Acupuncture might have contributed to improving amenorrhoea in a top athlete

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Abstract
A 26-year-old top female athlete (height 157 cm), who took part in competitive sport similar to middle- and long-distance running, became amenorrhoeic in February 2009. In late May 2009, athletic amenorrhoea was diagnosed and a norgestrel–ethinyl estradiol combination (norgestrel 0.5 mg and ethinyl estradiol 0.05 mg three times daily) was prescribed for 2 weeks. She experienced menstrual bleeding on one occasion for 4 days in mid-June before becoming amenorrhoeic again. The athlete visited our centre to try acupuncture treatment. Forty-six acupuncture sessions were given between 1 October 2009 and 2 November 2010. Acupuncture point selection was based on classical acupuncture medicine and included points long used for gynaecological disorders in Japan—namely, CV6, CV12, LR3, LR14, BL17, BL18, BL23, SP6 and SP10. On 7 May 2010, owing to lack of regular normal vaginal bleeding, she again consulted her gynaecologist and was prescribed the same hormone preparation as used previously. She took it for 2 weeks in conjunction with acupuncture treatment. From July, the amount and duration of menstrual flow increased at regular intervals. Throughout July, a biphasic pattern in basal body temperature (BBT) was gradually established. In conclusion, the single hormone replacement therapy in May 2009 without acupuncture treatment was not effective for the amenorrhoea, nor was the single acupuncture treatment between October 2009 and May 2010. However, after hormone replacement therapy was started in May 2010 in conjunction with regular acupuncture treatment, menstrual blood flow restarted and BBT moved close to the biphasic pattern.

INTRODUCTION
Acupuncture treatment is often used for the prevention and rehabilitation of sports injuries in Japan, particularly orthopaedic disorders among field athletes. For female competitive athletes, the female athletic triad consisting of the three inter-related conditions of disordered eating, amenorrhoea and osteoporosis has been clinically recognised.2 Acupuncture treatment has sometimes been tried to treat amenorrhoea in non-athletes,3–5 but we found no such reports pertaining to athletes in a literature search of PubMed. We report here the successful treatment of amenorrhoea in a top athlete through acupuncture treatment in conjunction with medication.

PRESENTATION AND HISTORY
A 26-year-old top female athlete (height 157 cm) involved in competitive sport similar to middle- and long-distance running (the competitive sport cannot be named to ensure anonymity) became amenorrhoeic in February 2009. In 2004 and 2005 she successfully competed in the Japan Intercollegiate Championships, in 2006 she joined the national team and she has since competed in the World University Championships, Japan Championships and World Championships with good results. Her menstruation was normal until August 2008 (body weight (BW) 48.1 kg, body mass index (BMI) 19.5, body fat rate (BFR) 23.7%: TBF-410 Body Composition Analyzer; TANITA Corporation, Tokyo, Japan), but thereafter although her menstrual cycles were still normal, the amount of menstrual flow gradually decreased until she became amenorrhoeic in February 2009 (BW 43.2 kg, BMI 17.9, BFR 17.3%). In late May 2009, athletic amenorrhoea was diagnosed by a gynaecologist and a norgestrel–ethinyl estradiol combination (norgestrel 0.5 mg and ethinyl estradiol 0.05 mg three times daily; Planovar Combination Tablets, Takeda Pharmaceutical Company, Osaka, Japan) was prescribed for 2 weeks. She experienced menstrual bleeding on one occasion for 4 days in mid-June before becoming amenorrhoeic again. The athlete herself wished to try acupuncture treatment and visited the acupuncture department of the Center for Integrative Medicine, Tsukuba University of Technology on 1 October 2009 (BW 44.0 kg, BMI 17.9, BFR 17.3%).

TREATMENT
Acupuncture point selection was based on classical acupuncture medicine and included those points that have long been commonly used for gynaecological disorders in Japan—namely, CV6, CV12, LR3, LR14, BL17, BL18, BL23, SP6 and SP10. In traditional acupuncture medicine, gynaecological disorders including menstrual disorders are supposed to be deeply related to the Conception Vessel as the name “conception” shows and the Liver meridian. The Conception Vessel is supposed to start from the womb and the Liver meridian is supposed to end in the womb according to classical acupuncture theory. Thus, CV12 and CV6 have been used for the treatment of menstrual disorders,1 BL18, LR3 and LR14 are respectively considered to be an Associated point, a Primary point and an Alarm point of the Liver meridian.6 Moreover, since menstrual disorders are classed as Blood disorders in traditional acupuncture medicine, BL17 (Confluent point to Blood)6 and SP10 (the Centre of Blood) were used. Also used were BL23 (a point related to Fundamental Qi; body energy) and SP6 which has been commonly used for gynaecological disorders for a long time in traditional Japanese acupuncture.

Disposable tubes and needles (diameter 0.16 mm, length 40 mm) sterilised with ethylene oxide gas (Seirin Corporation, Shimizu, Japan) were used. When the needles were inserted 0.5–0.7 cm deep depending on the part of the body, the patient experienced a slightly heavy feeling according to the course of the meridian called de qi; and needles were retained for 10 min. As soon as the needles were inserted, the
patient felt warmth in the feet which spread throughout the body.

Acupuncture sessions continued and the patient felt her overall physical condition was good. Although she experienced a small amount of vaginal bleeding on 2 and 21 December 2009 and on 11 January and 27 February 2010, she consulted her gynaecologist again on 7 May 2010 owing to lack of regular normal vaginal bleeding. The same hormone preparation used previously was prescribed and she took it for 2 weeks in conjunction with acupuncture treatment. From 24 May she experienced vaginal bleeding for 6 days (BW 43.9 kg, BMI 17.8, BFR 17.0%) and acupuncture treatments continued thereafter. A small amount of vaginal bleeding occurred on 12 June for only 1 day and from July the amount and duration of menstrual flow increased at regular intervals. Throughout July, a biphasic pattern in basal body temperature (BBT) was gradually established (figure 1) and acupuncture treatment was completed at the 46th session on 2 November 2010 (BW 44.9 kg, BMI 18.2, BFR 18.0%).

The patient did not alter the intensity of her daily training throughout the period of acupuncture treatment (figure 1) and she reported no noticeable change in the degree of physical and mental stress during that time.

DISCUSSION
Neither the single hormone replacement therapy in May 2009 nor the acupuncture treatment alone between October 2009 and May 2010 effectively alleviated the amenorrhea. However, after hormone replacement therapy was started in May 2010 in conjunction with regular acupuncture treatment, menstrual blood flow restarted and BBT moved close to the biphasic pattern. As seen in figure 1, it is possible that the slight amount of vaginal bleeding on 12 June 2010 was non-pathological metrorrhagia and that menorrhoea occurred during July. It is thought that several occurrences of menorrhoea were in fact non-ovulatory menstruation, but ovulatory menstruation did occur in December 2010 (figure 1), suggesting that the patient’s menstruation had restarted. The patient’s intensity of exercise and psychological stress were not

**Figure 1** Clinical course. Medication: norgestrel–ethinyl estradiol combination (norgestrel 0.5 mg and ethinyl estradiol 0.05 mg three times daily). AT, acupuncture treatment; BBT, basal body temperature; BW, body weight; BFR, body fat rate; BMI, body mass index; DC, domestic competition; IC, international competition; IE, intensity of exercise (strong, moderate, weak); TAAP, trip abroad to competition.
altered during the course of acupuncture treatment, which implies the potential effectiveness of acupuncture treatment for hormonal regulation of the menstrual cycle. This patient had a similar course to that reported in a previous case study of a female non-athlete with amenorrhoea who received acupuncture treatment continuously; the high temperature phase in BBT was attained 2–4 months after acupuncture treatment started and the biphasic pattern within 6–8 months.

The acupuncture point selection for this study was based on classical acupuncture theory and referred to common anecdotal reports on amenorrhoea in Japan. However, this traditional concept and these reports of clinical success are not supported by any scientific evidence or current knowledge of neurophysiology, anatomy and pathology. One potential scientific hypothesis concerns the possible inducement of a somatic-endocrine reflex by stimulation from the skin and subcutaneous tissues of the whole body and this reflex would help to regulate hormone secretion. Somatic sensory stimulation from the acupuncture needles reaches the thalamus and changes the neurons on the way to the cerebral cortex. At that time, hormonal secretion might be regulated through the hypothalamus–anterior pituitary–gonadal pathway. This would translate to the release of gonadotropin-releasing hormone, then luteinising hormone and follicle-stimulating hormone and, finally, oestrogen and progesterone. Although a little different from stimulation by acupuncture treatment, noxious mechanical cutaneous stimulation in anaesthetised rats was found to increase the secretion of luteinising hormone from the anterior pituitary gland and increase the secretion of testosterone from testis to plasma. A similar mechanism may occur for hormonal regulation in the female human body induced by acupuncture treatment.

When comparing the patient’s BW (43.2 kg), BMI (17.5) and BFR (17.7%) in February 2009 when amenorrhoea occurred with those after the hormone replacement therapy in May 2010, there was a slight increase in all three parameters. Possibly, these increased induced the restarting of menorrhoea, in which case, continuous acupuncture treatment might have contributed to hormone replacement therapy sufficiently enhancing the patient’s physical condition.

Studies show that menstrual disorders such as amenorrhoea/oligomenorrhoea are more prevalent among athletes than in the general population. Since athletic amenorrhoea is a risk to athletes’ health and can adversely influence future fertility, an early solution is desirable. On the other hand, paradoxically, some athletes experience unexpected adverse effects on their competitive performance or physical conditions owing to the administration of progesterone preparations. Moreover, caution is required when providing medical treatment as some hormone preparations appear on the doping list. Against this background, acupuncture treatment may be a feasible treatment option in the field of sports medicine to help competitive athletes with amenorrhoea.

References
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