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ROUND TABLE DISCUSSION III: HYBRID ASSISTIVE SYSTEMS

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The first question related to this trend in rehabilitation engineering is how to define the meaning of the term hybrid. When referring to a hybrid assistive system we mean:

a) Integration of functional electrical stimulation and external control of human extremities.
b) Partial external power supply added to defficient biological resources.
c) Preferably, nonnumerical, biologically oriented external control (logical control, external reflex action) which acts in conjunction with internal control of functional motions.

Above features are common to all hybrid assistive systems. However, the deffinition of the hybrid assistive system leaves open such questions as the type and the amount of man-machine interaction involved (choice of assisted muscle groups, choice of assisted joints, amount of added external power, complexity of the functional motion, type of interface, etc.). Consequently, the spectrum of hybrid systems covers a large variety of man-machine assistive devices implying active role of the patient in terms of control, power input and muscle activity. In other words, this approach is more of a flexible design methodology than an application of ready-made assistive devices.

Having in mind above features of hybrid assistive systems, it is easy to conclude that the rehabilitative potential of this approach is very wide. Actually, we are witnessing the very first step in the evaluation of hybrid assistive systems. So far the main effort was dedicated to the development of prerequisites needed to implement the hybrid approach such as self-fitting modular orthoses, soft man-machine interface, cybernetic actuators capable of reproducing the states of biological joints, and modular, non-numerical,

control software. It is expected that in the next phase of development of the hybrid concept satisfactory experimental results will be accumulated so that more specific statements about rehabilitative potential and medical indications can be made.