Overall Goals for CCNL:

Objective 1. Provide high quality tissue samples coupled with de-identified medical information from inhabitants of the Carolinas.

Objective 2. Develop and maintain a state-of-the-art database for tissue samples linked to medical information and ongoing research studies at MUSC.

Objective 3. Increase the participation in brain donation programs among African Americans in our state including the Sea Island Gullah population due to their valuable demographics.

Objective 4. Work with state agencies to enhance dissemination of knowledge and participation in a state-wide SC Brain Donation program.

Introduction:
The Carroll A. Campbell Jr. Neuropathology laboratory was established in 2009 with the help of the Department of Neurosciences, the Center on Aging and a donation from the Carroll A. Campbell Jr. family. The primary goals are to provide accurate postmortem diagnosis and to perform research on Healthy Aging as well as Alzheimer’s disease (AD), Down syndrome associated with AD (DS-AD), Parkinson’s disease (PD), stroke, ALS, Huntington’s disease and other neurological disorders. The laboratory provides a link between clinicians, scientists and pathologists involved in aging and dementia research throughout the state of South Carolina via the state-wide South Carolina Aging Research Network (SCARN; see www.scarn.org). The Neuropathology Laboratory was initiated by the Center on Aging and the Department of Neurosciences, and currently contains more than 100 brains and associated structures.

Significance: NIH now requires an academic neuropathology core in order to fund programmatic research on Alzheimer's disease, stroke, and Parkinson's disease, as well as many other diseases. Developing a first-rate brain bank at MUSC is a necessity for obtaining programmatic funding in neuroscience and neurology in terms of translational work. We strongly believe that in addition to supporting the development of these prestigious center grants, this core facility will facilitate multiple programmatic and translational grants that are based on the large variety of neurological syndromes such as neurodegeneration, autism, drug abuse, cancer, depression and psychoses. The Carroll A. Campbell, Jr. Neuropathology Laboratory (CCNL Brain Bank) is the only brain bank in South Carolina. Tissues that are well preserved and procured according to national pathological standards can be utilized to examine demographics for the higher incidence of some conditions in our state and in surrounding states in the southeastern portion of the country versus the population in northern or western areas. South Carolina has valuable and unique populations such as the African American Sea Island Gullah population, and has a high level of poverty and rural inhabitants with unusually high incidence of stroke, neurological disorders, and cardiovascular risk factors.
The CCNL brain bank (the only brain bank in South Carolina) serves unique populations, such as South Carolina’s rural and medically underserved population. According to HRSA (see Figure 1), 31 of 46 counties are designated as medically underserved areas (MUA), and there is a great need for medical information and training in rural portions of our state. About 30% of South Carolinians live under poverty levels and more than 30% are African American; higher than the national average (see e.g. http://www.cdc.gov/dhsp). Adults in South Carolina have high blood pressure (30%), high blood cholesterol (39%), diabetes (9.6%), and are overweight or obese (65%). There is a great need to collect information and tissues from South Carolinians to connect life style factors with the incidence of neurological conditions. This is especially true for obesity, since metabolic syndrome is a well-known risk factor for age-related neurological conditions, including stroke and Alzheimer’s disease. The existing brain banks in the USA have a scarcity of specimens from minorities, in particular from African Americans. **Given the demographics of South Carolina, an important strategic goal for the CCNL Brain Bank is focused on enhancing the brain donation program in the African American population.** The staff and faculty in the CCNL Brain Bank will develop and disseminate educational programs to increase recruitment of African Americans for diagnosis, treatment, research involvement, and brain donation.

**Organization.** The CCNL Brain Bank is a program developed in the cross-campus Center on Aging (www.musc.edu/aging), for which Drs. Ann-Charlotte Granholm and Kumar Sambamurti are Co-Directors. Last year a Centralized Biobank was formed at MUSC (see Diagram to the right), which includes three major collections; the Hollings Cancer Center, which is an NCI-accredited cancer center, the CCNL Brain Bank, and the South Carolina Clinical and Translational Institute (SCTR). Dr. Rick Drake (Department of Pharmacology) was named Director for the Centralized Biobank in April of 2014. A biobanking software program was purchased (TissueMetrix 2 from AIM). Although the CCNL Brain Bank works closely with the Centralized MUSC Biobank, the leadership and steering committee for the brain bank will remain in the Center on Aging, which has a strong outreach and advocacy program and members from different Departments and Colleges.

**Steering committee members:**

1. David Bachman, MD, Professor, Neurology
2. Charles and Diane Barmore, Community Members (Founders of the Barmore Fund)
3. Lauren Jutras, Brain Bank coordinator
4. Laura Columbo, Brain Bank coordinator
5. Judy R. Dubno, PhD, Director, Hearing Research Program, Professor Otolaryngology and Pathology
6. Maria Fatima Falangola, MD, PhD, Assistant Professor Radiology and Neuroscience
7. Ann-Charlotte Granholm, DDS, PhD, Director Center on Aging and Professor Neurosciences
8. Vanessa Hinson, MD, PhD, Associate Professor, Director, Movement Disorder Program, Neurology
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9. Mark Kindy, PhD, Professor, VA, Stroke Program and Neurosciences
10. Jacobo Mintzer, MD, Professor, Director Alzheimer Program, Roper St. Francis Healthcare, Charleston
11. Kumar Sambamurti, PhD, Professor, Neurosciences
12. Bradley Schulte, PhD, Professor, Pathology and Otolaryngology
13. Ida Spruill, Associate Professor, Director for Diversity Office, College of Nursing
14. Tanya Turan, MD, Associate Professor, Director Stroke Program
15. Christina Vaughan, MD, MHS, Associate Professor, Movement Disorder Program, Neurology
16. Cynthia Welsh, MD, Professor, Pathology

State-wide Brain donation Program. CCNL works closely with clinical neurology, otolaryngology, ophthalmology, and psychiatry programs at MUSC. These programs include a large variety of neurological syndromes and conditions including movement disorders and stroke, drug abuse, hearing loss, cancer, depression, autism, Down syndrome, and ADHD. We have a contract with Life Point Inc., the designated Organ Procurement Organization for organ recovery services in South Carolina, to increase collection of control specimens. The tissue obtained in the CCNL Brain Bank has been used for multiple studies that are published or in press (Wang et al., 2014; Iulita et al., 2014), or under review (Turan et al., 2014; Turner et al., 2014); See separate list below. We have successfully sent tissue to Canada (Dr. Claudio Cuello) and to Sweden (Dr. Marianne Schultzberg), and to other Universities in the US, and often receive tissue requests from other institutions within and outside of the US.

As part of our collaborative activities in the Center on Aging, we started the state-wide South Carolina Aging Research Network (www.scarn.org), which provides a platform for aging research in our state including all of the Health Sciences South Carolina institutions (HSSC; see www.healthsciencesssc.org). SCARN organizes an annual research conference (Aging Research Day, see www.musc.edu/aging), and inter-institutional IRBs and grants. The CCNL Brain Bank participates and supports this annual research conference on aging and provides funding for its continuance. Due to this state-wide network, we have increased the catchment area for donations state-wide (see Figure 2). The community and caregiver education programs at the Center on Aging will be leveraged to obtain increased subject participation, especially among minority and rural populations of the state. The CCNL Brain Bank staff and faculty participate in many community and University organized events for patients, health care providers, and researchers to raise awareness for our brain donation program. See list of FY14 events below.

Figure 2. Families served by the CCNL Brain Bank (red dots).

STANDARD OPERATING PROCEDURES (SOP). The CCNL Brain Bank has adopted standard biobanking procedures that closely mimic those of the Hollings Cancer Center (HCC) Biobanking facility, so that comparable standards can be achieved across the campus. The SOPs were developed in the spring of 2014, and have been approved by the steering committee. They will be available on the website (www.musc.edu/brainbank).
Summary of facilities and other resources. Our facilities include an 1,800 sq.ft. laboratory for Dr. Granholm and a 1,000 sq.ft. laboratory for Dr. Sambamurti, 5 freezers for brain tissue, a cold room, offices for CCNL personnel, conference room, and offices for the investigators. We are using the Autopsy suite in the MUSC Department of Pathology for extraction of brain. Through the Centralized Biobanking at MUSC, we have access to personnel and know-how of the Hollings Cancer Center (HCC) Biorepository and Tissue Analysis Shared Resource (HCC BTA), an NCI designated cancer center. The HCC-BTA comprises several integrated components, e.g., biospecimen and data repository, customized and readily available tissue microarrays (TMAs), laser capture microdissection (LCM), matrix-assisted laser desorption/ionization (MALDI) tissue imaging, and research pathology services. In addition to the HCC-BTA, we also collaborate with the SCTR Biorepository (www.sctr.musc.edu), which collects and stores specimens from clinical IRB approved studies at MUSC. All three of these biorepositories at MUSC operate under the same LIMS (TissueMetrix) to link specific specimens with clinical data in the MUSC Clinical Data Warehouse (CDW).

All areas of the brain are available to researchers, either in fixed or frozen condition. The CCNL Brain Bank provides high quality samples of brain tissue and associated structures from individuals that are either normal controls of ages 7-100 or have various neurological or psychiatric conditions. The specimens collected and stored include the left hemisphere (frozen), the right hemisphere (fixed in 4% paraformaldehyde), aqueous and vitreous humors of the eye, lumbar and cranial CSF, serum, plasma, buffy coat, inner ear, retina, choroid plexus, and pituitary gland. Seventeen brain regions are routinely stained for H&E, silver, and specialty stains, and a neuropathology diagnosis is provided and attached to the donor information sheet in the TissueMetrix database by Dr. Cynthia Welsh, a SC board certified neuropathologist. The CCNL Brain bank can provide de-identified demographic information and additional medical data via linkage to the clinical data warehouse (CDW).

Partnerships and/or research collaborations: CCNL is working closely with many clinical programs at MUSC and other institutions in terms of donor recruitment and clinical diagnosis/medical history, as outlined below. The CCNL does not exclude any conditions for brain donation, including tissue from otherwise normal subjects of all ages, as outlined in the list provided below.

A. MUSC partnerships
1. Center on Aging
2. Center for Biomedical Imaging (CBI)
3. Hollings Cancer Center (HCC)
4. Neuroscience Institute (NI)
5. Cognitive Neuroscience Center
6. Alzheimer’s Research & Clinical Program
7. Movement Disorder Program
8. Stroke Program
9. Hearing Research Program, MUSC
10. Department of Pathology, MUSC
11. Department of Radiology, MUSC
12. Department of Neuroscience, MUSC
13. Department of Medicine, MUSC
14. Department of Ophthalmology, MUSC
15. Department of Psychiatry, MUSC
16. Department of Otolaryngology-Head and Neck Surgery, MUSC
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B. State-wide collaborations:

17. South Carolina Aging Research Network (www.scarn.org)
18. Alzheimer’s Association South Carolina Chapter
19. Parkinson’s Disease Foundation, Trident Chapter
20. SC Aging in Place Coalition
21. SC Respite Care Coalition
22. The Lowcountry Senior Network
23. Down Syndrome Association of the Lowcountry (DSAL)

C. Nation-wide collaborations:

24. Department of Neurology, Rush Presbyterian/ St Lukes (Chicago, Dr. Elliott Mufson)
25. Brain Bank, University of Maryland (Dr. Ron Zielke)
26. Linda Crnic Institute for Down syndrome, Denver CO (Dr. Huntington Potter)
27. Banner Health Institute, Arizona (Dr. Marwan Sabbagh and Dr. Elliott Mufson)
29. Johns Hopkins Medical Center (Dr. Wayne Silverman)
30. University of California at Irvine (Dr. Ira Lott)
31. University of Utah (Dr. Julie Korenberg)
32. University of Kentucky (Dr. Elizabeth Head)

D. International collaborations:

33. Karolinska Institutet Brain Bank, Stockholm, Sweden (Drs. Inger Nennesmo and Caroline Graff)
34. Karolinska Institutet Alzheimer Research Program, Stockholm, Sweden (Drs. Marianne Schulzberg and Maria Eriksdotter)
35. McGill University, Canada (Dr. Claudio Cuello)

Clinical research areas at MUSC directly associated with CCNL:

**Alzheimer’s Disease.** Many research groups at MUSC share the interest and research commitment to AD-related research, including researchers in College of Health Professions, College of Medicine, and College of Nursing. Two years ago, the Center on Aging formed an interdisciplinary focus group to determine and evaluate research interest in this area among scientists in Nursing, Radiology, Neurology, and Neuroscience. During 2014, an interdisciplinary task force will be formed to finalize a specific business plan for AD-research and clinical assessment at MUSC. The majority of donated brains to the CCNL Brain Bank have a diagnosis of AD, and our plans are to develop an integrated and innovative research program, collaborative in nature and expanding throughout the state via our collaborations with SCARN and the HSSC.

**Parkinson’s Disease.** The Brain bank works closely with the Movement Disorders Program at MUSC, including Dr. Vanessa Hinson (Director), Dr. Travis Turner, and Dr. Cristina Vaughan. Dr. Hinson and Dr. Granholm lead a funded pilot grant program (the Barmore Fund, see [www.musc.edu/aging and Letter from the Barmores](http://www.musc.edu/aging)), which directs annual funding for clinical and translational projects on PD at MUSC. Because of the participation of the CCNL coordinators in outreach activities organized by the Movement Disorders Program
(see list of activities below), we have been able to increase donations from subjects with PD, with meaningful phenotypic and clinical data attached. This collaboration has resulted in several collaborative manuscripts.

**Age-related Hearing Loss.** The Hearing Research Program at MUSC has been in existence for more than 30 years. The research program in age-related hearing loss has been funded by a P50 Clinical Research Center from NIH/NIDCD, which was recently renewed another 5 years (years 26-30). CCNL works closely with investigators in the Hearing Research Program and its director, Dr. Judy R. Dubno. The CCNL Brain Bank has provided inner ear tissue from 65 donors to date to the Hearing Research Program, and continues to collaborate closely. We will continue to work together to expand the minority recruitment of donors. The Hearing Research Program is a very well established and successful program, as evidenced by their continued funding by NIH through the years (see [www.musc.edu/hearing](http://www.musc.edu/hearing)).

**Stroke.** South Carolina has had one of the highest stroke mortality rates in the country for many years (see e.g. [www.cdc.gov](http://www.cdc.gov)). Our state is the “buckle of the stroke belt”, and although vascular risk factors are known to play a role, it is still not clear why South Carolinians are so highly stricken by this condition. The stroke team at MUSC cares for almost 1000 patients per year in the University Hospital, but also provides remote consultations at select hospitals in South Carolina through a telemedicine initiative called REACH MUSC. The CCNL Brain Bank has worked with the stroke program at MUSC to provide high-quality brain tissue. This collaborative work has already resulted in a funded grant to Dr. Tanya Turan (K23NS069668; Director MUSC Stroke Program) and a manuscript regarding Correlation Between In-vivo 3Tesla High Resolution MRI and Pathology, which was recently submitted to JAMA Neurology. One of our goals is to increase our banking of tissues from stroke patients in our state, since this tissue may provide valuable information for researchers in the stroke field across the nation due to the unique demographics in SC.

**Down syndrome.** Down syndrome (DS) is a fairly common genetic abnormality, with approximately one in every 800 births. The lifespan of individuals with DS has doubled in the last few decades due to advancement in surgical and medical methods, and it is estimated that there are more than 250,000 individuals with DS in the US. Individuals with DS exhibit developmental changes in brain function and develop AD neuropathology with near conformity in their 4th to 5th decade, and are at a much higher risk of developing AD dementia than the general population. There is a strong need for a centralized coordination of brain donation programs for DS ([Granholm et al., 2012](https://act.alz.org)). Dr. Granholm is participating in a national network of scientists coordinating brain and tissue donation from individuals with DS of all ages. Dr. Granholm is the chair for the ISTAART (International Society to Advance Alzheimer's Research and Treatment) professional interest area (PIA) on DS and related Alzheimer’s disease (see [https://act.alz.org](https://act.alz.org)). Of note is also that all the National Alzheimer Coordinating Centers (NACCs) only have a few subjects with DS in their collections, as indicated by a recent survey. Thus, there is a dire need to collect tissues from individuals of all ages with DS connected with meaningful clinical information. The NIH initiative DS Connect is a registry that will help in this respect, and we are hoping to be one of several brain banks participating in this centralized effort.

**Obesity.** South Carolina is one of 12 states with the highest incidences of obesity, with more than 50% of the population either obese or overweight. In Charleston County, 50% of the children are overweight and have no access to after school sports. An important part of the CCNL activities includes participating in the Brain Awareness program, during which we take human brains and educational materials to area school classes (5th-12th grades) to talk about brain health and exercise programs. We also organize the annual MUSC team for the Alzheimer Association Walk and have plans to be involved in the Buddy Walk for Down syndrome in the fall. Each of the brains obtained in CCNL has information regarding weight and height and we also have cholesterol and glucose levels for most subjects, so that we will be able to provide these measures for potential recipients of research tissue samples. Obesity is a severe problem in South Carolina, and to our knowledge, there is no
other biobank that receives tissues from individuals in the stroke and obesity belt. Therefore, a mission in the CCNL Brain Bank is to provide clinical data linked to obesity and blood lipids for tissues from donors in our state.

**Previous experience.** As can be seen in Fig. 3, the number of brain donations has increased each year, and in 2013 alone we received 35 brains. We are now equally funded by grants, support from clinical programs at MUSC, and the Dean’s and Provost’s offices. However, due to the reduced state funding to MUSC and the current funding climate, there is a concern regarding sustainability of funding for the CCNL Brain Bank.

**Figure 3. Average age of donors (A), Numbers of donors per year (B), and postmortem interval per year (C) in the CCNL Brain Bank.**

As evidenced above (Figure 3), we have consistently reduced the average postmortem interval (PMI) of donated tissues, and in 2013 we received more than 35 brains, a number that is significantly increased from only 15 brains received in our first year of operation. The total number of samples donated to the brain bank, including serum and plasma samples, amounted to more than 100 donations as of the end of 2013. Because of increased support from MUSC clinical programs, we have been able to obtain donors of young ages, and now include Huntington’s disease, CNS cancers, and bipolar disorders among the donors.

**Community Service FY 14**

1. Dr. Granholm is serving on Alzheimer Association Board (since June 2013)
2. Community talk at a church in Senega, SC, August 2013 (organized by the Barmores) for 150 people
3. CCNL researchers presented and had a table at the Alzheimer caregiver conference September 2013
4. Organized and ran the pilot grant program for Barmore Fund Sep-Nov 2013 together with Dr. Vanessa Hinson (Movement Disorder Program)
5. CCNL investigators presented and had an exhibit at the Parkinson’s disease caregiver conference March 2014
6. Participated in the Senior Mentor program for medical students
7. Organized a meeting and gave a talk for families with Down syndrome (DSAL) February 2014
8. Organized an interest group for families with Down syndrome (Open house planned for October, 2014)
9. Published two Newsletters for Brain Bank donors and family members
10. Sponsored a table for the Alzheimer Association annual Forget-me-Not-Ball in May 2014
11. Organized an MUSC team for the annual Alzheimer walk (September 2013), raised > $2000
12. Organized an MUSC team (Endow Your Brain) for the Alzheimer walk, September 20, 2014
13. Speaker and member of the Lowcountry Senior Network
14. Member of the SCARN executive committee, and the executive committee of SeniorSmart CoEE
15. Participated with an exhibit for the Stroke Awareness conference May, 2014
16. Organized and gave a presentation for the John’s Island AME church to discuss dementia and Healthy Aging, May 2014
17. Speaker, Alzheimer caregiver conference, Columbia, SC, August 2014
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18. Participated in and supported the Aging Research Day, Columbia Conference Center, 2014
19. Chair, ISTAART Professional Interest area on Down syndrome-Alzheimer’s Disease (DS-AD). This PIA now has more than 250 members from more than 38 different countries. The work in this committee has resulted in a workshop focused on DS-AD, sponsored by Alzheimer Association, Global Down syndrome Foundation, and DS Achieves, to be held in December of 2014. The workshop group, including researchers from 8 different brain banks and clinical centers in the US and 6 different Centers in Europe, will move forward to form an international network for biobanking of DS tissues.

**Clinical studies:**

1. BDNF and EGF levels in serum of patients with Parkinson’s disease and cognitive impairment
   Study completed and written up for publication (see below, Turner et al paper)

2. BDNF and pro-BDNF levels in serum of PD patients receiving Atomoxetine treatment for 12 weeks (supported by Michael J Fox Foundation) Study still ongoing.

3. Healthy Aging after 65: serum biomarkers are examined in older adults who receive exercise or cognitive training. Funded by the Kamprad Foundation (2 year grant to Dr. Granholm). MTA with Harvard University and the Linneus University in Sweden. Initiated January 2014.

4. Clinical study as part of the Alzheimer grant: Serum biomarkers for dementia are examined in individuals with Down syndrome with or without dementia. MTA with Johns Hopkins and Banner Health in Arizona. Initiated November 2013.

**Grants resulting from CCNL collaborations:**

**Alzheimer’s Association DSADIIP-13-284845** 10/1/2013- 09/30/2016
Title: “BDNF and Executive Dysfunction in Down syndrome”
Role: PI
Grant funded September 2013.
Project is focused on assessing biomarkers in brain tissue and serum in patients with Down syndrome and Alzheimer’s disease as well as a mouse model of DS.
Award amount: $291,347.00

**Kamprad Foundation** 02/01/2013-01/31/2015
Role: Collaborator (PI: Abdul Mohammed, Karolinska Institutet)
“Healthy Aging over 65: The role of exercise and cognitive training”.
Project is focused on cognitive and motor training in older adult humans and effects on cognitive performance and motor coordination.
Award amount: $50,000/year for two years.
Dr. Tanya Turan (K23NS069668)  
“Characterization of Intracranial Atherosclerotic Stenosis Using HR MRI”.  
Amount: $750/patient up to $3,000/year.

P50 DC000422-26  
“Experimental and Clinical Studies of Presbycusis” (J.R. Dubno, Program Director), 1/1/14-12/31/18

NIH-NIA R21 AG046200 04/01/2013-03/31/2015  
“Understanding the Neuroprotective activities of Posiphen” (PI: K. Sambamurti)  
Award amount $186,875 per year for two years.

Publications resulting from CCNL collaborations:


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**Pending or In Press:**


**Presentations at National and International meetings:**

**Dubno:**

**Granholm:**
1. Grand Rounds at NYU, February 2014
2. Grand Rounds at University of Alabama (UAB), April
3. Chair for a session, ASNTR annual meeting, May 2014
4. Invited speaker, annual Frontiers in Alzheimer’s Disease conference, MUSC CBI
5. Grand Rounds Neurosciences, MUSC, November 2013

**Sambamurti:**
1. Invited speaker, annual Frontiers in Alzheimer’s Disease conference, MUSC CBI
2. Invited speaker, annual Aging Research Day conference, MUSC
3. Chair for a session, SFN annual meeting, November 2013
4. Invited Speaker, Wayne State University, January 2014
5. Invited speaker, Boston University, August 2014
## BUDGET PROPOSAL FY15

### A. AVAILABLE RESOURCES:

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<tr>
<th>Name</th>
<th>Amount 6/30/14</th>
<th>Comments</th>
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### GRANT SUPPORT

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<td>TEVA Neuroscience biomarker grant</td>
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<td>Kamprad Biomarker Grant/Sweden</td>
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<td>Barmore Pilot (Granholm)</td>
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<td>PPG Dubno (pay per brain)</td>
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<td>$400/inner ear donations</td>
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<td><strong>Total currently</strong></td>
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<td>Granholm laboratory grants</td>
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**Total Resources** $249,727.00

Sambamurti NIH grant (Pays 0.5 FTE for Scientist and supplies for genotyping and biomarker analysis) $25,000.00
**B. ACTUAL COSTS FY14 AND PROJECTED COSTS FY15**

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<th>Projected FY15</th>
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<td>Personnel salary +Fringe</td>
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<td>Equipment</td>
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<td>Paraffin embedding</td>
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<td>Lab supplies</td>
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<td>Transportation</td>
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<td>Pager/phones</td>
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<tr>
<td><strong>Totals</strong></td>
<td><strong>263,968</strong></td>
<td><strong>202,091</strong></td>
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*Sliding microtome SouthEast Pathology Instruments

**Salary effort reduced due to grants, see below for percent effort

**New -80 freezer needed FY15

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<thead>
<tr>
<th>Salaries</th>
<th>effort</th>
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<tr>
<td>Lotta Granholm</td>
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<tr>
<td>Kumar Sambamurti</td>
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<td>Heather Boger</td>
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<tr>
<td>Laura Columbo</td>
<td>30</td>
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<tr>
<td>Lauren Jutras</td>
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C. Detailed budget per brain and projected for 30 and 100 brains:

<table>
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<tr>
<th>Detailed budget for materials:</th>
<th>FY15</th>
<th>100 brains estimate</th>
<th>30 brains** estimate</th>
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<tbody>
<tr>
<td>Item</td>
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<td>Antibodies</td>
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<td>Glassware</td>
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<td>Plastic Specimen Bags</td>
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<td>297.30</td>
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<td>Reagents</td>
<td>48.91</td>
<td>4,891.00</td>
<td>1,468.77</td>
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<td>Safety Supplies</td>
<td>13.61</td>
<td>1,361.00</td>
<td>408.71</td>
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<td>Secondary Antibodies</td>
<td>11.53</td>
<td>1,153.00</td>
<td>346.25</td>
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<td>Slide Books</td>
<td>65.97</td>
<td>6,597.00</td>
<td>1,981.08</td>
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<td>Test Tubes</td>
<td>7.25</td>
<td>725.00</td>
<td>217.72</td>
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<td>Tools</td>
<td>8.53</td>
<td>853.00</td>
<td>256.16</td>
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<tr>
<td>General</td>
<td>167.79</td>
<td>16,779.00</td>
<td>5,038.74</td>
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<td>**TOTAL =</td>
<td>$694.78</td>
<td>$69,478.00</td>
<td>$20,864.26</td>
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**Based on this year's volume we expect 30 brains for FY15**