

Abstracts

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Valentino R, Savastano S, Tommaselli AP, D'Amore G, Dorato M, Lombardi G: The influence of intense ballet training on trabecular bone mass, hormone status, and gonadotropin structure in young women. *J Clin Endocrinol Metab* 86:4674–4678, 2001.

The authors performed a cross-sectional study on young dancers and former dancers to evaluate the effects of intense weight-bearing exercise and restricted dietary intake begun during puberty, on bone mineral density (BMD), age of menarche, menstrual function, and gonadotropin structure. They compared 20 current dancers (group 1) and nine ex-dancers (group 2) with a matched control group of 30 women. Dancers began as children (mean age 7.3 years), had dance training averaging 13 hours per week, and continued this pattern for at least 10 years. Body weight, body mass index, total daily caloric intake, and nutritional markers were significantly lower in groups 1 and 2 than in controls. Using quantitative computed tomography for evaluating BMD, they found that 12 dancers and five ex-dancers had Z-scores greater than 2.5 S.D. below the mean of the controls. Groups 1 and 2 both had delayed menarche, which correlated positively with the years of dance before menarche. Dancers also had low levels and altered structure of circulating gonadotropins. The authors concluded that ballet training performed before and during puberty,

dietary restriction, and low body mass index all can be associated with reduction in BMD and altered gonadotropin isoforms, with subsequent delay of menarche, menstrual dysfunctions, and insufficient peak bone mass. They recommend a longitudinal study to confirm the persistence of low lumbar spine bone density in adult age.

Thomasson M, Sundberg J: Consistency of inhalatory breathing patterns in professional operatic singers. *J Voice* 15:373–383, 2001.

Respiratory behavior is generally considered important to voice function, the assumption being that it affects the voice source. Accurate and consistent control of the voice source is particularly important in professional operatic singing. Erratic behavior of any factor that influences voice production is incompatible with a well-controlled vocal activity. The paper reports an analysis of inhalatory breathing patterns' consistency during singing in five professional operatic singers (three sopranos and two baritones), using the same material as in a previous investigation of phonatory breathing patterns. Rib cage (RC) and abdominal wall (AW) movements were recorded by respiratory inductive plethysmography. Consistency of response was analyzed in terms of the mean correlation between three takes of ten musical phrases. The results revealed a high consistency in lung volume (LV) change and RC movements in all singers, and in AW movements in three singers. Consistency across different phrases was slightly lower. A high correlation between LV change and RC movement was found in all singers and between LV change and AW movement in three. During fast inhalations, the singers tended to rely

mostly on RC movements, exclusively so for three subjects. The contribution to LV change from RC movement was greater than that from AW in all singers, but varied among them, suggesting that operatic singing does not require a uniform breathing strategy. The results are compatible with the concept that inhalatory behavior is important to the voice source in singing.

Pantev C, Roberts LE, Schulz M, Engelien A, Ross B: Timbre-specific enhancement of auditory cortical representation in musicians. *NeuroReport* 12(1): 169–174, 2001.

Neural imaging studies have shown that the brains of skilled musicians respond differently to musical stimuli than do the brains of non-musicians, particularly for musicians who began playing their instruments at an early age. The present study was undertaken to test a neuroplastic account of enhanced auditory cortical representations for notes of the musical scale in musicians. Results showed these neuromagnetically measured representations for tones of different timbre (violin and trumpet) were enhanced compared with sine tones in highly trained violinists and trumpeters, preferentially for timbres of the instrument of training. There were larger cortical responses to the musical tones overall in the trumpeters compared with the violinists, and larger responses to trumpet tones than to string tones when the musician groups were combined. This finding was attributed to a robust timbre-specific enhancement when the trumpet was the instrument of training. Timbre specificity is predicted by a principle of use-dependent plasticity and imposes new requirements of nativistic accounts of brain attributes associated with musical skill.

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Levy S, Abaza MM, Hawkshaw M, Sataloff RT: Common otolaryngologic medications: Psychiatric side effects. *J Singing* 57(5):35–40, 2001.

It is important for singing teachers to recognize that not all problems of stress, agitation, and emotional lability in a singer are the result of a “high-strung” personality, preperformance anxiety, or even intrinsic psychological problems. In some cases, psychological disturbances may be caused by common medications, prescribed often for singers by otolaryngologists, and ordinarily tolerated well without significant side effects. Common symptoms in these cases include delirium, confusion, disorientation, tremor, ataxia, and mania, with accompanying behaviors such as increased activity, mood elevation, rapid speech, and insomnia. The authors recommend assessment of all risk factors in the student, as multiple factors may be additive. Negative side effects of various medications are listed; these include adrenocorticosteroids, antihistamines, decongestants, and reflux medications. Several useful tables summarize many pertinent details, and the authors mention a number of specific drug combinations whose interactions may produce potentially harmful effects.

Kaufman BA, Warren MP, Dominguez JE, Wang J, Heymsfield SB, Pierson RN: Bone density and amenorrhea in ballet dancers are related to a decreased resting metabolic rate and lower leptin levels. *J Clin Endocrinol Metab* 87(6): 2777–2783, 2002.

Osteopenia, which is correlated with amenorrhea and poor nutritional habits, has been well documented in elite ballet dancers. The osteopenia may be related to changes brought about by chronic dieting or other factors, such as a hypometabolic state induced by poor nutrition. The study planned to investigate the relationship of chronic dieting and resting metabolic rate (RMR) to amenorrhea and bone density. The study group included 21 elite ballet dancers and 27 nondancers. No signifi-

cant correlations were found between high scores on the EAT26 test (eating disorder assessment) and RMR, bone densities, body weight, body fat, or fat-free mass (FFM). However, when RMR was adjusted for FFM, a significant positive correlation was found between RMR/FFM and bone density in both the arms and the spine in ballet dancers, but not in the normal controls. The dancers also demonstrated significantly higher EAT scores and lower RMR/FFM ratios. The only variable to predict lower RMR/FFM in the entire sample was ever having had amenorrhea: this group had significantly higher EAT scores, lower levels of leptin (a hormone secreted by fat cells, which is disproportionately lowered by fasting and is an independent regulator of metabolic rate), and lower bone mineral density in both the arm and the spine. The authors hypothesize that the correlation between low RMR and lower leptin levels and bone density may be more strongly related to nutritional habits in ballet dancers, causing significant depression of RMR, particularly for those with a history of amenorrhea.

Altenmüller EO: How many music centers are in the brain? *Ann N Y Acad Sci* 930:273–280, 2001.

When reviewing the literature on brain substrates of music processing, there are a puzzling variety of findings. The traditional view of a left-right dichotomy of brain organization—assuming that in contrast to language, music is primarily processed in the right hemisphere—was challenged 20 years ago, when the influence of music education on brain lateralization was demonstrated. Modern concepts emphasize the modular organization of music cognition. According to this viewpoint, different aspects of music are processed in different, although partly overlapping, neuronal networks of both hemispheres. However, even when isolating a single “module,” the interindividual variance of brain substrates is enormous. To clarify factors contributing to this variability, the author conducted a longitudinal experiment com-

paring the effects of procedural versus explicit music teaching on brain networks. Results demonstrated for the first time directly that musical expertise influences auditory brain activation patterns, and that changes in these patterns depend on the teaching strategies applied. Brain substrates reflect the auditory learning “biography,” the personal experiences accumulated over time. Listening to music, learning to play an instrument, formal music education, and professional training result in multiple, often multisensory, representations of music, which seem to be partly interchangeable and rapidly adaptive. These “real music” brain substrates form individually, adapt quickly, and are widely distributed in both hemispheres.

Bara-Jimenez W, Shelton P, Hallett M: Spatial discrimination is abnormal in focal hand dystonia. *Neurology* 55:1869–1873, 2001.

In patients with focal hand dystonia, abnormal digit representations in the primary somatosensory cortex (S1) could be the result of enlarged and overlapping receptor fields. A possible clinical correlate of this S1 abnormality is a disturbed spatial discrimination activity. To test the hypothesis that somatosensory spatial discrimination is abnormal in this condition, the authors evaluated 17 patients with focal hand dystonia, administering tests of both quantitative spatial frequency (gap detection using JVP domes) and single-touch localization (Von Frey filaments) to the subjects’ fingertips. When compared with 13 matched controls, the patients had a statistically significant decrease in performance of both spatial frequency and localization tasks. The extent of spatial frequency abnormality correlated with age in both groups. These findings, together with a previously shown temporal discrimination deficit, support a role for sensory dysfunction in the pathophysiology of dystonia. [Although the study patients all suffered from writer’s cramp, it is reasonable to assume that the findings would be applicable to patients with music-induced focal hand dystonia as well—Ed.]