

**Colorado Brain Injury Program
Report to the Joint Budget Committee and
Health and Human Services Committees**

July 1, 2012 – June 30, 2013

Program Overview

The Colorado Traumatic Brain Injury (TBI) Program was created by Title 26, Article 1, Part 3 of the Colorado Revised Statutes, to improve the lives of Colorado residents who have survived traumatic brain injuries. This statute created the Colorado Traumatic Brain Injury Trust Fund (Trust Fund) to finance program activities, and the Colorado Traumatic Brain Injury Board to advise the Program on operations of the Trust Fund. The TBI Board is administered within the Colorado Department of Human Services (CDHS). Three board members are designated in statute and 10 members are appointed by the Governor with the consent of the Senate. Please see below for a list of board members. The Board has established four ongoing committees to assist staff in policy-setting of program goals and strategic planning for the Trust Fund: Services, Research, Education and Futures.

Colorado Brain Injury Program Operations

Program Administration

CDHS administers the Brain Injury Program which is housed within the Division of Vocational Rehabilitation (DVR). DVR's mission is to provide an environment of highly supportive and complementary services to emphasize independence and its programs regarding rehabilitation services, training, and vocational guidance and counseling for individuals with disabilities. CDHS staff work closely with the TBI Board and perform the following functions for the program: financial management, policy development, program development and implementation, contract management, program monitoring, administrative support, website maintenance, public assistance and information, reporting, and marketing and public relations.

Trust Fund Board of Directors

Name	Employment/Affiliation
Holly Ann Batal MD MBA	Denver Health
Deborah Boyle	Douglas County Sherriff's Office
Susan Charlifue PhD	Craig Hospital
Aaron D. Sanchez	Denver Police Department
Kim Gorgens PhD	University of Denver
Rhesia-Maria Ochoa	University of Denver, Graduate Student
Timothy Hurtado MD	Front Range Emergency Specialists
Sena Harjo	Clayton Early Learning Center
James Pinkney	Veterans Administration Medical Center
Bill Levis JD	Brain Injury Alliance of Colorado
Indira Gujral	Colorado Department of Public Health and Environment
Nancy Smith	Department of Human Services, DVR
Laetitia Thompson PhD	University of Colorado School of Medicine

Overview of Significant Program Changes for FY 2012-13

During FY 2012-13, important changes were made to both the children's and adult program. In 2011 the Brain Injury Program entered into an Inter-agency Agreement with the Colorado Department of Education (CDE) to manage the children's program, Youth Brain Injury Connections (YBIC). This partnership has been enhanced in FY 2012-13. There are now 1.5 FTE dedicated to brain injury at CDE. Funding for these two positions represents a true inter-agency partnership and a creative blended funding effort. Money from the Trust Fund supports 1.0 FTE Brain Injury Health Consultant and the subsequent operational costs associated with this FTE. This individual sits within the Health and Wellness Unit at CDE. In addition to this FTE there is a 1.0 FTE Brain Injury Education Consultant that sits within the Special Education Unit at CDE. This individual is partially funded (.5 FTE) through a Federal Health and Human Services, Health Resource Services Administration grant that was awarded to the Brain Injury Program in 2010. The other half of this individual's funding is supported with dollars from special education through CDE to focus on Fetal Alcohol Syndrome. CDE has agreed to fund this position in whole when the grant is completed in 2014. The CDE consultant's scope of work includes; managing referrals through the YBIC, providing education consultation and technical assistance to the school districts, and building capacity of schools and other providers to better meet the needs of children and youth with brain injury.

In addition to education support, the YBIC provides care coordination support. This function of the program has always been supported through a partnership with the Health Care Program for Children with Special Needs (HCP) offices, located in local county health agencies. In the past, the Trust Fund has paid HCP for this support. However, in 2011, when purchased services supports for children/youth were eliminated, HCP felt that they were able to provide care coordination for children/youth with brain injury as they were already doing with all other children with special health care needs. Therefore, the TBI Trust Fund was able to build off of this existing infrastructure to provide care coordination as mandated in statute at no cost to the Trust Fund. These services are paid for through Title V funds from the Social Security Act. Additionally, the Brain Injury Program continues to partner with the Colorado Department of Public Health and Environment to maintain the care coordination infrastructure and to collect data related to children served through care coordination.

Prior to FY 2012-13 purchased services were provided for adults through the TBI Trust Fund, due to sufficient revenues. However, due to a decrease in revenue, the Brain Injury Program staff and Board of Directors made the decision to first reduce purchased services from \$2,000 per person once in a lifetime to \$1,000 per person, and, ultimately made the decision to eliminate purchased services funding all together. Purchased services accounted for approximately 50% of the adult services budget. To maintain the purchased services funding would have led to a waitlist for care coordination services of up to five years within the next two years. In addition, the statute does not mandate purchased services support. The statute states that the program must provide case management support. Purchased services were made available when funding was available. Due to the elimination of purchased services the following enhancements to the TBI Trust Fund services were made:

1. The elimination of the waitlist for care coordination services.
2. Applicants will meet face-to-face with a care coordinator in their own community within 45 days of acceptance into the program.
3. Program participants will have access to care coordinators via drop-in centers within their region on a monthly basis.

4. Program participants will have access to the level of care coordination that meets their specific needs including intensive one-to-one care coordination support as needed.
5. Services will be available for a two year period with the option to reapply as necessary.
6. Enhanced classes and workshops regarding brain injury for program participants and family members will be offered.

The aim of the Adult Brain Injury Program is to increase self-sufficiency and to create a safety net for those who require on-going support. The Program staff and Board of Directors feel strongly that this approach to case management will provide program participants with the supports necessary to more fully re-integrate into their communities.

Revenue and Expenditures

The TBI Trust Fund receives revenue from surcharges assessed for convictions of driving under the influence of alcohol (DUI) or driving while ability is impaired (DWAI), speeding and youth under 18 years of age riding a motorcycle or motorized bicycle without a helmet. The surcharges are \$20.00 for drinking and driving related convictions, and \$15.00 for speeding convictions and helmet convictions.

Funds are divided across program areas with the following percentages: a minimum of 55 percent for services, 25 percent research, and five percent education. This leaves 15% of funds flexible so that the Program Director and Board of Directors can determine which program area requires an increase in percent of funds each year.

During the reporting period of July 2012– June 2013, the Trust Fund received \$2,075,353. The Trust Fund expended \$2,223,691.21. The TBI Program was approved a spending authority of \$3,321,588 for FY 2012 - 13. The Program had a reserve fund of \$551,344 which covered the expenses over the revenue. The revenue for the Trust Fund has been decreasing for the past three years. This decrease in revenue has caused the Program and Board to look very critically at what services are offered and how education and research grants are awarded. This evaluation has led to the program changes described previously. The Program Director and Contracts Manager continue to research why the revenue is decreasing. This is a very difficult question to answer. It appears that possibly due to the economy people were not able to pay the fines and surcharges associated with their DUI/DWAI and at times speeding convictions. When this occurs the counties will often work with the individual to set up a payment plan. Fines, fees and surcharges are prioritized based on a variety of factors. The TBI Trust Fund is low on this priority list and when a person is paying fines, fees and surcharges based on a payment plan, they are paid in full in order of the prioritized list. The other complicating factor to collecting these surcharges is related to Colorado's Home Rule status. Currently, the Model Traffic Code for Colorado allows those municipalities that have adopted this code to collect surcharges on speeding violations written under the municipal or county ordinance. Based on Home Rule, municipalities have the option to collect the TBI Trust Fund speeding conviction surcharge or not. As a result, a majority of the municipalities are currently not collecting, including those larger communities on the Front Range. Based on our research it appears that approximately 21 municipalities are collecting the surcharge. There are 271 municipalities/towns in the state of Colorado.

The Brain Injury Program, Trust Fund Board of Directors and the Brain Injury Collaborative have focused on increasing the participation of municipalities that opt into collecting surcharges on behalf of the TBI Trust Fund. The Brain Injury Program has engaged in an educational

campaign to increase participation in collecting surcharges to benefit the program. The economy may be a significant barrier in terms of municipalities wanting to implement the surcharge. Communication with a few municipalities suggests the “failure to pay rate” has significantly increased over the past few years. What this means is that individuals who are being convicted of traffic violations are not able to pay their fines. Therefore, it seems cities are hesitant to add additional surcharges to tickets that people are already struggling to pay.

In addition to working to increase participation of municipalities to collect the surcharge, the Brain Injury Program and Board of Directors are also working to explore diverse funding options to include gifts, grants and donations as authorized through the statute. Both of these efforts are becoming increasingly important as revenue has declined over the past three years and the demand for services continues to increase each year.

Services

All individuals receiving assistance from the Colorado Brain Injury Program funded by the TBI Trust Fund receive case management/care coordination services (these terms are used interchangeably). Care coordination is designed to provide clients with skills they can use throughout their lifetime and to connect clients with resources in their communities following their participation in the Brain Injury Program. Additionally, the Adult Brain Injury Program provides classes and workshops for survivors and families in an effort to improve life and advocacy skills. Youth accessing Youth Brain Injury Connections are provided education linkage support in addition to care coordination. The goal of the YBIC is to develop a comprehensive safety net to support the families as they navigate medical, community and educational systems.

Services Provided During the Reporting Period of July 1, 2012 – June 30, 2013

Clients Served

Colorado Adult TBI Connections

The Brain Injury Program contracts with the Brain Injury Alliance of Colorado (BIAC) to conduct intake and eligibility for the program. Once approved for services, the individual is referred to Rocky Mountain Human Services for case management services. During FY 2013, 729 adults received care coordination services. There were 389 on a waitlist for services. Individuals on the waitlist had access to a Resource Navigator for minimum care coordination services. Twenty percent of adults served were veterans or active military personnel, and represented 21 percent of the waitlist. With the elimination of purchased services and with the program changes implemented July 1, 2013 (FY 2013-2014), the waitlist for case management services will be eliminated by July 1, 2013.

Colorado Youth Brain Injury Connections

The youth program uses an on-line referral process to enroll children in the program. This referral is managed by BIAC which contacts the Local Health Agency and HCP with the referral information for the child/family to receive care coordination. Additionally, BIAC sends the referral to CDE. The Brain Injury Consultant at CDE then notifies the school and school district of the child. CDE and the Regional Brain Injury Liaisons then provide coaching and consultation support to the school to ensure the child is receiving effective support. Children can also access services by contacting their HCP office or school directly. When this occurs, the HCP and school staff are encouraged to refer the child through the on-line referral process to ensure they also receive educational support. The program received a total of 76 children through the Brain Injury Alliance of Colorado. There were a total of 96 children served through HCP. It is not clear

how many of the children are duplicates to the BIAC data. This is an area that the program is working to improve through more communication with the State Health Department.

Evaluation:

The Brain Injury Program Director, with support from the Board of Directors, will be conducting comprehensive program evaluation on all aspects of the program.

Outreach: The Brain Injury Program contracts with the Brain Injury Alliance to provide outreach for all aspects of the Trust Fund. During the reporting period of July 2012– June 2013 the Outreach Coordinator focused efforts on reaching out to hospitals, attending conferences across the State and attending events such as health fairs. Outreach efforts include the following:

- Outreach at 12 hospitals: Craig Hospital, St. Anthony's – Central, Memorial, Swedish, Children's, Poudre Valley, Good Samaritan, McKee Medical Center, University Hospital, St. Mary Corwin, Parkview, and North Colorado Medical Center.
- Outreach at Statewide Regional Brain Injury Conferences: Colorado Springs, Pueblo, Gunnison, Grand Junction, Denver Metro (multiple), Greeley and Boulder.
- 12 Outreach Education Events: Aurora Public Library, trainings for other organizations, workshops, and Pikes Peak Community College.
- Initiated five new Support Groups: Colorado Springs, Longmont, South Metro, Summit County – Youth Group, and Pueblo West.
- Attended 15 Health Fairs (both for youth and adults), multiple Brain Injury Professional Networks and support group meetings each month.

Research

The Brain Injury Program awards grants to support research in Colorado related to the treatment and understanding of traumatic brain injuries. The Research Program has established the following three research priorities: basic science, clinical science and health services and outcome research. Research is funded at three levels: Type I (up to \$50,000/year for two years), Type II (up to \$150,000/year for two years) and Type III (up to \$250,000/year for five years).

During the period of July 2012 – June 2013, one research grant was completed, with a no cost extension granted to one researcher. Additionally, there are three current active grants that will continue to be funded next fiscal year. Expenditure on the five research grants totaled \$563,355 for FY 2012-13.

Title: *“Improving the Mental Health Outcomes of Child Brain Injury in Colorado”*

Principal Investigator: Michael Kirkwood, PhD

Institution: The Children's Hospital, Denver

Award: \$637,520

Status: four year active project (awarded a no cost extension to be completed 2/14)

Description: This study seeks to compare the efficacy of Counselor-Assisted Problem Solving (CAPS) versus Internet Resources (IRC) for families following pediatric TBI. CAPS addresses cognitive appraisals, behavior management, problem-solving skills, and family communication through a skill-building website coupled with synchronous 1:1 video conference sessions with a therapist. In contrast, IRC provides families with access to online TBI education and resources. CAPS reflects an innovative integration of cognitive-behavioral theory, efficacious treatment strategies and the emerging technology of the World Wide Web. Allowing families in both

groups to access help online has the potential to significantly reduce both physical and psychological barriers to care. This project will provide critical information about: 1) the efficacy of online interventions following TBI; and 2) the types of families and children most likely to benefit from this type of approach. The investigation represents the logical continuation of previous work developing and testing theoretically-grounded interventions for pediatric TBI. It will lay the foundation for subsequent investigations of the effectiveness of this approach when translated to clinical settings. The results from the project could provide knowledge, skills, and support to families of children with TBI throughout the state of Colorado, as well as the country, at a relatively low cost. The findings and methodology also have broad applicability to other groups of children with chronic medical and neurological conditions.

Title: *“Executive Dysfunction and Suicidal Behavior: An Examination of Veterans with Traumatic Brain Injury, Post Traumatic Stress Disorder or Both”*

Principal Investigator: Marie T. Banich, PhD

Institution: University of Colorado at Boulder

Award: \$342,711

Status: two year project (completed the end of FY13)

Description: The purpose of this study is to determine whether tasks taken from cognitive neuroscience can distinguish the contribution of mild TBI versus PTSD to patterns of impairment in executive function. This focus is important because at present there is controversy regarding both the degree to which symptoms of executive dysfunction are related to TBI versus PTSD in individuals with co-occurring conditions (e.g., Moore, Terryberry-Spohr, & Hope, 2006), and the utility of measures (standard clinical and/or neuroscience tasks) to identify such differences (Vanderploeg, Curtiss, Belanger, 2005; Brenner et al., 2008; Brenner et al., in press). Differentiating the causative effect of neuropsychological dysfunction is important because treatment programs for executive dysfunction may be quite different when associated with TBI, as compared to PTSD. For example, whereas methylphenidate is often used in the treatment of attentional and executive function deficits after TBI (Neurobehavioral Guidelines Working Group, 2006), it is contraindicated for symptoms commonly observed in PTSD such as “marked agitation, anxiety, and tension”, and “may aggravate symptoms” (VA Medical Center Micromedex Healthcare Series). A secondary goal is to determine whether performance on our tasks of executive function is predictive of psychiatric symptoms, in particular suicidality. An exploratory aim is to determine whether tissue loss in specific brain regions can provide any additional information above and beyond task performance to help distinguish between the three groups of interest (mild TBI, PTSD, mild TBI+PTSD).

Title: *“The role of Natural Antibodies in Pathophysiology of TBI”*

Principal Investigator: Philip F. Stahel, MD

Institution: Denver Health Medical Center, University of Colorado School of Medicine

Award: \$1,024,753

Status: five year active project

Description: The initial goal of the proposed study is to evaluate the role of natural antibodies on the secondary neuroinflammatory response following TBI. As natural antibodies are a relatively new area of inflammation research, researchers are just beginning to understand their intricate and complex mechanisms of interaction with neoantigens exposed after trauma. An intimate and more sophisticated understanding of natural antibodies and their roles in the neuroinflammatory response after head injury is a prerequisite for a future successful “bench-to-bedside” translation of basic research into therapeutic modalities. This project is ultimately aimed at a long-term “bench-to-bedside” transfer of insights from experimental models into new therapeutic modalities for reducing the extent of secondary brain damage and attenuating the overall mortality and long-term neurological morbidity in patients suffering from TBI. Excessive

local complement activation in the CNS may be triggered by natural antibody-neoantigen interactions. Thus, experimental pharmacological blockade using novel CR2-chimeric molecules may represent a “cutting-edge” approach to inhibit complement-mediated local brain tissue damage resulting from natural antibody-induced activation of the 18 complement cascade. This therapeutic approach may limit the inflammatory downstream events prompted by natural antibodies with amelioration of secondary brain injury. Should this approach be successful, pharmacological blockade of natural antibodies or utilization of CR2-chimeric molecules may represent a therapeutic option to be tested in clinical trials in the longterm.

Title: “*Neuroendocrine Dysfunction in Traumatic Brain Injury: Effects of Testosterone Therapy*”

Principal Investigator: David L. Ripley, MD, MS, CRC, FAAPM&R

Institution: CNS Medical Group, Craig Hospital

Award: \$1,468,582

Status: five year active project

Description: Neuroendocrine dysfunction following traumatic brain injury (TBI) has recently been an area of significant investigation. As many as 80% of men with severe TBI experience low testosterone (T) levels, or *hypogonadism*, following injury. Testosterone therapy has been shown to be effective in improving strength, cognition, and function in hypogonadal men, although this has yet to be evaluated in hypogonadal men with TBI. This study proposes to assess the hormonal status of men on admission to an inpatient TBI rehabilitation program. Individuals with low T levels will be randomized to receive either physiologic T therapy or placebo. Individuals with sufficient levels of T will be followed as a second control group. All three groups will undergo serial assessment of neurological function and functional independence to correlate with hormone levels. These findings will have direct impact on optimizing the rehabilitation of individuals with TBI. *Objective 1:* Determine the effects of physiologic testosterone (T) therapy on neurological function and functional independence following traumatic brain injury (TBI) in hypogonadal men during inpatient rehabilitation. *Objective 2:* Document the natural history of neuroendocrine dysfunction and recovery in men during inpatient rehabilitation after TBI. *Objective 3:* Obtain data to validate the NIH toolbox, a novel assessment of neurological function for use in the TBI population. Long-term Objectives: *Objective 1:* Utilize study findings to design a multicenter trial to further assess the impact of T therapy in hypogonadal men following TBI. *Objective 2:* Impact TBI practice management with new information about neuroendocrine dysfunction after TBI and hormone treatments to improve outcomes.

Title: “*Developing Novel FLAP Inhibitors for Use in TBI*”

Principal Investigator: Kim A. Heidenreich, PhD

Institution: Department of Pharmacology, UC Denver, AMC

Award: \$ 375000.00

Status: two year active project

Description: About 1.7 million American civilians each year suffer a TBI from motor vehicle accidents, falls, and sports injuries. The military estimates that as of 2008 more than 320,000 soldiers have returned from Iraq and Afghanistan with TBI largely from increased exposure to blasts. Neurological damage resulting from a TBI does not all occur immediately at the moment of impact (primary injury) but evolves afterwards (secondary injury). Secondary brain injury is the leading cause of hospital deaths after TBI. Most secondary brain injury is caused by brain swelling and if unchecked swelling can lead to increased intracranial pressure, cerebral herniation, enhanced morbidity, and possibly death. Using an experimental model of TBI, the PI and collaborators have shown that pharmacological administration of MK-886, a FLAP inhibitor previously developed for asthma, before or immediately after TBI blocks the production of lipid mediators that cause brain swelling after TBI. The early blockade of swelling by MK-886 is

associated with less cell death and subsequent neurological impairment. The aims of the current proposal are to develop FLAP inhibitors that can be evaluated in human studies to treat TBI in both prophylactic and acute settings.

Additional to the current grants, the Colorado Brain Injury Program released a competitive request for proposals (RFP) in January 2012. This RFP resulted in 12 letters of intent submitted, five accepted and six requesting revisions with one not invited to submit a full proposal. Nine researchers submitted full research grant applications. Two grants were awarded. Both grants began FY 2012-2013 with one starting in July and the other November 2012.

Education

For FY 2012-13, 26 grants for a total of \$108,673 were awarded to conduct education and outreach, with individual awards ranging from \$1,200 to \$10,000. All education grants are awarded for a one year period. Education grants were awarded for the following projects:

Organization	Amount Awarded	Grant Focus	Geographical Location Covered
Brain Injury Alliance	\$5,000	Provide education for professionals to include two one-day retreats for the Brain Injury Professional Network and one one-day retreat for the leaders of the Brain Injury Support Groups.	Statewide
Grand Junction High School	\$2,000	Assist with the education and distribution of the developed concussion management plan.	Grand Junction, School District 51
Summit Medical Health Foundation	\$5,000	Provide education regarding helmet use and snow rider injury prevention during the 2013 Skier Safety Week.	Statewide
Western Colorado Area Health Education Center	\$4,500	Conduct the "Joining Forces Traumatic Brain Injury (TBI)-Psychological Health Injury (PHI) Event."	Offered statewide, focused on Western Slope and surrounding region
CDHS, Aging & Adult Services	\$9,615	Provide education about the prevention of traumatic brain injury among Coloradans aged 60 years and older.	Statewide
Children's Hospital, Colorado	\$10,000	Provide a BrainSTARS Manual to all parents of children hospitalized or treated for TBI in the rehabilitation units at Children's Hospital Colorado or Denver Health Medical	Denver Metro focused with children across the state impacted when treated at Children's Hospital or Denver Health.

		Center.	
GCI Brain Injury Services	\$4,500	Conduct a two-day event on the topic of building community and social capital.	Statewide with focus on North Central and Northeast Colorado
GCI Brain Injury Services	\$1,200	Conduct training and testing as Certified Brain Injury Specialist for up to 6 brain injury service providers.	Northern Colorado region
Boulder Shelter	\$2,000	Host the fourth annual Brain Injury Awareness Training & Resource exchange.	Boulder and surrounding communities
CSU Occupational Therapy	\$5,000	Educate students, faculty and staff at Colorado State University about prevention of brain injury and compensatory strategies.	Fort Collins and surrounding communities
Poudre School District	\$2,000	Assist with the Poudre School District Brain Injury Resource Team.	Fort Collins and surrounding areas, Poudre School District
University of Denver	\$2,000	Present a series of two professional development dinners and two didactic luncheon events that will focus on assessment and treatment implications.	Denver Metro
St Vrain Valley School District	\$5,520	Purchase resources and training for school district personnel.	Boulder/Longmont, St. Vrain Valley School District
Northeast Colorado Health Department	\$3,000	Provide opportunities for school personnel and professionals to attend trainings.	Northeast
Denver Juvenile Court	\$3,400	Provide two full day training workshops on the BrainSTARS model.	Denver Metro
CTAT	\$3,500	Develop an online training designed to give TBI survivors techniques on utilizing Social Security Work Incentives.	Statewide
CTAT	\$3,500	Develop an online training designed to give TBI survivors techniques on finding a job and returning to work.	Statewide
West Metro Fire	\$5,000	Offer senior citizens fall prevention program aimed at preventing brain injuries.	Denver Metro
Brighton SD 27J	\$2,438	Enhance the education and training of school district brain injury team.	Brighton and surrounding communities

University of Colorado at Denver	\$5,000	Funds to conduct training on brain injury through the Area Health Education Centers.	Statewide
Rocky Mountain Brain Injury Services	\$4,000	Facilitate a one day conference on brain injury.	Colorado Springs and surrounding area
Denver Public Schools Indian Education	\$2,950	Provide education to school personnel regarding brain injury, assessment and intervention.	Denver Metro
Answers About Brain Injury	\$3,000	Training for judicial audience including judges, probation and other officers.	Denver Metro
Tri-County Health	\$4,600	Provide a train the trainer module to focus on bi-lingual Spanish instructor and provide the Matter of Balance class to mono-lingual Spanish speakers.	Denver Metro
Native LAX	\$4,950	Purchase 45 Lacrosse Helmets for the Youth Native Lacrosse League and provide training on prevention.	Denver Metro
Moffat County School District	\$5,000	Work collaboratively with community, health and education entities to provide training on concussion management.	Northwest