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CONTROL OF THE POSTURE OF THE HUMAN MANDIBLE AT REST AND DURING LOCOMOTION

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The vertical position of the human mandible at rest is an important parameter in dentistry and maxillofacial surgery. However, the physiological mechanisms that maintain this position within a narrow range over long periods of adult life have been unclear. We have established that two major mechanisms are responsible for opposing the force of gravity that tends to displace the mandible downwards, and that the contributions of these differs under different conditions. We examined the electrical activity of the masticatory muscles both at rest and during locomotion. We found very low levels of alternating activity in masseter and digastric both at rest and during slow mandibular movements. These are responsible for the low-amplitude tremor of the mandible at rest and during slow movements, but appear to play no role in maintaining the vertical position of the mandible. We found no evidence for tonic activity in the antigravity muscles in subjects whose head was stationary that might contribute to supporting the mandible. Even when subjects walk and the mandible moves up and down with every step, there is no corresponding reflex activity in the masticatory muscles. However, when subjects run, the head moves more rapidly up and down, and these brisker movements evoke reflexes in masseter following landing in each step. The ~7-8 ms latency of the reflex responses indicate that they are monosynaptic stretch reflexes arising from the muscles spindles in masseter. Our data indicate that these reflex responses limit the downward mandibular movement in subjects who are running. We conclude, therefore, that in subjects whose heads are stationary or who are walking slowly, the rest position of the mandible is maintained passively against the force of gravity by viscoelastic forces arising from the perioral soft tissues. In subjects who run or hop, however, the downwards movement of the mandible is resisted by stretch reflexes that activate the jaw-elevator muscles. This appears to be the first unequivocal demonstration of the function of an stretch reflex uncontaminated by other muscle activity under conditions of entirely natural activation.

Acknowledgment: These studies were supported by the National Health and Medical Research Council of Australia.

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WHAT SHOULD A MEDICAL PHYSIOLOGY CURRICULUM BE LIKE?

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Medical education will continue to change for the better in response to various demands and pressures, and it is already spurred by high expectations and active participations of many medical educators for further development of medical education. Traditional teaching method in medical colleges has been highly structured, discipline-oriented lectures by individual departments aiming for primarily cognitive development. Progressive medical educators have criticized that indiscriminate education of rapidly growing medical knowledge has produced many knowledgeable but not clinically competent doctors and more medical colleges started to concern about improving the medical education in recent years. The medical school curriculum had been modified in 1970s as the medical educators became aware of the problems related with the subspecialty-oriented medical education. Major modifications of curriculum and teaching method including medical physiology education were adjusting the teaching sequence of various subjects. Medical colleges and faculty members are no more allowed to keep maintain the lecture-oriented educational instruction but to facilitate undergraduate or postgraduate student learning with interdisciplinary approach. Self-instructional technology will be much highlighted and tremendously expanded in the coming educational era. Incredibly vast explosion of knowledge and technology in the allied sciences is another force to look for future commitment from the university on educational revision; development of high technology including informatics and automation will heavily influence the environment of the medical education. In Korea, since early 1980s, there has been a gradual move towards curriculum changes in three areas such as learning objectives, teaching/learning methods, and assessment methods. Every medical college developed a set of learning objectives that medical students are supposed to achieve during 4 years of medical course. But the number of learning objectives was reduced. This reduction was possible mainly because of the introduction of integrated teaching. The integration of courses was aimed at making learning more effective and meaningful by showing students how concepts in both basic and clinical sciences are related to each other. For most of medical colleges, integrated courses are combined with conventional courses on basic medical science and clinical medicine. The difference is only the length of integrated courses. One of the crucial developments in medical education in the past ten years or so has been the adoption of the problem-based learning (PBL) method. In the past, the examination tended to be less relevant because there was no standard basis for constructing the test. As a result, questions were too easy or it was unnecessarily too difficult. The level of difficulty was frequently attuned to the interests of those who constructed the test items. Most of the MCQ-type questions in previous examinations were concentrated on evaluating examinees' ability to recall simple information. However, this has gradually changed and now there is a balanced distribution of questions for information recall, interpretation and problem solving. Accordingly, we assert that changes are needed now to anticipate the circumstances that are beginning to alter the practice of medicine and that today's medical students will confront in the future. We judge that the present system of education will become increasingly inadequate unless it is revised. We cannot predict precisely the educational needs of students whose careers will be practiced mainly in the 21st century, but this is the time, though late, to prepare ourselves firstly as a high quality of educators and search for a better educational program to serve the needs of physicians.