

Editorial

New perspectives in neurotrauma research

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Traumatic brain and spinal cord injuries are severe burdens for the patients, their relatives, the health care providers and society as a whole. Recent data demonstrate the magnitude of the problem: It is mostly a disease of the young generation (age 20–45 years) with mortality rates for severe traumatic brain injury (TBI) between 40–50 %. In approximately 60 % of cases, multiple trauma is accompanied by head injury. The outcome of TBI is determined not only by the extent and severity of the primary insult, but also by the degree of secondary brain damage. In the subgroup of severe TBI (GCS \leq 8) only 25 % of patients showed a complete recovery or had minor neurological deficits; 15 % resulted in a lifelong disability or even in a permanent vegetative state. Economically, the impact of TBI is enormous – estimates of the costs of TBI in the U.S. range from 4–15 billion dollars per year. Valid data for Germany are not yet available.

Against this background, the German Ministry of Education and Research (BMBF) initiated a research program on “Neurotrauma and Neuropsychological Rehabilitation” to link active experimental and clinical research groups in Germany in order to facilitate and to strengthen their cooperation. The aim of this six year program is to develop innovative approaches with direct application to patients’ care and to improve the quality of the hospitals providing acute care and rehabilitation. In 1994, a total of 8 regional joint projects encompassing 60 specific subprojects began their investigations. Annual symposia are held to evaluate progress, close the gap between basic science and clinical research and strengthen the relationship and cooperation between the research teams.

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The current issue of this journal is a cross-section of the present research activities in a number of joint projects. It is based on the 3rd BMBF-Symposium on Neuro/Polytrauma which took place in Cologne (March 13–14, 1998). More than 100 papers were presented as lectures and posters in the fields of epidemiology and outcome assessment, pathobiochemistry, diagnosis I prognosis, neuroprotection I therapy and rehabilitation. A complete list of abstracts has been published in “Zentralblatt für Neurochirurgie” [10].

Improvement of outcome following TBI can be expected from progress in preventive strategies and reduction of secondary brain damage. In order to obtain valid data from the pre- and early clinical treatment phase, systematic analyses in southern Bavaria [7] and a more specific ten years (1990–1999) epidemiological study in the Cologne urban area are in progress. The first results of the Cologne study are presented by Bouillon et al. Data from the first 6 years show that 60 % of deaths (GCS \leq 8) occurs in the prehospital phase; 49 % of the study population suffered multiple injuries [3]. However, the mortality rate or the Glasgow Outcome-Scale (GOS) for survivors are only crude measures of outcome. The paper of Berger et al. [2] systematically reviews the literature on Quality of Life (QL) as a more meaningful parameter of outcome and its methods for assessment after TBI. It is concluded that a homogenous and comprehensive QL-concept for TBI patients is not yet available and that a conference that can deliver a consensus of opinion is urgently required for the formation of a valid QL assessment in order to reliably evaluate the progress of treatment in the different phases of rehabilitation. Such a conference is planned in October 1999 with contributions from experts in a number of disciplines.

Apart from new methods of neuroimaging, the analysis of neurobiochemical markers are of high interest for the early diagnosis and prognosis of TBI. Herrmann and coworkers

[5] have investigated the predictive value of early patterns of release of the protein S-100 B and neuron specific enolase (NSE) into the blood stream and support the hypothesis that these markers might be more useful than conventional CCT or MRI procedures. Further studies are required to confirm these interesting results.

Brain-injured children and adolescents need our special attention, because they are at risk of suffering neuropsychological, cognitive and social impairment for an extended period of time beyond the initial recovery period. Three papers in this issue [1,6,9] from Bremen, Kiel and Cologne focus on these patients and emphasize the need for long-term outcome studies, improvement and procedural uniformity of qualitative and quantitative methods for the evaluation of sensorimotor function after TBI, and the importance of a comprehensive early onset multimodal approach for rehabilitation. Preliminary results of a prospective randomized study indicate that the early onset of rehabilitation program improves cognitive abilities, reduce psychopathological alterations and improves the quality of life [9]. To evaluate the efficacy (and effectiveness) of specific rehabilitation procedures in prospective controlled studies, specific knowledge and data about the test properties (i.e. test/retest reliability, responsiveness to change) is mandatory. However, this requirement has rarely been fulfilled in rehabilitation research, until now. A positive example is given by Platz et al. [11] for specific interventions in arm and gait rehabilitation. These methodological prerequisites also have to be fulfilled by the new imaging procedures such as PET or functional magnetic resonance imaging (fMRI) which offer new insights into the evaluation of cortical activation [8].

Although we are still far from understanding the mechanisms of secondary brain and spinal cord injury, the 3rd BMBF-Symposium on Neuro-/Polytrauma revealed promising new therapeutic perspectives. Examples are the positive long-term effect of nimodipine in patients with traumatic subarachnoidal bleeding (see [10]), the chronic sacral neuromodulation for vesicourethral dysfunction [4], the combination of sacral-anterior root stimulation and posterior rhizotomy for the restoration of bladder function in patients with supraconal spinal cord injury [12] or certain coma stimulation

techniques in TBI patients. A great number of techniques, still in their experimental phase (i.e. cochlear implants) are poised to enter the clinical arena.

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