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# Motor Imagery in Patients with Duchenne Muscular Dystrophy May Depend On Their Cerebral, Motor, and Cardiac Functions

***Josef Finsterer***
*MD, PhD, Neurology Dpt., Neurology & Neurophysiology Center, Vienna, Austria, Orcid: 0000-0003-2839-7305*

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## LETTER TO THE EDITOR

We read with interest the article by Bora-Zereyak, *et al*. on a prospective study of motor imagery ability in patients with Duchenne muscular dystrophy (DMD) using the KVIQ-10 and MIQ-C subscores [Bora-Zereyak, M. *et al*., 2024]. It was found that the KVIQ-10 and MIQ-C were reduced in DMD patients, that the test-retest reliability of the KVIQ-10 was quite good, that there was a moderate association between the KVIQ-10 and the MIQ-C subscales, and that the KVIQ-10 correlated with the MoCA test [Bora-Zereyak, M. *et al*., 2024]. The study is convincing, but several points should be discussed.

The first point is that motor imagination may depend on motor function and thus on the degree of muscle weakness. Therefore, the results of the KVIQ-10 should be correlated with the degree of muscle weakness in DMD patients. Those who are no longer able to move may have diminished imaginative capacity due to their inability to use their muscles to a sufficient degree. Patients with preserved motor function or only mild muscle weakness may have preserved the ability to imagine movements or muscle contractions.

The second point is that the MoCA may not be suitable for assessing motor imagination. The MoCA tests various cognitive abilities such as memory, language, coherent thinking, attention and concentration, behaviour, calculation, temporal and spatial orientation and the ability to recognize complex shapes and patterns, but it does not test the ability of imagination. The Torrance Test of Creative Thinking (TTCT), Guilford's Alternative Uses Test (AUT), the Runco Ideational Behaviour Scale (IBS), the Creative Achievement Questionnaire (CAQ) or the Creative Self-Efficacy Scale (CSES) are more suitable in this respect.

The third point is that the ability to visualize movement may also depend on the causative mutation class, the number of deleted exons or the location of the mutation. Since the type and degree of cerebral involvement in DMD depends on the underlying dystrophin mutation [Battini, R. *et al*., 2021], it is conceivable that the ability to visualize movement also depends on the mutation characteristics. Therefore, we should know in how many of the included patients DMD was caused by a deletion, duplication or point mutation in the dystrophin gene and how large the deletion was.

The fourth point is that the ability to visualize movement may also depend on cardiac function. Since DMD patients often develop heart disease, especially dilated cardiomyopathy (dCMP) [Mavrogeni, S. *et al*., 2015], and since dCMP may be complicated by systolic dysfunction and heart failure, it is conceivable that imaging ability may decrease with reduced systolic function or heart failure. Therefore, we should know whether motor imagination correlates with fractional shortening, ejection fraction on echocardiography, or serum levels of pro-brain natriuretic peptide (BNP). Cerebral hypoperfusion may occur as a consequence of heart failure [Doorenweerd, N. *et al*., 2017], which contributes to impaired motor imagination.

In conclusion, it can be said that this interesting study has limitations that relativize the results and their interpretation. Removing these limitations could strengthen the conclusions and reinforce the message of the study. To assess the ability of motor imagination in DMD patients, all influencing factors should be included in the assessment and appropriate instruments should be used to test motor imagination.

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***Corresponding Author:** Josef Finsterer

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