

Original Article

Stroke screening and health-related physical fitness testing in medical staff members in Urumqi, China

Yu-Shan Wang^a, Bo Liu^a, Yan Jiang^a, Zhong-Hua Liu^b, Hua Yao^{a,*}

^a Center of Health Management, The First Affiliated Hospital of Xinjiang Medical University, Urumqi, Xinjiang 830054, China

^b Shanghai Key Laboratory of Tuberculosis, Shanghai Pulmonary Hospital, Tongji University School of Medicine, Shanghai 200433, China

Received 28 October 2016

Available online 2 February 2017

Abstract

Objective: Stroke is the leading cause of death and disability, and is closely related to a lack of exercise. Currently, most Chinese medical staff members lack exercise and may be at risk for stroke. We sought to determine the risk factors for stroke and study the significance of health-related physical fitness testing in stroke prevention among Chinese medical staff members.

Methods: A total of 627 subjects from Urumqi, Xinjiang, China, were included in the study and a survey was conducted from 1st January 2016 to 1st February 2016. Stroke screening and health-related physical fitness testing were completed according to the standard protocol, and the related data were analyzed.

Results: Based on the screening, 27.6% ($n = 173$) of the subjects were at high risk for stroke. The top risk factors for stroke in these subjects were dyslipidemia, lack of exercise or mild physical activity, being overweight or obese, and high blood pressure. Body weight, body mass index, body fat, visceral fat area, body fat percentage, and basal metabolic rate were significantly higher ($P < 0.01$) in subjects at high risk for stroke than in subjects who were not at high risk. Lung capacity, step index, grip test, vertical jump, and sit-up/push-up index were significantly lower ($P < 0.01$) in subjects at high risk for stroke than in subjects who were not at high risk.

Conclusions: A large proportion of China's on-the-job medical personnel is at high risk for stroke. This may be related to the nature of the profession and warrants more attention from the society. The health-related physical fitness measurement parameters in subjects at high risk for stroke were significantly different from those in subjects who were not at high risk. Screening and health-related physical fitness testing in medical staff members may contribute to stroke prevention. More rigorous controlled clinical trials will be needed in the future.

© 2017 Chinese Medical Association. Production and hosting by Elsevier B.V. on behalf of KeAi Communications Co., Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: Stroke; High risk population; Health-related physical fitness; Prevention

* Corresponding author.

E-mail address: yh2001002@163.com (H. Yao).

Peer review under responsibility of Chinese Medical Association.



Production and Hosting by Elsevier on behalf of KeAi

Introduction

Stroke is one of the common diseases that endanger human health. Many factors have been reported to contribute to stroke occurrence, including genetic factors, poor eating habits and lifestyle, being

<http://dx.doi.org/10.1016/j.cdtm.2017.01.001>

2095-882X/© 2017 Chinese Medical Association. Production and hosting by Elsevier B.V. on behalf of KeAi Communications Co., Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

overweight, dyslipidemia, hypertension, and diabetes.^{1–6} Exercise and physical activity play an important role in stroke prevention,^{7–10} while on the job, medical staff members lack exercise and moderate physical activity may be risk factors for stroke. However, limited data and occupational characteristics are available in China.^{11–13} Screening patients who may be at risk for stroke is very important for stroke prevention.^{10,14–18} As a result, a survey of on-the-job medical staff members is needed to identify individuals at risk for stroke as well as the key risk factors.

A health-related physical fitness test is one of the methods used to measure the level of human health, including heart and lung endurance, muscle strength and endurance, body composition, and flexibility.^{9,19–23} Previous studies have demonstrated that health-related physical fitness tests and comprehensive evaluations of the health status of the body are important in identifying early risk factors of cardiovascular disease.^{21,22,24–29} However, studies investigating the relationship between stroke and health-related physical fitness are still lacking at this time. To determine the risk factors for stroke and explore the significance of health-related physical fitness testing in stroke prevention, we performed a survey in 627 medical staff members using stroke high-risk population screening and a health-related physical fitness test.

Methods

Ethics statement

This study was approved by the First Affiliated Hospital of Xinjiang Medical University Medicine Ethics Committee. Subjects were treated in accordance with the Helsinki Declaration on the participation of human subjects in medical research. Written informed consent was obtained from all the study participants.

Study subjects

This survey was conducted from 1st January 2016 to 1st February 2016. A total of 627 on-the-job medical staff members from Urumqi, Xinjiang, China, were included in the study, including 111 men and 516 women. The age range of the subjects was 20–60 years (mean age, 39.2 ± 9.3 years). According to the standard protocols,³⁰ stroke screening and health-related physical fitness tests were completed within the time limit and the related data analyzed. The inclusion criteria were as follows: i) normal activity

ability; and ii) normal working ability. The exclusion criteria were as follows: i) age outside the 20–60 years range; and ii) serious chronic illness and/or disability.

Stroke screening of the high-risk population

Stroke screening was completed according to special screening protocols and Implementations of the Pilot Program for the Screening and Intervention of High Risk Population in the National Health Care Reform Program in 2011.³⁰ The specific risk factors included: i) history of hypertension ($\geq 140/90$ mm Hg) or use of antihypertensive drugs; ii) atrial fibrillation or obvious pulse numbers; iii) smoking; iv) dyslipidemia or unknown; v) diabetes mellitus; vi) no physical exercise (≤ 3 times a week, ≤ 30 min every time, ≤ 1 year; or workers engaged in mild manual); vii) body mass index (BMI) ≥ 26 kg/m²; or viii) family history of stroke.

Subjects with >3 risk factors for stroke, or a history of stroke or transient ischemic attack, were classified into the high-risk group, and subjects with ≤ 3 risk factors for stroke were included in the non-high-risk group.³⁰

Health-related physical fitness test

Individual cardiopulmonary endurance was tested using a Monark 828E bicycle ergometer and classical step test. Data were calculated using related processing software. The test was performed according to the instructions of the instrument. Parameters including height (cm), weight (kg), lung capacity (ml), step test index, sit and reach (cm), balance test (s), nerve reaction time (s), grip test (kg), vertical jump (cm), sit ups/push ups (BPM), BMI, body fat (kg), basal metabolic rate (cal), visceral fat area (cm²), and body fat (%) were recorded.³¹

A body composition analyzer (bio-impedance indicators, South Korea) was used to test the body fat rate and for other human body composition analyses.

Statistical methods

Data description and analyses were carried out using the SPSS 17 software. The mean \pm standard deviation were calculated for continuous quantitative data, and differences between the two groups were compared using the Student's *t* test. The data were described using percentages (%) and compared using the Chi-square test. Results with *P* values less than 0.05 were considered statistically significant.

Results

General subject characteristics

The general characteristics of the subjects in this study are described in Table 1. Of 627 subjects, 17.7% (111 participants) were men and 82.3% (516) were women; the age range was 20–60 years (mean \pm SD, 39.2 \pm 9.3 years). The ethnic distribution was as follows: Han, 80.1% (502); Uygur, 16.1% (101); other minorities, 3.8% (24).

Based on the screening results, 27.6% (173 participants) of subjects had a high risk for stroke. Of these subjects, 95.5% (600) lacked exercise or light physical labor, 88.4% (555) had dyslipidemia, 22.3% (140) were overweight or obese, 8.6% (54) had hypertension, 2.9% (18) had atrial fibrillation, 2.5% (16) had

diabetes, 3.7% (23) smoked, and 0.3% (2) had a family history of stroke. The top risk factors for stroke in the high-risk group were dyslipidemia, lack of exercise or mild physical activity, being overweight or obese, and hypertension. However, significantly abnormal rates in other indicators were few. The proportion of men and mean age were significantly higher in the high-risk group than in the group not at high risk for stroke ($P < 0.01$).

Comparisons of health-related physical fitness test results between the high-risk group and the group not at high risk

Compared with subjects who were not at high risk for stroke, the body weight, BMI, body fat, visceral fat area, body fat percentage, and basal metabolic rate were significantly higher in subjects at high risk for stroke ($P < 0.01$). In addition, the lung capacity, step index, grip test, vertical jump, and sit-up/push-up index were significantly lower in the high-risk group than in the non-high-risk group for stroke ($P < 0.01$; Table 2).

Table 1
The general characteristics of the subjects included in this study.

Variables	High-risk group (n = 173)	Non-high-risk group (n = 454)
Age, years, n (%)		
22–40	84 (48.6)	279 (61.5)
41–60	89 (51.4)	175 (38.5)
Gender, n (%)		
Male	65 (37.6)	46 (10.1)
Female	108 (62.4)	408 (89.9)
Ethnics, n (%)		
Han	129 (74.6)	373 (82.2)
Uygur	36 (20.8)	65 (14.3)
Other	8 (4.6)	16 (3.5)
Hypertension, n (%)		
Yes	49 (28.3)	5 (1.1)
No	124 (71.7)	449 (98.9)
Dyslipidemia, n (%)		
Yes	170 (98.3)	385 (84.8)
No	3 (1.7)	69 (15.2)
Diabetes, n (%)		
Yes	9 (5.2)	7 (1.5)
No	164 (94.8)	447 (98.5)
Overweight or obesity, n (%)		
Yes (BMI \geq 26 kg/m ²)	131 (75.7)	9 (2.0)
No (BMI < 26 kg/m ²)	42 (24.3)	445 (98.0)
Lack of exercise or mild physical activity, n (%)		
Yes	167 (96.5)	433 (95.4)
No	6 (3.5)	21 (4.6)
Smoking history, n (%)		
Yes	21 (12.1)	2 (0.4)
No	152 (87.9)	452 (99.6)
Atrial fibrillation, n (%)		
Yes	16 (9.2)	2 (0.4)
No	157 (90.8)	452 (99.6)
Family history of stroke, n (%)		
Yes	2 (0.3)	0 (0)
No	171 (98.8)	454 (100)

BMI: body mass index.

Discussion

With the continuous development of China's economy and improvement in the standard of living of the public in the recent years, the disease spectrum in the Chinese population has changed significantly. The incidence of some cardiovascular diseases, including stroke, continue to increase.^{6,10,17,32–39} Unfortunately, stroke is associated with high mortality and disability rates.^{40–43} Therefore, early prevention of stroke is very important. Screening the population for stroke risk factors and health assessment can identify patients who are at high risk early. This will not only reduce the rate of fatality and disability, but also relieve the economic burden of families and the society at large. Therefore, it is of great importance to investigate the main risk factors for stroke and the high-risk populations for prevention and health management services. In recent years, the Chinese government has also initiated a screening and early intervention program for individuals at high risk for stroke.

The risk factors for stroke are diverse in nature and can be divided into preventable and non-preventable factors. Among the eight known risk factors for stroke, only 3 (age, gender, and family history) are non-preventable. The other risk factors, including dyslipidemia, smoking, being overweight or obese, and lack of exercise, can be rectified early through health management. In this study, the main risk factors for

Table 2
Comparison of health-related physical fitness parameters between the stroke high-risk group and non-high-risk group.

Groups	Height, cm	Weight, kg	Lung's capacity, ml	Step test index	Sit and reach, cm	Sit test, cm	Balance test, s	Nerve reaction time, s	Grip test, kg	Vertical jump, cm	Sit ups/BPM	Body mass index	Nerve reaction time, s	Body fat, kg	Basal metabolic rate, cal	Visceral fat area, cm ²	Body fat, %
High-risk group (n = 173, mean ± SD)	165.2 ± 8.2	73.9 ± 11.2	2766 ± 677	53.1 ± 5.3	7.3 ± 7.1	7.3 ± 7.1	18.9 ± 3.1	0.51 ± 0.08	27.1 ± 7.8	20.3 ± 6.5	18.3 ± 9.4	27.0 ± 3.1	0.51 ± 0.08	24.9 ± 5.9	1409 ± 198	120.0 ± 34.5	34.1 ± 6.9
Non-high-risk group (n = 454, mean ± SD)	162.0 ± 6.7	58.8 ± 7.8	2960 ± 879	57.4 ± 8.6	9.7 ± 7.0	21.6 ± 2.3	0.56 ± 0.12	0.56 ± 0.12	33.1 ± 11.4	24.2 ± 9.6	21.9 ± 7.8	22.4 ± 2.3	0.56 ± 0.12	17.7 ± 4.3	1259 ± 125	81.0 ± 25.8	29.9 ± 5.2
t value	-4.504	-16.183	-2.626	5.867	4.198	1.212	0.226	0.664	-6.321	-3.449	3.155	-18.024	0.664	-13.055	-8.293	-12.076	-6.516
P value	0.000	0.000	0.009	0.000	0.000	0.226	0.507	0.507	0.000	0.001	0.000	0.000	0.507	0.000	0.000	0.000	0.000

stroke in the high-risk group were dyslipidemia, lack of exercise or mild physical activity, being overweight or obese, and hypertension. However, significantly abnormal rates in other indicators were relatively small.

Due to the shortage of doctors in China, most medical staff members have to work long hours^{11–13}; a sedentary lifestyle and lack of exercise is common. Therefore, the medical staff members are prone to dyslipidemia, being significantly overweight or obese, and hypertension. This survey indicated a high proportion of subjects at high risk for stroke among on-the-job medical staff members. Furthermore, the risk for men was more than thrice as high as the risk for women. The proportion of elderly patients at high risk for stroke was also higher than the proportion of elderly patients not at high risk, suggesting that age may be an independent risk factor for stroke. More attention should be paid to the prevention and timely health intervention among elderly medical workers. Our survey also found that the top risk factors for stroke included dyslipidemia, lack of exercise or mild physical activity, being overweight or obese, and hypertension. However, significantly abnormal rates in other indicators were few. Therefore, prevention management of stroke should focus on these factors in the future.

Health-related physical fitness mainly includes cardiovascular fitness, body composition, muscle fitness, and flexibility. Exercise has a relatively large impact on health-related physical fitness. Health-related physical fitness assessment has a significant impact on the progression of many chronic diseases.^{21,22,28,29,44,45} We found that parameters of health-related physical fitness among medical staff members in the high-risk group were different from the non-high-risk group for stroke. Compared with subjects not at high risk for stroke, body weight, BMI, body fat, visceral fat area, body fat percentage, and basal metabolic rate were significantly higher in subjects at high risk for stroke. The lung capacity, step index, grip test, vertical jump, and sit-up/push-up index were significantly lower in subjects at high risk for stroke, compared with the group not at high risk. This suggests that health-related physical fitness in the population at high risk for stroke is poor, and may result in the onset of symptoms of stroke. Based on these results, we believe that stroke screening and health-related physical fitness testing in medical staff members may contribute to stroke prevention.

However, this study had some limitations: i) small number of cases; ii) cross-sectional study design (instead of a follow up cohort study design, i.e., patient outcomes were not followed up); and iii) bias related to differences in age, gender, and other confounding factors.

Conclusions

In brief, a large proportion of China's on-the-job medical personnel is at high risk for stroke. This may be related to the nature of the profession, and needs more attention from the society. The health-related physical fitness measurement parameters in subjects at high risk for stroke were significantly different from those in patients who were not at high risk. Screening and health-related physical fitness testing in medical staff members may contribute to stroke prevention. In the future, more rigorous controlled clinical trials will be needed.

Conflicts of interest

The authors declare no competing interests.

Acknowledgements

This project was funded by the Science and Technology Project of Xinjiang Uygur Autonomous Region (No. 201517102), the Xinjiang Uygur Autonomous Region Natural Science Foundation (No. 2016D01C330) and the National Natural Science Foundation of China (No. 81201253).

References

- Aalami Harandi S, Sarrafzadegan N, Sadeghi M, et al. Do cardiometabolic risk factors relative risks differ for the occurrence of ischemic heart disease and stroke? *Res Cardiovasc Med*. 2016;5:e30619.
- Abete I, Zulet MA, Goyenechea E, et al. Association of lifestyle, inflammatory factors, and dietary patterns with the risk of suffering a stroke: a case-control study. *Nutr Neurosci*. 2016;1–9.
- Alkali NH, Bwala SA, Dunga JA, et al. Prestroke treatment of stroke risk factors: a cross-sectional survey in central Nigeria. *Ann Afr Med*. 2016;15:120–125.
- Anderson CS. Depression after stroke-frequency, risk factors, and mortality outcomes. *JAMA Psychiatry*. 2016;73:1013–1014.
- Tang M, Sun J, Wang W, et al. The prevalence and status of pre-hospital treatments of risk factors among patients with stroke in China [in Chinese]. *Zhonghua Nei Ke Za Zhi*. 2015;54:995–1000.
- He J, Klag MJ, Wu Z, et al. Stroke in the People's Republic of China. I. Geographic variations in incidence and risk factors. *Stroke*. 1995;26:2222–2227.
- Jeon MY, Jeong H. Effects of a stroke primary prevention program on risk factors for at-home elderly. *Med Sci Monit*. 2015;21:3696–3703.
- Gan XM, Xu YH, Liu L, et al. Predicting the incidence risk of ischemic stroke in a hospital population of southern China: a classification tree analysis. *J Neurol Sci*. 2011;306:108–114.
- Ivey FM, Macko RF, Ryan AS, et al. Cardiovascular health and fitness after stroke. *Top Stroke Rehabil*. 2005;12:1–16.
- He Y, Chang Q, Huang JY, et al. Study on mortality, incidence and risk factors of stroke in a cohort of elderly in Xi'an, China [in Chinese]. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2003;24:476–479.
- Chen J, Li-Tsang CW, Yan H, et al. A survey on the current status of burn rehabilitation services in China. *Burns*. 2013;39:269–278.
- Liu K, You LM, Chen SX, et al. The relationship between hospital work environment and nurse outcomes in Guangdong, China: a nurse questionnaire survey. *J Clin Nurs*. 2012;21:1476–1485.
- Lu H, While AE, Barriball KL. Job satisfaction and its related factors: a questionnaire survey of hospital nurses in Mainland China. *Int J Nurs Stud*. 2007;44:574–588.
- Wang Z, van Veluw SJ, Wong A, et al. Risk factors and cognitive relevance of cortical cerebral microinfarcts in patients with ischemic stroke or transient ischemic attack. *Stroke*. 2016;47:2450–2455.
- Cadena R. Cervical artery dissection: early recognition and stroke prevention. *Emerg Med Pract*. 2016;18:1–24.
- Keach JW, Bradley SM, Turakhia MP, et al. Early detection of occult atrial fibrillation and stroke prevention. *Heart*. 2015;101:1097–1102.
- Zhang WN, Pan YH, Wang XY, et al. A prospective study of the incidence and correlated factors of post-stroke depression in China. *PLoS One*. 2013;8:e78981.
- Zhang Y, Zhang Z, Yang B, et al. Incidence and risk factors of cognitive impairment 3 months after first-ever stroke: a cross-sectional study of 5 geographic areas of China. *J Huazhong Univ Sci Technol Med Sci*. 2012;32:906–911.
- Hong I, Coker-Bolt P, Anderson KR, Lee D, Velozo CA. Relationship between physical activity and overweight and obesity in children: findings from the 2012 national health and nutrition examination survey national youth fitness survey. *Am J Occup Ther*. 2016;70, 7005180060p1–p8.
- Byun JE, Kang EB. The effects of senior brain health exercise program on basic physical fitness, cognitive function and BDNF of elderly women – a feasibility study. *J Exerc Nutrition Biochem*. 2016;20:8–18.
- Gui Z, Sun F, Chen Y. Fatness, health-related physical fitness, and cardiovascular disease risk factors in Chinese adolescents: 1018 board #334 June 1, 2:00 PM – 3:30 PM. *Med Sci Sports Exerc*. 2016;48(5 suppl 1):293.
- Muntaner-Mas A, Vidal-Conti J, Borrás PA, et al. Effects of a whatsapp-delivered physical activity intervention to enhance health-related physical fitness components and cardiovascular disease risk factors in older adults. *J Sports Med Phys Fit*. 2015. Available online: <http://www.minervamedica.it/en/journals/sports-med-physical-fitness/article.php?cod=R40Y9999N00A150159>.
- Krasnoff JB, Painter PL, Wallace JP, et al. Health-related fitness and physical activity in patients with nonalcoholic fatty liver disease. *Hepatology*. 2008;47:1158–1166.
- Armstrong ME, Lambert MI, Lambert EV. Relationships between different nutritional anthropometric statuses and health-

- related fitness of South African primary school children. *Ann Hum Biol.* 2016;1–6.
25. Hoekstra S, Valent L, Gobets D, et al. Effects of four-month handbike training under free-living conditions on physical fitness and health in wheelchair users. *Disabil Rehabil.* 2016;6:1–8.
 26. Wimmelmann CL, Lund MT, Hansen M, et al. The effect of preoperative type 2 diabetes and physical fitness on mental health and health-related quality of life after Roux-en-Y gastric bypass. *J Obes.* 2016;2016:3474816.
 27. Wilczynska M, Lubans DR, Cohen KE, et al. Rationale and study protocol for the ‘eCoFit’ randomized controlled trial: integrating smartphone technology, social support and the outdoor physical environment to improve health-related fitness among adults at risk of, or diagnosed with, type 2 diabetes. *Contemp Clin Trials.* 2016;49:116–125.
 28. Clennin MN, Payne JP, Rienzi EG, et al. Association between cardiorespiratory fitness and health-related quality of life among patients at risk for cardiovascular disease in Uruguay. *PLoS One.* 2015;10:e0123989.
 29. Klausen SH, Wetterslev J, Sondergaard L, et al. Health-related fitness profiles in adolescents with complex congenital heart disease. *J Adolesc Health.* 2015;56:449–455.
 30. Stroke Screening and Prevention Engineering Committee of National Health and Family Planning Commission. Technical specification for stroke screening and prevention [in Chinese] *Chin J Neurol.* 2014;47:198–203.
 31. The State General Administration of Sports. *Chinese National Measurement Standards on People's Physical Fitness (in Chinese)*. Beijing, China: People's Sports Publishing House; 2003.
 32. Jiang G, Li W, Wang D, et al. Epidemiological transition and distribution of stroke incidence in Tianjin, China, 1988–2010. *Public Health.* 2016;131:11–19.
 33. Zhou Y, Tian Y, Zhong C, et al. Combined effects of family history of CVD and heart rate on ischemic stroke incidence among Inner Mongolians in China. *Neurol Res.* 2016;38:441–447.
 34. Li B, Lou Y, Gu H, et al. Trends in incidence of stroke and transition of stroke subtypes in rural Tianjin China: a population-based study from 1992 to 2012. *PLoS One.* 2015;10:e0139461.
 35. Sun XG, Wang YL, Zhang N, et al. Incidence and trends of stroke and its subtypes in Changsha, China from 2005 to 2011. *J Clin Neurosci.* 2014;21:436–440.
 36. Wang J, Ning X, Yang L, et al. Sex differences in trends of incidence and mortality of first-ever stroke in rural Tianjin, China, from 1992 to 2012. *Stroke.* 2014;45:1626–1631.
 37. Wang WZ, Jiang B, Wu SP, et al. Change in stroke incidence from a population-based intervention trial in three urban communities in China. *Neuroepidemiology.* 2007;28:155–161.
 38. Jiang B, Wang WZ, Chen H, et al. Incidence and trends of stroke and its subtypes in China: results from three large cities. *Stroke.* 2006;37:63–68.
 39. Xue GB. The incidence rates in 1986 of stroke in urban and rural areas of the People's Republic of China. *Zhonghua Yu Fang Yi Xue Za Zhi.* 1991;25:196–200.
 40. Jørgensen TS, Wium-Andersen IK, Wium-Andersen MK, et al. Incidence of depression after stroke, and associated risk factors and mortality outcomes, in a large cohort of Danish patients. *JAMA Psychiatry.* 2016;73:1032–1040.
 41. Li J, Wang D, Tao W, et al. Early consciousness disorder in acute ischemic stroke: incidence, risk factors and outcome. *BMC Neurol.* 2016;16:140.
 42. Miller CM, Behrouz R. Impact of infection on stroke morbidity and outcomes. *Curr Neurol Neurosci Rep.* 2016;16:83.
 43. Nolte CH, Erdur H, Grittner U, et al. Impact of heart rate on admission on mortality and morbidity in acute ischaemic stroke patients – results from VISTA. *Eur J Neurol.* 2016;23:1750–1756.
 44. Brusseau TA, Burns RD, Hannon JC. Free-living physical activity and health-related fitness of adolescents within the Juvenile Justice system: 857 board #173 June 1, 3:30 PM – 5:00 PM. *Med Sci Sports Exerc.* 2016;48(5 suppl 1):239.
 45. Farren GL, Gu X, Zhang T, et al. How frequencies of different physical activity intensities relate to health-related physical fitness in adolescents: 853 board #169 June 1, 3:30 PM – 5:00 PM. *Med Sci Sports Exerc.* 2016;48(5 suppl 1):238.

Edited by Jing-Ling Bao