

## Needling depth at BL52 in 13 cadavers

### BACKGROUND

BL52 is located 3 *cun* lateral to the lower border of the spinous process of the L2 vertebra. The needling pathway includes the skin, subcutaneous tissue, latissimus dorsi muscle, intrinsic muscles of the back, quadratus lumborum muscle, the dorsal branches of the second lumbar artery and vein, and the lateral branches containing fibres from the second lumbar spinal nerve.<sup>1</sup> Deep perpendicular needle insertion at this location in the lower back risks damage to the kidneys,<sup>2</sup> which are located in the dorsal region of the abdominal cavity within the retroperitoneal space.

### ANATOMICAL OBSERVATION

In 2015, we observed the needling depth at BL52 on the right side of 13 cadavers during the eighth week of medical student anatomical dissection teaching at Flinders University of South Australia (table 1). The left sides of the cadavers were not included, because they had already been dissected by the medical students. The cadavers were donated through the Body Donation Program to the school for teaching and research purposes.

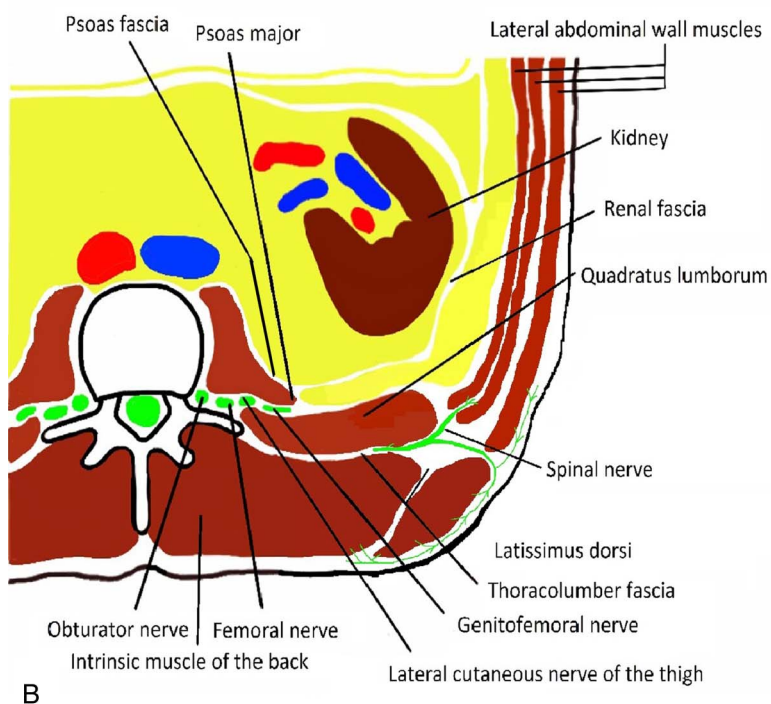
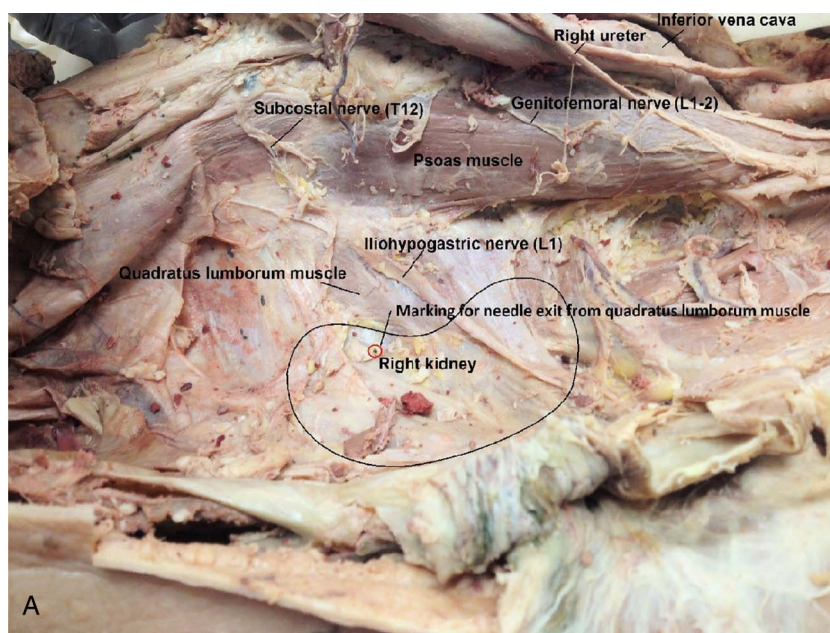
**Table 1** General characteristics of study cadavers

No	Age	Sex	Cause of death
1	79	M	Congestive heart failure
2	67	M	Colorectal cancer
3	75	M	Pneumonia
4	95	M	Sepsis due to perforated diverticulum
5	83	M	Pneumonia and congestive heart failure
6	57	M	Mesothelioma
7	77	F	Lung cancer
8	91	F	Pneumonia
9	91	F	Breast cancer
10	88	F	Cerebral atherosclerosis
11	83	F	Renal failure and ischaemic stroke
12	79	F	Myocardial infarction
13	88	F	Ischaemic stroke

None of them were Australian Aboriginal or Torres Strait Islanders. Ethical approval was granted by the Southern Adelaide Clinical Human Research Ethics Committee (reference no. 245.14—HREC/14/SAC/241).

In each cadaver, a caudal-cranial sagittal dissection was performed to expose the lumbar vertebra. The interspace of L2/3 was located by

visually counting the vertebra. Then, the *cun* measurement of each individual cadaver was obtained by measuring the width of its thumb, which was used for localisation of BL52 at the level of L2/3. Next, the depth-measuring blade of a vernier caliper was inserted dorsally and perpendicularly to the surface of the skin at BL52 to mimic acupuncture needle



**Figure 1** Photographic (A) and graphical (B) depiction of anatomical relationships of acupuncture at BL52.

insertion until the deepest layer was perforated. A vernier caliper was used in order to provide precise measurement to the nearest 1 mm. The needling depth was defined as the depth at which the blade passed through all the tissue layers and entered the abdominal cavity, and the safe depth was defined as 75% of the needling depth;<sup>3</sup> that is, safe depth increases proportionately with needling depth. The procedure was carried out by KLC, who is an experienced registered acupuncturist.

### NEEDLING DEPTH AT BL52

All needles inserted dorsally and perpendicularly at BL52 perforated the quadratus lumborum muscle (figure 1). In general, male subjects had a greater needling depth than female subjects (median 37 (IQR 24–59) mm vs 30 (21–46) mm). Therefore, the safe depths in males and females were estimated to be 28 (18–44) mm and 23 (16–35) mm, respectively. Overall needling depth was 32 (25–47) mm and the safe depth was 24 (18–35) mm for male and female subjects combined.

### COMMENT

To our knowledge, there have been two previous published observations of needling depth at BL52. In 1998, a study of 51 cadavers in China suggested that the overall needling depth was approximately 32–35 mm.<sup>3</sup> In 2003, another study of 10 cadavers in China reported that the overall needling depth was about 28 mm.<sup>4</sup>

Needling depth at BL52 in the present (third) study was similar in magnitude.

The safe depth of 24 (18–35) mm suggests that the tip of the needle will typically lie between quadratus lumborum and latissimus dorsi after insertion (figure 1). This observation suggests that needles at BL52 come into close proximity with lumbar spinal nerves, which travel anteriorly between the quadratus lumborum and latissimus dorsi muscles before entering the plane between the internal oblique and transversus abdominis muscles. Thus, needling at this site may stimulate the somatic and sympathetic nervous systems to induce local and systemic effects.<sup>5</sup>

### CONCLUSION

Our observation showed that the overall needling depth and safe depth at BL52 were 32 (25–47) mm and 24 (18–35) mm, respectively, in Australian cadavers.

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**Contributors** KLC was responsible for the original idea of this research, study design, ethics application, data collection, statistical analysis, discussion of the

research findings, and preparation of the manuscript. RVH was responsible for supervision, provision of expert opinion about the research, and discussion of the research findings. Both authors examined and approved the final manuscript.

**Competing interests** None declared.

**Ethics approval** Southern Adelaide Clinical Human Research Ethics Committee.

**Provenance and peer review** Not commissioned; internally peer reviewed.



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**To cite** Chia KL, Haberberger R V. *Acupunct Med* 2017;**35**:155–156.

Accepted 6 November 2016  
Published Online First 28 November 2016

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*Acupunct Med* 2017 35: 155-156 originally published online November 28, 2016

doi: 10.1136/acupmed-2016-011233

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