# Traumatic Brain Injury
## Facts and Figures

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United States Department of Education • National Institute on Disability and Rehabilitation Research
Traumatic Brain Injury Model Systems National Data Center

## Inside This Issue



## Increased Funding Opens A New Era In TBI Model Systems Program

Due to the tireless efforts of brain injury rehabilitation advocates, consumers and legislators, the TBI Model Systems of Care received 5 million dollars in additional funding starting in FY 1998. This increased the budget for the program from 1.7 to 6.7 million dollars per year, which is housed in the National Institute on Disability and Rehabilitation Research (NIDRR). This additional funding has allowed 3 initiatives: 1) Twelve new centers have been added, increasing the total number of TBIMS to seventeen (see page 3); 2) Funding for the TBIMS National Data Center has been doubled (from $125,000/year to $250,000 for FY 1999); and 3) Approximately 1 million dollars in funding has been allocated to individual collaborative research projects.

### Increase in Centers: A "True" National Database

Though the Model Systems have developed a national database which has been in operation since 1989, it has been dependent on data submitted from only 4-5 centers and has only accumulated just over 1000 cases to date. Given the high incidence and prevalence of traumatic brain injury, the existing database, though quite comprehensive, is limited in its representativeness of the population and is subject to a high level of annual attrition (approximately 40% lost to follow-up at one year post-injury). The new centers should contribute at least 300 additional cases per year and broaden the database representation in terms of geographic distribution, ethnic group membership, and socioeconomic status.

In addition, the new centers include key investigators who have published widely in the brain injury literature and who are recipients of other TBI-related grants from NIDRR and other federal agencies (e.g. Health Centers for Disease Control, and Human Services).

### Expanded Role of the National Data Center

The expansion in the number of centers will increase the scope and workload of the TBIMS National Data Center, located at the Rehabilitation Institute of Michigan and Wayne State University. To support that effort, the budget for the National Data Center has been doubled (from $125,000 to $250,000) for fiscal year 1998-1999. To provide an in-depth orientation to the extensive data collection required for the national database, Cynthia Harrison-Felix, M.S., TBI National Data Center Manager, visited each new center last Fall and provided in-person training to all personnel. In December, 1998, the National Data Center coordinated a two day TBIMS Project Directors meeting in Washington, D.C. at which all centers met together for the first time with NIDRR management staff.

Some of the new objectives for the National Data Center include the following: 1) Coordinate the Interagency TBI National Conference, December 1-4, 1999; 2) Upgrade the database syllabus to a more user friendly format for model system and non-model system users; 3) Conduct a Data Collectors' conference in 1999 for the purposed of reviewing all operational and technical aspects of the TBI National Database; and 4) Develop a TBI Model Systems exhibit to disseminate TBIMS materials at TBI-related conferences and meetings.

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## New Era in TBIMS Program

### Collaborative Research Projects

The final aspect of the funding initiative was approximately one million dollars allotted for collaborative research among the model systems or between non-model systems and model system programs. The following projects were funded:

**1 A Double-Blind, Placebo-Controlled Trial Exploring the Efficacy of Nortriptyline and Amantadine in the Management of Post-Traumatic Agitation.**

*Ohio State University (Columbus, OH). Principal Investigator - W. Jerry Mysiw, M.D. Collaborating Centers - The Institute for Rehabilitation Research (Houston, TX); Moss Rehabilitation Research Institute (Philadelphia, PA); Santa Clara Valley Medical Center (San Jose, CA); and the Rehabilitation Institute of Michigan (Detroit, MI).*

This study provides objective data for evidence-based evaluation and treatment of the most common behavioral impediment to acute rehabilitation, post-traumatic agitation. Post-traumatic agitation is a dramatic behavioral consequence of traumatic brain injury (TBI) occurring in approximately 33 percent of coma-emerging patients. The agitated brain injury survivor has diminished capacity to respond to traditional rehabilitation services. At risk for injury and disruptive to the therapeutic milieu, these patients consume considerable health care resources. Pharmacologic intervention is becoming increasingly important in the care of post-traumatic agitation in an effort to resolve the aberrant behavior promptly and permit the patient to respond to an expanded range of rehabilitation services. This project offers a unique opportunity to develop the multicenter trial needed to recruit a statistically meaningful cohort for study. The project involves a randomized, double-blind, placebo-controlled study of two medications commonly used to treat agitation. The study has specifically chosen measures of treatment efficacy with demonstrated validity in this population.

**2 Effects of Methylphenidate on Working Memory and Cerebral Glucose Metabolism in Persons with Severe Traumatic Brain Injury.**

*Baylor College of Medicine (Houston, TX). Principal Investigator - Harvey S. Levin, Ph.D. Collaborating Centers - The Institute for Rehabilitation and Research (Houston, TX); University of Washington (Seattle, WA); and the Rehabilitation Institute of Michigan (Detroit, MI).*

This project conducts a multicenter clinical trial of methylphenidate (MPH) to treat deficits in working memory and other cognitive impairments resulting from severe traumatic brain injury. MPH is a potentially cost-effective intervention that could mitigate frequent and disabling cognitive impairments and thereby improve the lives of people with TBI, their families, and caregivers. By using functional brain imaging to identify the mechanism through which MPH improves cognitive functioning, the project seeks direction for developing pharmacological interventions for people with TBI. A total of 144 people with severe TBI are recruited at three TBI Model Systems Centers. All are to have a working memory deficit on one or both screening tests and no medial contraindications for MPH treatment; they are randomized to three conditions; randomization is stratified by center and recovery phase. Working memory, long term memory, processing speed, everyday memory, and productivity in performing adaptive activities, is assessed at pretreatment baseline. Subsets of participants also undergo positron emission tomographic scanning to evaluate changes in cerebral glucose metabolism. Results are disseminated through publications, presentations, and internet media to NIDRR Model Systems network investigators, other researchers, rehabilitation providers, family members, and payors.

**3 Collaborative Study of Impaired Self-Awareness After Traumatic Brain Injury.**

*Mississippi Methodist Rehabilitation Center (Jackson, MS). Principal Investigator - Mark Sherer, Ph.D. Collaborating Center - Moss Rehabilitation Research Institute (Philadelphia, PA).*

This project creates new knowledge on impaired self-awareness (ISA) in people with moderate to severe traumatic brain injury. ISA interferes with effective delivery of rehabilitation services, prevents self-advocacy, leads to distress within the family system, and negatively affects social outcomes. No effective treatment exists. This project studies its impacts and its subjective meaning for consumers in order to design new treatments and service delivery innovations. It conducts the first large-scale (N=160), prospective longitudinal study of ISA's neural substrates, neuropsychological features, natural history, and relationship to functional and quality-of-life outcomes over the first year following moderate to severe TBI. With several methodological innovations that improve interpretation of the quantitative data, project researchers provide the first systematic qualitative study of self-awareness from the perspective of the people with TBI and their families. The project uses (1) the expertise of researchers involved in TBI outcomes research; (2) many data elements already captured in the Model System database and supported by Model System infrastructure; and (3) the high volume of subjects and excellence of resources jointly available at the collaborating sites.

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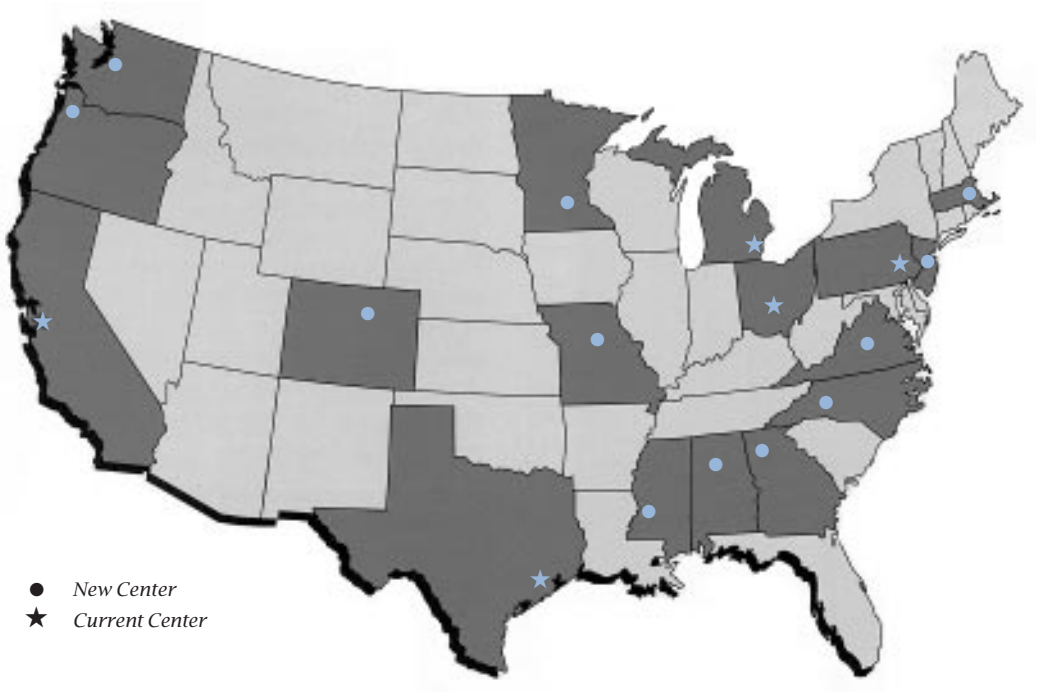
## Traumatic Brain Injury Model Systems




For more information about the TBI Model Systems program, visit the national website at www.tbims.org or contact Cynthia Harrison-Felix, MS at (313) 745-1188 or cindyskier@aol.com.

| | Name of Center | City | State |
|---|---|---|---|
| ● | University of Alabama | Birmingham | AL |
| ★ | Santa Clara Valley Medical Center | San Jose | CA |
| ● | Craig Hospital | Englewood | CO |
| ● | Emory University | Atlanta | GA |
| ● | The Spaulding Rehabilitation Hospital | Boston | MA |
| ★★ | Rehabilitation Institute of Michigan | Detroit | MI |
| ● | Mayo Foundation | Rochester | MN |
| ● | University of Missouri | Columbia | MO |
| ● | Mississippi Methodist Rehabilitation Center | Jackson | MS |
| ● | Charlotte Institute-Mecklenburg Hospital Authority | Charlotte | NC |
| ● | Kessler Medical Rehabilitation Research and Education Corp. | West Orange | NJ |
| ★ | Ohio State University | Columbus | OH |
| ● | Oregon Health Sciences University | Portland | OR |
| ★ | Moss Rehabilitation Research Institute | Philadelphia | PA |
| ★ | The Institute for Rehabilitation and Research | Houston | TX |
| ● | Medical College of Virginia | Richmond | VA |
| ● | University of Washington | Seattle | WA |

● *Newly funded October 1, 1998*

★★ *Also the National Data Center*

Center Spotlight

# Center Spotlight: Moss Rehabilitation Research Institute

*Philadelphia, PA*

Moss Rehabilitation Research Institute joined the TBI Model Systems in the fall of 1997, with a project that involves the collaboration of two of our main acute care referral hospitals, Albert Einstein Medical Center, and Temple University Hospital, both of which see predominantly urban low income patient populations. Model System patients from these two acute care institutions receive their inpatient rehabilitation at MossRehab Hospital's Drucker Brain Injury Center, which has had a dedicated TBI program since 1976.

The Drucker Center was fortunate to already have a very well developed continuum of TBI rehabilitation services, including the *Basic Living Skills* (acute inpatient) *Program*, a *Day Hospital* program, a *Day Treatment Program*, *Community Reentry Program*, and *Vocational Directions Program*. The Day Hospital allows patients that are medically stable to reside at home while partaking in a full transdisciplinary rehabilitation program during the day, including nursing services. The Day Treatment Program is designed for individuals who need one or more therapy services on an outpatient basis, but allows continued team coordination and case management. The Community Reentry Program provides assessment and treatment of more advanced community living skills including naturalistic observation and life-skills coaching. Similarly, the Vocational Directions Program provides job coaching and follow-up services to individuals with employment potential. In addition, post-acute individuals can join the *Clubhouse*, a client directed social and activity center, and can be employed by our *Affirmative Business Program*, alongside able bodied individuals.

A number of additional focused specialty services are also available. Vegetative and minimally conscious patients are admitted to the *Responsiveness Program*, in which individualized single subject assessment methods are used to assess their state of consciousness and response to treatment. The *Institute of Mobility Evaluation and Treatment* allows individuals with contractures or deficits in motor control to be evaluated dynamically in the *Gait and Motion Analysis Laboratory* or the *Motor Control Analysis Laboratory* (for upper extremity function), in order to plan optimal therapy, pharmacologic, or surgical interventions. *Brain Injury Support Groups* are available for both survivors and family members, as are *Substance Abuse Services.*

*The MossRehab Hospital in Philadelphia, PA*

Funds from the Model System have allowed us to enhance our follow up and case management services. In particular, this allows us to avoid problems in the transitions between MossRehab-based services. In today's managed care environment, however, it also allows us to maintain contact with clients who are not able to continue in our treatment system, so that we can still assist them in accessing services elsewhere that they need and to which they are entitled. In addition, our 3 consumer advisory focus groups allow us to examine ways of

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## Center Spotlight

improving services in the inpatient, community reentry, and vocational/ educational treatment components.

Funding from the Model System also supports our 11 focused research projects. Two of these projects focus on treatment of motor impairments. In particular, we are interested in the degree to which our sophisticated laboratory assessments of movement contribute to improved patient care, and whether computer-directed movement therapy can be cost-effectively applied. We also have 2 projects that focus on whether advances in computer technology (palmtop computers, internet services) can improve clients' outcomes. We will be attempting to develop improved methods of assessing attention deficits in TBI, with a collaborative validation of our recently developed "Attention Rating Scale." We are also assessing whether prolonged vocational follow up services can improve job retention in a cost-effective manner. Another project also focuses on cost issues by trying to predict variance in specific cost categories, such as laboratory studies, antibiotic use, etc. Finally, we have several projects that involve evaluation or improvement of outcome assessment methods. One examines whether some of the community reintegration methods contain occult racial biases that may confound results, while another attempts to improve case mix adjustment of various outcomes of interest.

Two of NIDRR's required priorities were very thorny to address. In trying to understand the impact of violence-induced TBIs, one invariably finds violence to be confounded with the etiology of injury, and the premorbid status of the injured individual. Because we were interested in the role of violence itself, we chose to evaluate whether participants attribution of blame for their TBI (i.e., blaming the perpetrator of the violence) might influence their outcome, as it appears to do in spinal cord injury. In attempting to assess the impact of alternative methods of service delivery on outcome, we were concerned that patients referred to subacute rehab services or other non-inpatient alternatives would differ in non-random ways from our inpatient sample, thus making it difficult to disentangle the impact of the services themselves, from differences in case mix. Our approach to this topic has been a qualitative research project in which detailed interviews are conducted with clients and families about what services they need vs. what services their insurance actually allows them to receive. We hope that the detail provided by the qualitative method will strengthen the inferences we can make.

More recently, we have also been funded for 3 related projects. Two of these are NIDRR-supported collaborations on the topics of awareness deficits following TBI (with Mississippi), and treatment of post-traumatic agitation (with the other 4 centers that were funded in 1997). We are also the lead center for an NIH-funded clinical trials planning grant that will explore the feasibility of testing errorless learning techniques in a clinical trial with memory-impaired patients. We look forward to collaborating with our other Model System colleagues on these and other projects. ■

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## New Era in TBIMS Program

**4 Research Impact of Family Environment on Patient and Family Outcome After TBI: A Multi-Center Study.**

*Baylor College of Medicine (Houston, TX). Principal Investigator - Angelle M. Sander, Ph.D. Collaborating Centers - The Institute for Rehabilitation and Research (Houston, TX); Mississippi Methodist Rehabilitation Center (Jackson, MS); and the Mayo Medical Center (Rochester, MN).*

This study determines the importance of the preinjury family environment in the prediction of long-term patient and family outcome after traumatic brain injury. The research develops models that can be used to identify family members and patients who are at risk for developing long-term adjustment problems. Information gained is also used to develop and pilot a structured family intervention. Previous research has shown that TBI results in substantial distress for a majority of family members. Research conducted with parents of children with TBI indicates that preinjury family functioning has an impact on children's outcome. Similar studies have not been conducted with the population of adults with TBI. Systematic dissemination activities are designed to target consumers (people with TBI and their families) and rehabilitation professionals. ■

New Research

# Analysis of Neuropsychological Recovery Following Traumatic Brain Injury: A Hierarchical Linear Modeling Approach*

*S. R. Millis, M. Rosenthal, & J. H. Ricker (Rehabilitation Institute of Michigan & Wayne State University School of Medicine); C. Boake & W. High (The Institute for Rehabilitation and Research & Baylor College of Medicine); J. S. Kreutzer (Medical College of Virginia); M. Stern (Santa Clara Valley Medical Center)*

The neuropsychological consequences of traumatic brain injury (TBI) in adults have been relatively well documented (Brooks, 1990). Reduced capacity for new learning, slowed information processing, and disruption in complex integrative functions have been reported, although the extent and pervasiveness of impairment seem to be related to the initial severity of the TBI as well as the time post-injury at which the individual is assessed (Dikmen, Machamer, Winn, & Temkin, 1995). However, long-term neuropsychological recovery is less well understood. Does recovery continue several years following injury? Is recovery uniform across individuals and neuropsychological domains? Previous studies have been hampered in answering these questions by small samples, limited follow-up, or inadequacies in statistical design. Typically, investigators have calculated mean test scores for comparisons, collected data at only two time points, and examined persons with TBI at 2 years post-injury or less (e.g., Dikmen et al., 1995; Drudge, Williams, & Kessler, 1984; Levin et al., 1990). Moreover, conventional repeated measures analysis does not allow one to measure differences in rates of change among individuals but treats these differences as error (Bryk & Raudenbush, 1992).

In an attempt to address these methodological issues, we investigated recovery in attention and memory after TBI on a limited number of neuropsychological tests using hierarchical linear modeling (HLM). Our focus was on the chronic stages of recovery. Neuropsychological measures were collected prospectively in a multicenter study on adults with TBI at a minimum of three points in time and up to seven time points. Assessment began at one-year post-injury and follow-up was at yearly intervals.

### *Participants*

Participants were 79 adults who sustained a traumatic brain injury which was defined as an external mechanical force causing brain dysfunction as indicated by loss of consciousness, or posttraumatic amnesia, or objective neurological findings. Participants were drawn from the Traumatic Brain Injury Model Systems National Database (Harrison-Felix, Newton, Hall, & Kreutzer, 1996) who had completed the measures of attention and memory at one-year post-injury and on at least two subsequent occasions. The sample ranged in age from 17 to 85 years at injury ($\underline{M}$ = 32.1, $\underline{SD}$ = 13.2). Sixty-three percent of the of participants sustained severe TBI as defined by the Glasgow Coma Scale ($\underline{M}$ = 8.3, $\underline{SD}$ = 3.1). Half of the sample did not complete high school and 81% were men.

### *Materials*

Four neuropsychological tests were selected to assess recovery: Digits Forward from the Wechsler Memory Scale-Revised (DF; Wechsler, 1987), Trails B (TMT; Reitan & Wolfson, 1993), Rey Auditory Verbal Learning Test total score (RAVLT; Lezak, 1995), and Symbol Digit Modalities Test-Written (SDMT; Smith, 1982).

### *Design and Procedure*

The number of participants tested at each assessment interval follows: Year 1 = 63, Year 2 = 67, Year 3 = 60, Year 4 = 39, Year 5 = 51, Year 6 = 14, Year 7 = 6. The multiple assessment periods are considered "nested" within the person (Bryk & Raudenbush, 1992) and, thus, the number and spacing of assessment periods can vary across cases. Not all participants were able to complete all tests: DF = 69, TMT = 59, RAVLT = 64, SDMT = 61. Age, education, admission Glasgow Coma Scale, and pupillary status at admission were examined as predictors of neuropsychological recovery. Pupillary status was dichotomized as abnormal (sluggish or nonreactive) or normal; 59% had abnormal pupillary status. Education was coded as a nine-increment variable.

### *Results*

Data were analyzed with HLM 4.01 (Bryk, Raudenbush, & Congdon, Jr., 1996). The Level-1 model represented the individual growth or recovery trajectory for each participant on each neuropsychological test and was modeled by: Y = raw score on a individual neuropsychological measure; $p_{0i}$ =

* *Poster presented at the 27th Annual Meeting of the International Neuropsychological Society, Boston, MA, February 12, 1999.*
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the intercept representing the individual participant's expected performance at one-year post-injury; $p_{1i}$ = the linear trend representing the constant rate of change; $a_{it}$ = the "age" of the injury, i.e., the time post-injury in years; e = random error. The Level-1 equation was $Y = p_{0i} + p_{1i} a_{it} + e$.

The Level-2 model assumed that the growth or recovery parameters varied across participants and was modeled by: X = participant characteristic, e.g., injury severity, age, education; b = the effect of X on the growth parameter; r = random effect. The Level-2 equation was $p_{pi} = b + S\, bX + r$.

Hierarchical analysis begins with the fitting of an unconditional model in which no person-level predictors are put in the model. This initial model assists in determining the proper specification of the individual growth equation. At the one-year post-injury baseline, participants varied significantly in the performances on all measures. However, the recovery ("growth") rates were quite different across measures. Although there were significant individual differences among the linear growth rates for DF and RAVLT, the coefficients had t values less than 1.0, indicating that the growth rates were not significantly different from zero. Participants gained an average of 0.11 words a year on the RAVLT beyond one-year post-injury baseline and 0.0 trials on DF. Thus, we constrained the average growth rate coefficients to zero for subsequent DF and RAVLT models. In contrast, the linear growth rates for SDMT (t = 3.5) and TMT (t = 2.8) were significant, although there was little variation in individual TMT growth rates ($c^2 = 60.2$, p = .39). Participants' time to complete TMT decreased an average of 4.36 seconds a year. SDMT showed a gain of 1.0 items a year beyond the one-year baseline. In the interest of parsimony, we constrained the residual slope variance to zero for the subsequent TMT model.

Having identified appropriate unconditional models, we then evaluated conditional models with the Level-2 predictor variables of age, education, GCS, and pupillary status. Age at injury (t = 2.8) and education level (t = 3.7) were strongly related to TMT performance at the one-year baseline. On average, an increase of one year in age was associated with an increase of 2.23 seconds on TMT while one-increment increase on the education scale was associated with a 19.06-second decrease on TMT. The t ratios were less than 2.0 for GCS and pupillary status but their estimated effects were plausible. This model accounted for 36% of the parameter variance on TMT at one-year post-injury. Age and education were also related to baseline performance on RAVLT. GCS (t = 2.0) and education (t = 2.3) were related to baseline SDMT performance: each unit increase on GCS and education were associated with 1.0- and 1.8-item increases on SDMT, respectively, and accounted for 16% of parameter variance. We failed to find any strong relationships between DF and age, education, GCS, or pupillary status.

### *Discussion*

Neuropsychological recovery following TBI appears multifaceted. Even at one-year post-injury, significant individual differences in the performance levels were found on the measures of attention and memory used in this study. Individuals varied considerably in terms of where they "started" and the "steepness" of their recovery curves. Age at injury, educational attainment, and injury severity explained a modest amount of the this baseline parameter variance at one year on SDMT, TMT, and RAVLT.

We also found that cognitive recovery was detectable beyond one year post-injury on only our measures of complex attention. However, the factors explaining this improvement were less clear. Age and education had plausible, although statistically nonsignificant, associations with the recovery trajectories while injury severity characteristics appeared to be less strongly related. It may be that injury severity factors exert greatest influence on test performance during acute recovery stages.

Minimal improvement in new learning capacity and span of attention was found subsequent to the one-year post-injury baseline. However, this finding may reflect the measure or metric we used to assess new learning. Nonetheless, the recovery period for some cognitive processes like new learning and memory may be shorter than for cognitive speed and flexibility. The observation of minimal change on DF is less surprising as other investigators have found DF to be relatively resilient to the effects of TBI.

We see several implications from these findings. From a rehabilitation perspective, measures of cognitive speed and flexibility may be particularly useful for monitoring recovery and response to intervention. Selection of target symptoms for intervention might be better guided as recovery curves are more adequately described by hierarchical analysis. Further analysis of the Level-2 person-level variables associated with recovery may be an auspicious area for future work: there may be acute biomedical variables responsive to intervention that have long-term impact on recovery. Hierarchical analysis may also assist in the forensic arena by providing more precise information on expectable courses of recovery following TBI. ■

Recovery in attention and memory after traumatic brain injury was investigated with hierarchical linear modeling (HLM). Beginning at one-year post-injury, neuropsychological measures were collected on adults with TBI at a minimum of three yearly time points and up to seven points. Participants were 79 adults (age, M = 32.1; GCS, M = 8.3; 64 men). At one-year baseline, participants varied significantly in the performances on all measures but the recovery rates beyond one-year post-injury were not significant on Digits Forward or the Rey Auditory Verbal Learning Test. Growth rates were significant for Trails B and Symbol Digit Modalities Test. Age at injury, educational attainment, and injury severity explained modest amounts of baseline parameter variance at one year on SDMT, Trails B, and RAVLT.

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# Data From the Traumatic Brain Injury Model Systems of Care 1989-98

The Traumatic Brain Injury Model Systems (TBIMS) Project is a prospective, longitudinal multicenter study examining the course of recovery and outcomes following traumatic brain injury (TBI). The Seventeen Model System centers (11 new centers just beginning to collect data), funded by the National Institute on Disability and Rehabilitation Research, provide coordinated emergency care, acute neurotrauma management, comprehensive inpatient rehabilitation and long-term interdisciplinary follow-up services.

Information contained in the database is collected during initial hospitalization and annually thereafter on the anniversary of injury. The database contains 391 variables describing the initial hospitalization period, and 419 variables relevant to the follow-up period. The Database Syllabus contains detailed information about the database and is available for purchase from the TBIMS National Data Center.

Presently, the database contains **1115** cases discharged from the TBIMS between March, 1989 and September, 1998; with annual follow-up information extending, thus far, to nine years post injury. The table below summarizes several key characteristics of the TBIMS population, which have been updated from previous issues of ***TBI Facts and Figures:***

| Number of Cases | 1086 |
|---|---|
| Mean Age in Years | 36 |
| % Male | 76 |
| % White | 50 |
| % African American | 37 |
| % not Married at Injury | 75 |
| % w/o High School Completion at Injury | 41 |
| % Employed at Injury/1 yr. Post-Injury | 51/22 |
| Mean Lowest GCS | 7 |
| % with Post-traumatic Amnesia | 97 |
| % Vehicle-related Injury | 58 |
| % Violence-related Injury | 26 |
| **% Positive Blood Alcohol Level at Injury | 53 |
| Mean Acute Length of Stay 1990 & 1998 | 29/19 |
| Mean Rehab. Length of Stay 1990 & 1998 | 48/25 |
| Mean Acute Charge Per Day 1990* & 1998* | 4119/4687 |
| Mean Rehab. Charge Per Day 1990* & 1998* | 1499/1349 |
| % with Medicaid Payer | 30 |
| Mean Disability Rating Scale Score at Rehab. Admit and D/C | 13/6 |
| Mean Functional Independence Measure Score at Rehab. Admit and D/C | 54/98 |
| % Living in Private Residences at Rehab. D/C | 83 |
| % Drinking Alcohol at 1 yr. Post-Injury | 42 |
| Mean Community Integration Questionnaire Score at 1 yr. Post-Injury | 15 |

* *all figures adjusted to 1998 dollars*
** *any alcohol detected; only includes those tested*

TBIMS Syllabus

# Now Available: The 1999 Traumatic Brain Injury Model Systems National Data Base Syllabus

In 1987, the U.S. Department of Education, National Institute on Disability and Rehabilitation Research (NIDRR) provided funding to establish the Traumatic Brain Injury (TBI) Model Systems of Care. These research and demonstration projects (currently there are 17 in the U.S.) focus primarily on:

1 developing and demonstrating a model system of care for persons with TBI, stressing continuity and comprehensiveness; and
2 establishing a standardized national database for innovative analyses of TBI research data.

The TBI Model Systems National Data Base Syllabus is available for public sale. This syllabus (also referred to as a data dictionary or codebook) contains:

1 Introductions to the TBI Model Systems and the Data Base;
2 Case definition and inclusion criteria;
3 A detailed description of each data item, including codes;
4 Data collection forms and guidelines for data collection; and
5 Detailed information on standardized tests and measures used in the data base.

*The Syllabus may be ordered by returning a copy of this completed order form, accompanied by the correct payment:*

*Please mail this order form to:*

**Cynthia Harrison-Felix, MS**
**TBI Model Systems National Data Center Manager**
**261 Mack Blvd.**
**Detroit, MI 48201**

**1999 Syllabus prices: $100.00 (USA) OR $125.00 (International)**

**1**) Payment in U.S. funds must accompany all orders **2**) Checks or Money Orders should be made payable to: **Rehabilitation Institute of Michigan 3**) Shipping and handling charges are included in the charge **4**) ***Sorry*** *-- we cannot accept credit cards or purchase orders.*

Please send me _____ copies of the **1999 TBI Model Systems National Data Base Syllabus**.

Enclosed is my check / money order for $_____.

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_____
*Title / Department*

_____
*Facility / Organization*

_____
*Address (Street)* *(City)* *(State/Province)* *(ZIP/Postal Code)*

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*Telephone (Area Code)* *(Number)* *Fax (Area Code)* *(Number)*

*The Traumatic Brain Injury Model Systems of Care*
*National Institute on Disability and Rehabilitation Research*
*United States Department of Education*
*are pleased to present*

# TBI in the 21st Century: Learning from Models of Research and Service Delivery

**December 2-4, 1999**
**Hyatt Regency - Bethesda, Maryland**

*Co-Sponsored by:*

**Brain Injury Association**

**Centers for Disease Control**

**Defense and Veterans Administration Head Injury Program**

**National Association of State Head Injury Administrators**

**NIH/National Center for Medical Rehabilitation Research**

**US Department of Health and Human Services/**
**State TBI Demonstration Grant Program**

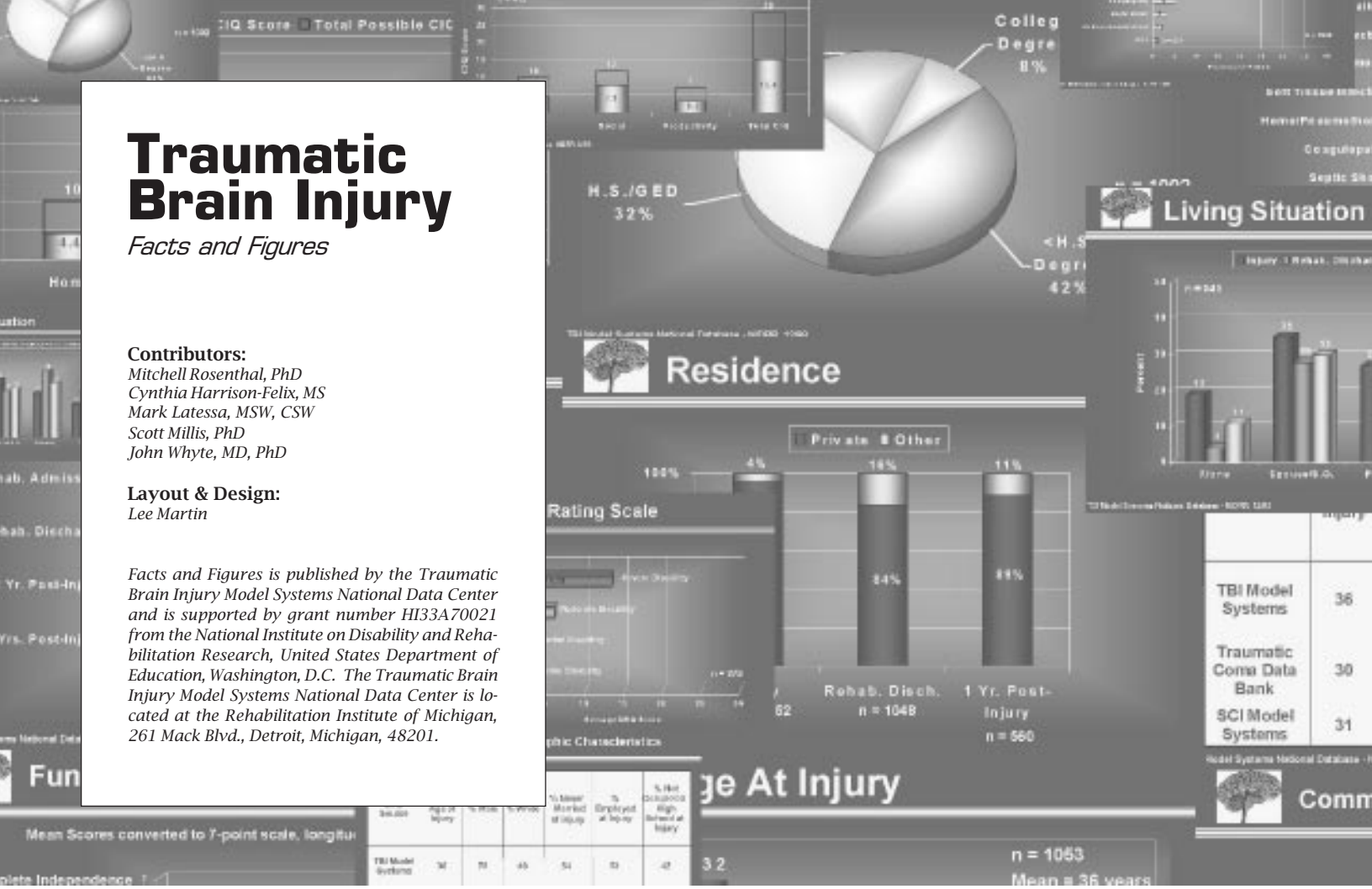
*This conference is the first Interagency conference designed to disseminate information from federal and state research and service delivery grant programs and to foster greater communication and collaboration among grantees, as well as consumers and other interested parties.*

## CALL FOR PAPERS

**Deadline: July 1, 1999**

Poster presentations are invited for submission to this conference. We are interested in showcasing original, empirical research as well as innovative models of service delivery on all aspects of brain injury rehabilitation. Abstracts should be 500 words in length and should be submitted no later than **July 1, 1999**. Application forms will be mailed out to interested parties. For further information, contact: **Mitchell Rosenthal, PhD, ABPP**, Program Chairman, or **Cynthia Harrison-Felix, MS**, TBI National Database Management Center, Rehabilitation Institute of Michigan, 261 Mack Boulevard, Detroit, Michigan 48201, (313) 745-9769; FAX: (313) 745-1175; e-mail: mrosenth@med.wayne.edu.

Call for Papers




# Traumatic Brain Injury

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**Traumatic Brain Injury Model Systems National Database**