srivastava K, Ko J, Xi ST, Mu DZ, Du JB, Li GH, Wallenstein S, Sampson H, Kattan M, Li XM (2005). Efficacy and tolerability of anti-asthma herbal medicine intervention in adult patients with moderate-severe allergic asthma. J Allergy ClinImmunol;116(3):517–24.

White A (2004). A cumulative review of the range and incidence of significant adverse events associated with acupuncture. Acupunct Med;22(3):122–33.

Zhao LJ (2015). Acupuncture Meridian of Traditional Chinese Medical Science: An Auxiliary Respiratory System. Acupunct Meridian Stud;8(4):209.

Zheng Z (2014). Review Article. Acupuncture in Australia: regulation, education, practice, and research. Integr Med Res. (3): 103–110.