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'SARAglyph': a proposed graphic system for representing ataxia progression^{☆,☆☆}



'SARagrama': una propuesta de representación gráfica en la evolución de las ataxias

Dear Editor:

The Scale for the Assessment and Rating of Ataxias (SARA)¹ is often used to evaluate patients with different types of degenerative ataxias, both in clinical practice and in research projects.² Results from a SARA assessment are expressed as a single number, which overlooks the multidimensional nature of cerebellar impairment.³ We propose a simple and standard method of expressing ataxia patients' impairment across multiple dimensions that will show all SARA item values at a single glance. This graphic display is useful for the initial assessment of the patient, and to document patient progress.

To this end, we designed a template that would be used to record values for each SARA item and automatically

generate the SARAglyph (Microsoft® Excel 2004). For items that can affect either side, values from each side (left and right) were gathered independently. We used a polar graph to represent the normalised values of the 12 SARA items. Values were normalised using the following formula:

$$x'_{ijt} = x_{ijt} / \max(x_j)$$

where x_{ijt} is the value, in subject i , of item j at time t , and $\max(x_j)$ is the maximum theoretical value for item j .

The result obtained is what we term the 'SARAglyph' (Fig. 1), a visual model that provides a multidimensional representation of cerebellar disorders. The value of each item is normalised to a maximum of 1 and a minimum of 0. The SARAglyph allows researchers to compare the affectation pattern of different types of ataxias. It also facilitates studying a single patient's progression along multiple dimensions. This model is easy to implement in normal clinical practice, research, and in pre-existing databases.

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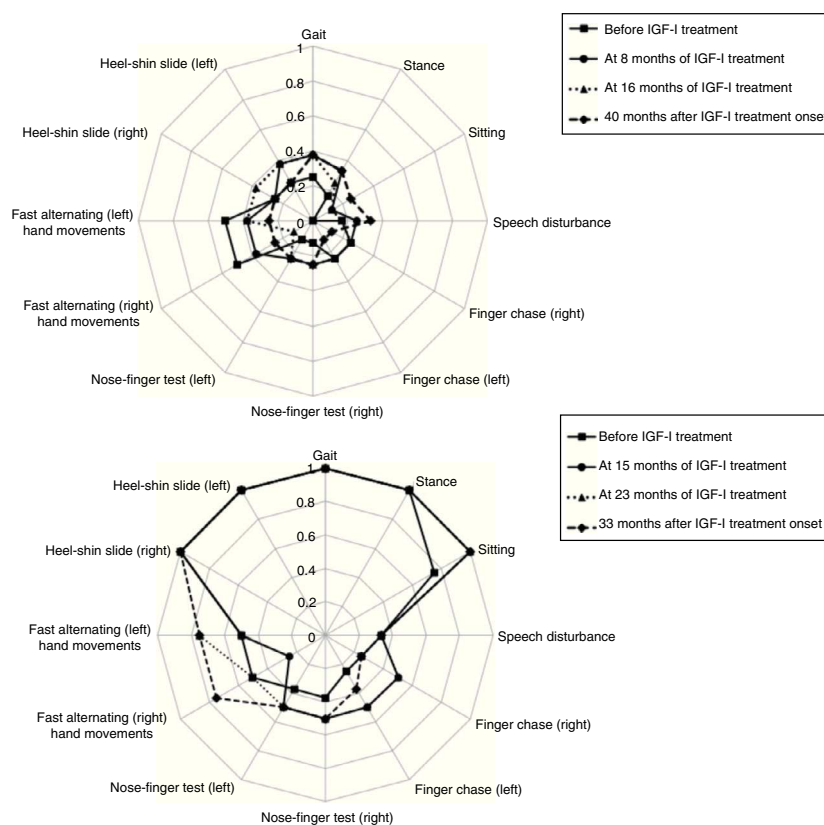


Figure 1 Examples of SARAgaphs showing the progress of patients with 2 different cerebellar disorders (the colour figure may be downloaded as supplementary material). The lines indicate different evaluations over time. Each point represents the normalised score for each item on the SARA scale at a given time. The farther the point is from the centre (0), the greater the patient's impairment for this specific item. (A) Graph describing a patient with spinocerebellar ataxia type 7 that illustrates the course of the disease after 24 months of IGF-I treatment in a clinical trial. It displays data from treatment onset, at 8 and 16 months of treatment, and 40 months after treatment onset. The initial evaluation (solid line connecting squares) found mild gait and bipedal stance impairment compared to moderate impairment of alternating movements. The graph shows that fast alternating hand movements improved during follow-up (dotted lines connecting triangles or diamonds and solid lines connecting circles); however, gait and stance deteriorated. (B) Graph describing a patient with Friedrich ataxia which illustrates the course of the disease after 24 months of IGF-I treatment in a clinical trial. It displays data at treatment onset, at 15 and 23 months of treatment, and 33 months after treatment onset. In the initial evaluation (solid lines connecting squares), the patient showed pronounced alterations of gait, stance, and of lower limb coordination. Over time, the patient's performance worsened for most items, including sitting ability. Improvement was only recorded for right-sided alternating movements at 15 months, but this ability worsened again with later visits.

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