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Orofacial muscle activity acquired in the natural environment of subjects with temporomandibular disorders

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Portable acquisition and analysis of orofacial muscle activity is of particular interest for the study of temporomandibular disorders, of orofacial pain and also for identifying subjects at risk of fracturing dental reconstructions. Indeed, muscle hyperactivity, especially of the jaw closers can result in overloading of the orofacial structures with consequent damage and pain. For this reason, we have been developing portable multichannel bio-signal recorders to be worn in the subjects' natural environment. They have mostly relied on the use of surface and/or indwelling electrodes for electromyography as well as the use of accelerometers to record head and body movements. Future studies will include also the use of other biosensors for the acquisition of further biological signals. Due to the large data throughput of the new recorder generation, signal analysis can be cumbersome and time consuming. Data reduction or compression as well as online pattern recognition are some of the techniques that we have adopted in the past. Lately signal form decomposition, signal demodulation techniques including Fast-Fourier-Transforms have been employed in order to gain information on the type of oral tasks performed, muscle fatigue and also on chewing behavior as well as so-called para-function (i.e. empty masticatory movements potentially damaging orofacial structures). Here a review of activity in this domain illustrating the single questions and the technical solutions adopted is presented. It is then shortly indicated future challenges of unanswered questions and the way to solve them by adopting cutting-edge technology.

Biography

Luigi M Gallo has a PhD in Biomedical Engineering, and is Professor of Physiology and Biomechanics of the Masticatory System at the University of Zurich. He is active on instrumental assessment of temporomandibular disorders, in particular a) by means of "Dynamic Stereometry", i.e. virtual modeling of mandibular anatomy animated with its own real kinematics, and b) by monitoring muscular activity and behavior of subjects with orofacial pain. In 2003/2004, Gallo was Research Fellow at the Hospital for Special Surgery in New York. Besides authoring round 90 journal papers and book chapters, he serves as scientific collaborator of several scientific journals and publishers.

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