

Site Visit Report
Center for Behavioral Neuroscience
Georgia State University
FY08 November 14-16, 2007

EXECUTIVE SUMMARY

The charge of the site visit team (Team) was to evaluate the accomplishments in year eight of the Center for Behavioral Neuroscience (CBN), a Science and Technology Center (STC) funded by the National Science Foundation (NSF). The CBN is a consortium of public and private institutions, including major research and teaching universities in the Atlanta area.

Twenty-first century science is becoming ever more transdisciplinary. Scientific progress demands that techniques and levels of analyses be well integrated across disciplines. However, intra- and inter-institutional barriers often prevent the integration of scientific ideas, methodologies and cultural attitudes. The CBN is now a leader, both nationally and internationally, in meeting these challenges.

The CBN has created a unique model of team science that promotes transformative discoveries. One fruitful outcome of this innovative approach is the training of the next generation of neuroscientists who will actively embrace team science. In addition, research productivity has been exceptional and has drawn substantial extramural support. The CBN has significantly enhanced the prominence of the Atlanta neuroscience research base. The combination of training, research productivity, outreach activities and knowledge transfer is a winning formula for science and economic development.

The CBN has clearly succeeded in its mission as one of NSF's premier Science and Technology Centers by forging important inter-institutional and interdisciplinary links. These efforts have the potential to leave a long lasting legacy in both neuroscience and innovative scientific training and public outreach at all levels. Institutional support would ensure that the internationally-recognized CBN will continue to flourish in the future.

INTRODUCTION

A Team of external reviewers and NSF officials visited the CBN at Georgia State University on November 14-16, 2007. This is the eighth evaluation of the CBN and is associated with oversight prior to its 9th year of funding. The Team included the following participants:

External members:

- Dr. Antonio A. Nunez, Michigan State University (Chair)
- Dr. Kathryn L. Crossin, Scripps Research Institute
- Dr. Jeffrey French, University of Nebraska at Omaha
- Dr. Karen A. Mesce, University of Minnesota
- Dr. Christine Wagner, University at Albany

NSF members:

- Dr. Randy Phelps, Staff Associate/ OIA
- Dr. Diane M. Witt, Program Director, BIO / IOS
- Dr. Bruce Umminger, Consultant/ OIA
- Ms. Lisa-Joy Zgorski, Public Affairs Specialist / OLPA

The Site Visit Team (the Team) met at Georgia State University (GSU) with the PI and CBN Director Dr. H. Elliott Albers (GSU), Co-Director for Research and Academic Programs Dr. Walter Wilczynski (GSU), Deputy Director Dr. Kim Huhman (GSU), Reproduction Collaboratory Director Dr. Kim Wallen (Emory University, EM), Associate Director Dr. Kelly Powell (GSU), and CBN Director of Undergraduate Programs Dr. Karen Falkenberg (EM). The Team also met with two post-doctoral fellows and several graduate students from GSU. Undergraduate Education Program Coordinator Shana Basnight (GSU) was also present. At the beginning of the meeting Dr. Peter MacLeish, who was at Morehouse School of Medicine, was video-linked, by Mr. Rob Poh, with the Team at GSU.

Formal presentations were made by Dr. Elliot Albers, Dr. Walter Wilczynski, Dr. Kelly Powell, and Dr. Karen Falkenberg. In addition, we had informal discussions with junior faculty from Spelman College, Dr. Joanne Chu and Dr. Kai McCormack, and from GSU, Dr. Kyle Frantz. The Team was graciously welcomed by Vice President for Research Dr. Robin Morris (GSU).

CENTER ACHIEVEMENTS AND PLANS

RESEARCH

Strengths:

It was clear to the Team that at least one legacy of the CBN will be its transformative way of conducting scientific research across multiple laboratories and institutions. This approach of team-oriented research across multiple disciplines has been exceedingly successful, and has resulted in an impressive number of scientific publications, research presentations and new extramural funding. The Team understands that the high quality of research conducted by members of the CBN has increased the visibility and high regard of many of the Atlanta-based universities and colleges, which should signal to each institution the need for intramural support once NSF funding for the CBN has ended. It is also clear that neuroscience-related programs at Emory, Georgia State, Spelman, and Morehouse have benefited through the recruitment of new faculty and postdoctoral hires, and their ability to recruit undergraduate students with excellent scholastic abilities. Further, the Team recognized that CBN-leveraged funds have significantly enhanced the infrastructure of research facilities at participating institutions.

The awarding of CBN Venture grants has been an exceptionally valuable tool for the seeding of new extramural funding and has enabled high risk/high impact projects. These discretionary funds have served as an adhesive element, providing the substrate to fuel innovative ideas and technologies across multiple laboratories that likely would not have been generated otherwise. In addition, these funds have provided important flexibility needed for the evolution of projects as the science develops over time.

We concur with CBN's plan to preserve funding for the Venture research grants in years 9 and 10. We encourage all participating institutions to consider the added value of this in-house granting system and explore innovative ways to financially support the small-grants process for funding collaborations once NSF support ends.

Concerns & Recommendations:

A point of concern has long been how to identify the output of the collaboratories and the results of Venture funding with respect to publications. This information will be especially important when seeking new sources of funding, both to emphasize the multidisciplinary and highly interactive nature of the research, and the support targeted to multiple institutions. Another concern of the Team was the addition of two new collaboratories placing additional competition for Venture grants when funding from NSF is diminishing. Although this might result in a dilution of funds for Venture grants, we recognize the potential for these new collaboratories to be important elements for securing new funding.

EDUCATION

Strengths:

The CBN has an impressive record of attracting top-quality graduate students and postdoctoral fellows who have enriched the collaboratory science at all participating institutions and have been integral to the unique Team Science approach of the CBN. It is also clear that the graduate students and postdoctoral fellows benefit enormously from the CBN. In addition to excellent scientific and technical training, it is clear that the collaborative approach to science that distinguishes the CBN among training programs provides trainees with a unique skill set they will utilize in their scientific careers for years to come. The Team met with several CBN-supported graduate students and postdoctoral fellows and is extremely impressed with the professional maturity of trainees. They are obviously proud of and loyal to the CBN. All trainees specifically expressed that the CBN was a significant factor when choosing their current institution. Postdoctoral fellows are very involved in collaboratories and received Venture grants to support research. Graduate students reported on a very successful and productive retreat, alleviating a concern that had been raised during the previous site visit about regular interaction among students. Graduate students and postdoctoral fellows appear to benefit from participation in the K-12 Outreach Program and Brain Awareness Month. The Team is enthusiastic about the potential of the BioBusiness program that is currently taking shape, and awaits word on future progress in this area. The placement of trainees into appropriate positions following training at the CBN is excellent, with the majority of graduate students obtaining postdoctoral fellowships at research institutions, and postdoctoral trainees securing research and teaching positions, as well as alternative scientific careers. The CBN leadership expects that financial support for graduate students and postdoctoral fellows will be absorbed by the participating institutions and individual grants, as NSF support decreases. In addition, we encourage efforts to obtain alternative funding to continue the innovative training model, such as those reflected in CBN's submission of an IGERT training grant pre-proposal. The Team was impressed with the approach used to evaluate the impact of initiatives involving undergraduates, in particular those that have resulted in peer review publications (Frantz et al, *Life Sciences Education*, 2006).

Concerns and Recommendations:

Graduate students expressed that they would like to see a mechanism by which they could receive formal credit for their involvement in the preparation of successful Venture grants. Postdoctoral fellows expressed their desire to have more opportunities for interaction among other CBN postdoctoral fellows. The Team noted that there are rather large disparities in the teaching obligations among CBN Scholars from different institutions or from different departments within an institution. Although the Team recognizes that the CBN has very little control over degree-granting programs, efforts toward a more level playing field would be beneficial. The Team has a slight concern that some graduate students may experience a significant burden in terms of time and effort due to their involvement in the outreach programs. Since student participation is voluntary, guidance from faculty mentors on the balance between teaching and research would be beneficial.

DIVERSITY AND HUMAN DEVELOPMENT

Strengths:

The CBN has seized the opportunity afforded by the diversity of the Atlanta metro area and its colleges and universities to promote productive interactions between comprehensive research universities and minority-serving institutions. Using several mechanisms, which include Venture grants awarded to AUC faculty members, the CBN has broadened the participation of underrepresented students in research while recognizing and respecting the traditional missions of the AUC institutions. The Team is pleased to learn that CBN actively recruits students at national minority meetings such as SACNAS and uses outreach activities such as the BRAIN program to increase minority participation in science. The CBN is also a partner in a multi-institutional initiative to increase diversity in the pool of applicants to programs in behavioral neuroscience. The Team is pleased to see that new hires in AUC institutions are now participating in several CBN activities including an IGERT pre-proposal that is being revised for submission to the next competition.

Concerns and Recommendations:

Full participation of AUC investigators in collaborative meetings continues to be a challenge for the CBN. Demanding teaching loads and lack of teleconferencing facilities at the AUC institutions are identified as the main impediments for regular participation by AUC faculty. This problem deserves the attention of the leadership of the CBN. The previous site visit Team recommended the use of rotations among the different institutions to increase the exposure of AUC faculty and students to the research discussions at these meetings, and at least one group (i.e., the Reproduction Collaboratory) plans to adopt that strategy. We recommend that the other collaboratories seriously consider this approach, as well.

KNOWLEDGE TRANSFER AND OUTREACH

Strengths:

The Team was exceedingly impressed with the multiple educational efforts and outreach programs provided through the CBN. Partnerships with the Fernbank Museum of Natural History and Zoo Atlanta continue to be strong and laudable. The Life Science Partnership with Georgia Bio will be increasingly valuable to the mission of the CBN as NSF STC funding ramps down and eventually ends. This alliance has the potential to secure future support for CBN-established K-12 science curriculum modules, the BioBusiness course and other community-based outreach programs. Clearly, the extension of neuroscience research and education to the community by the CBN faculty and its dedicated graduate students serves as an exemplary model of knowledge transfer to all collegiate units across the nation.

Concerns and Recommendations:

The Team recognizes the difficulty in reaching students that are not well prepared for academic success. It encourages CBN to continue its efforts in teaching K-12 students in the greater Atlanta areas, preparing school teachers to present materials related to neuroscience, and considering new ways to reach academically challenged students. The Team encourages CBN to carefully consider which programs are the most successful and have the highest impact as funding for these programs decreases in coming years. The Team acknowledges the increasing efforts towards quantitative assessment of Outreach Projects. We encourage the CBN to pursue peer-reviewed publication of the results of the assessment.

PRODUCT DEVELOPMENT

Strengths:

The Team recognizes the significant accomplishments in the development of research tools by the CBN Shared Facilities. The most notable are the software packages developed in the Behavioral Technology Core Facility and tools that have emerged from the Viral Tract Tracing Core. The Team concurs that since product development is not a major output of the CBN that it is reasonable to reduce further efforts in this area as funding decreases.

Concerns and Recommendations:

The Team continues to encourage CBN to take a more active role in disseminating existing behavioral analysis software and/or specific vectors to the greater neuroscience community. The Society for Behavioral Neuroendocrinology (SBN) website is an appropriate vehicle to demonstrate and distribute these products. This would not only directly benefit the broader scientific community, but could serve the CBN in terms of lasting impact and legacy. The Team recommends that the leadership of the CBN seek professional advice on issues of intellectual property development and transfer.

SHARED EXPERIMENTAL FACILITIES

Strengths:

The four shared core research facilities have been crucial in promoting the success of the CBN in the first eight years of funding. Clearly, important decisions regarding the future of the cores in the period of reduced funding in years 9 and 10, and beyond, are required. For two of the cores (Imaging and Cellular), there is the real possibility of alternative funding to support these critical functions. The Imaging Core is likely to be supported by new collaborative initiatives between GSU and Georgia Tech, and the Cellular Core has (or will) receive significant funding from NIH sources. In lieu of alternative external support, the plan to adopt a “fee for service” schedule is a sound decision.

Concerns and Recommendations:

The Behavioral Core has been widely successful, but its continuity may be problematic because most investigators may not be willing or able to pay for these services. However, a small institutional investment from Emory (the head of the Behavioral Core is an Emory faculty member) to maintain this Core is likely to serve neuroscientists in both the lead and affiliated institutions. Plans for broader promotion and distribution of the software and hardware products produced by the Behavioral Core, will contribute to the standardization of data formats that is requisite for neuro- and ethoinformatics initiatives.

STRATEGIC PLAN 2008

Strengths:

The leadership of the CBN developed a well-crafted strategic plan that includes an objective assessment of strengths and an honest identification of weaknesses and how they relate to anticipated opportunities and challenges. The plan includes a realistic and comprehensive set of goals for the different activities of the center. The plans realistically anticipate the reductions in funding and the consequences for center activities.

Concerns and Recommendations:

The Team fully expects the leadership of the CBN to provide the site visit team with an updated strategic plan document. In addition, specific changes to the strategic plan need to be articulated in the annual report.

RATIONALE AND VALUE ADDED

Strengths:

The multidisciplinary team-based research model that serves as the cornerstone for CBN has provided enormous benefits to all participants of the CBN and the home institutions involved. Publication rates among CBN faculty have risen, new faculty members have been hired, and graduate students and postdoctoral fellows appear to have a competitive advantage career-

wise because of their experience in the CBN. In addition, through the synergistic activities within and among laboratories, numerous extramural grants have been obtained. Graduate and postdoctoral trainees acknowledge that their decision to attend the institutions of the CBN was largely based on the vision of the CBN and the opportunity to work in a multi-institutional environment across sub-disciplines in behavioral neuroscience. The culture of a cross-institutional and multi-lab approach to science will be the legacy of the CBN and will serve as a national and international model for scientific collaboration. The formal publication documenting the genesis, growth, and sustainability of the CBN is a first step toward establishing that legacy.

Concerns and Recommendations:

Concerns from the previous year regarding the integration of junior faculty into the CBN were adequately addressed. It would behoove the CBN to highlight the added-value aspect of the CBN to secure post-NSF funding from Emory and other CBN institutions, businesses in the local community, and foundations.

INSTITUTIONAL AND OTHER SECTOR SUPPORT

Commitment from Lead Institution

It is clear that the lead institution in the CBN, Georgia State, has benefited greatly from NSF support, both in terms of support for new faculty hires in neuroscience and support for established faculty engaged in new collaborative research endeavors. The GSU administration has committed significant current resources that support neuroscience (e.g., the Brains and Behavior initiative). GSU has also committed to significant support for the CBN in the post-STC period (\$300,000 annually and new space) that will help maintain some of the core functions of the CBN.

Commitment from Partner Institutions

The CBN has served as an important collaborative “glue” to cement cooperative research relationships across institutions. Equally important, however, is the role of the CBN in promoting these collaborations within individual institutions. Emory University in particular has benefited from this model. The CBN supports collaborative research and intellectual exchange among 47 faculty members spanning three major administrative units at Emory University – the School of Medicine, Emory College, and Yerkes National Primate Research Center. This is a unique and unifying contribution of the CBN at Emory. Continued support from Emory in the post-STC era will be crucial for these continued intra-campus efforts and will be critical to the CBN as a whole. It is equally clear that CBN support for and participation by the AUC institutions has provided numerous students with novel opportunities to participate in basic research, and has contributed to important changes in the intellectual climate of the participating departments and their faculties. Although resources may be more limited at AUC institutions, the aggressive pursuit of resources (time and dollars) for continued post-STC participation of the AUC institutions in CBN would insure the continuation

of the benefits derived from the involvement of these critical institutions in the CBN. Other than a brief mention of Georgia Tech's participation in an initiative to enhance imaging capacity, there was no information about the present and future role of this institution in the CBN. With its emerging initiative in Cognitive Neuroscience, Georgia Tech is well-positioned to play a major role in the breadth and sustainability of the CBN in the post-STC phase. We expect information regarding Georgia Tech's role in, and commitment to, the Center to be available for the next site visit.

OTHER SECTOR SUPPORT

Strengths

The administrative heads of the CBN have acknowledged that significant sources of funding will be required to maintain the "value-added" features associated with the collaboratory and core organization. There are several alternatives for significant long-term funding for the CBN from non-NSF sources in years 9 and 10 and beyond, from both corporate sources and foundations. The CBN has established important participation in, and leadership of, the Atlanta-area chapter of the Society for Neuroscience. These connections have led to a commitment on the part of the A-SfN to take over significant portions of the activities for Brain Awareness Week and other current CBN outreach efforts. While CBN staff and students will still be centrally involved in these initiatives, the capital resources required will be shifted to A-SfN.

Concerns and Recommendations

The status of discussions with the Templeton Foundation and regional pharmaceutical and biotech firms apparently have made only limited progress since the 2006 Annual Report. The Team recognizes that there are constraints in the development of funding relationships in both of these areas (e.g., concerns regarding donor intent in the case of Templeton, and the need to realize mutually-beneficial outcomes in the case of pharmaceutical firms). The Team is concerned that while these potential sources have been identified in several previous annual reports, no commitments have been forthcoming. Formalizing and finalizing these financial commitments from various foundations and private sector sources are crucial as the STC funding winds down.

BUDGET

It is clear that the leadership of the CBN has begun to make budget decisions to accommodate changes in the level and sources of support for the Center. It is recognized that these changes will necessitate a shift of the priorities of the CBN with respect to research, education and community activities. The most critical mission for the CBN is its ability to provide Venture grants to seed new ideas and collaborations. The Team fully supports CBN's decision to maintain these grants as a priority during the remaining funding period from NSF and for fundraising for the future. The relationships that have been developed with GeorgiaBio and the Georgia Research Alliance have been of great mutual benefit and their support seems likely to continue.

The ability to provide seed funding is a unique feature of the CBN and is needed to sustain the productive collaborative environment established by the CBN. The team appreciates that this program requires the support of an administrative infrastructure to

sustain and encourage the team-based science approach. Georgia State University has made a generous commitment to the support of the CBN administration. It is strongly recommended that the successes of the CBN be used to stimulate support from the other institutions.