

Review of Objective Topographic Facial Nerve Evaluation Methods

*Pavel Dulguerov, *Francis Marchal, †Desheng Wang, and *Claudine Gysin

*Department of Otolaryngology—Head and Neck Surgery, Geneva University Hospital, Geneva, Switzerland, and
†ENT Department, Affiliated Union Hospital, Medical University of Fujian, Fuzhou, China

Objective: This study is a critical review of the described methods for objective topographic evaluation of facial nerve function to identify areas of consensus and point to future research topics. **Sources and Study Selection:** Original research articles on the subject were identified through the Medline database and reference cross-checking.

Data Extraction and Synthesis: The articles were grouped according to the methodology used for topographic facial nerve evaluation. The advantages and shortcomings of each method are evaluated. The results obtained in each publication are presented in light of the method used.

Conclusion: Measurements localized around the facial area under investigation show maximal displacement, whereas other sites exhibit much smaller displacements. Large displacements in these locations can be used to assess synkinesis and contractures. Large intersubject variability of the same measure is found. Both linear measurement and image-subtracting techniques hold promise, but until comparative studies are performed, the best method will remain controversial. Simple systems, accurately evaluating facial motor function, are yet to be developed. **Key Words:** Facial nerve test—Objective evaluation—Review.

Am J Otol 20:672-678, 1999.

Facial neuromuscular dysfunction is, in a strict sense, an impairment of the function of the facial neuromuscular motor system. The deficits are complex but can be classified into: 1) strength deficits (e.g., impaired motion of the facial muscles); 2) motor control problems (e.g., synkinesis); 3) relaxation difficulties (e.g., contracture and spasms); and 4) psychologic issues related to the inability to express emotional mimics (1).

Evaluation of the motor facial nerve function requires that movements of the facial musculature be elicited, either by an external electrical stimulation or by a verbal command. The appreciation of these movements represents the basis of every facial nerve evaluation system. This appreciation can be divided into subjective and objective methods (Table 1).

The external electrical stimulation methods were developed in attempts to quantify the degree of Bell palsy, early in its course, and to predict patients with unfavorable outcome. Subjective methods, such as the nerve excitability threshold and the maximal stimulation test, have been superseded by objective methods, such as electroneurography. Electroneurography is seen as objective, because the response waveform can be stored and quantified and therefore has been used extensively. A detailed review of the electrical stimulation methods is beyond our scope and can be found elsewhere (2,3).

Electrical stimulation tests have definitive shortcomings when used in incomplete facial nerve paralysis, mainly because they lack the necessary dynamic range for quantifying the remaining facial motor function. In addition, these tests evaluate the facial nerve in its entirety and have not been applied to test the relative deficits of different facial neuromuscular territories such as smiling versus eye closure. Finally, deficits other than motor strength are not addressed by these methods. Therefore, an independent line of research in which facial movements are evoked by voluntary contractures has emerged.

In tests of facial neuromuscular function evoked by voluntary contraction, the evaluation of facial movements can be classified as subjective and objective methods (Table 1). Subjective evaluation methods correspond to the various facial nerve grading systems (4-6). Currently, the most widely used system is the House-Brackmann facial nerve grading system (HB) (5).

The scoring in the subjective facial nerve grading systems remains subjected to the variations of: 1) the adequacy of a given grading system to apprehend the facial deficit; 2) the appropriate understanding and remembering by the observer of the different grades that make up the grading system; 3) the observer's appreciation of the facial deficit; 4) the correct categorization of the deficit within a grading system; and 5) the lack of observer bias. In addition, the way the data are gathered by the observer (clinical examination, videotape, and photographs) could influence their assessment, as shown by Smith et al. (7). To palliate these inconveniences, objective methods have been proposed within the past 10 years.

Address correspondence and reprint requests to Dr. Pavel Dulguerov, Department of Otolaryngology—Head and Neck Surgery, Geneva University Hospital, 24, rue Micheli-du-Crest, 1211 Geneva 14, Switzerland.

