PROCESS EVALUATION
OF THE
COBRE PROGRAM

Key Findings

Submitted by Carlyn Consulting to the
National Center for Research Resources (NCRR), NIH

September 2008
Purpose of the COBRE program

• Establish multidisciplinary biomedical research centers in IDeA states (those with ‘historically low aggregate success rates’ in obtaining NIH grants)

• Strengthen the infrastructure of participating institutions

• Enhance the research competitiveness of their research scientists, especially junior investigators
Evaluation design

• Based on a conceptual framework identifying the program’s goals and the predictor variables likely to be related to program success

• 6 study questions were addressed

• 2 target populations:
  
  • Initial cohort of 19 centers awarded a COBRE grant in Sept 2000 (n=18 since WY’s centers shared many resources)

  • 107 junior investigators at these centers who received substantial COBRE support during Years 1-3 and did not have an R01 before joining the program
CONCEPTUAL FRAMEWORK
FOR THE PROCESS EVALUATION OF THE COBRE PROGRAM

Baseline Characteristics of COBRE Centers
- Number of participating institutions and departments
- Affiliation with a medical school and/or health sciences center
- Type of research to be pursued by the center (basic, clinical, behavioral)
- Existing facilities and resources supporting this type of research
- Research, administrative, and mentoring experience of the PD
- Previous research experience of the senior investigators and mentors
- Number of graduate and postdoctoral students in scientific fields

Major Program Activities
- Providing scientific and administrative leadership to implement the center’s overall research plan
- Recruiting additional researchers and support staff
- Selecting/supporting promising junior investigators and appropriate mentors
- Establishing/enhancing core facilities and resources to support COBRE research projects
- Working with an External Advisory Committee (EAC) to improve the center’s effectiveness
- Encouraging the active involvement of senior administrators

Process Goals for Centers
- Successful recruitment of new research faculty, core directors, and EAC members
- Expansion of core facilities and other resources to meet the needs of COBRE investigators
- Successful implementation of 3-5 research projects in areas relevant to the center’s scientific focus
- Evidence that junior investigators are receiving adequate mentoring, research support and protected time
- Evidence that the EAC is offering useful advice, encouraging faculty development, and evaluating the center’s progress
- Evidence that the participating institutions are committed to enhancing the center’s research competitiveness

Outcome Goals for Junior Investigators
- Publishing research in peer-reviewed journals
- Giving presentations at scientific meetings
- Applying for research grants
- Receiving one or more research grants
- Achieving overall research success as an independent investigator
- Continuing to participate in COBRE activities

Feedback to NCRR and COBRE Centers

External Factors
Unexpected positive or negative events over which the center had no control

NCRR Funding and Staff Support for the COBRE Program
Q1. **What were the characteristics of the centers when they joined the COBRE program?**

- Most were collaborative partnerships (avg = 2.1 institutions and 4.8 departments per center in Year 1); 15 centers had a formal affiliation with a med school and/or major medical center

- All focused primarily on basic research; 7 centers were also interested in clinical research

- All had existing research resources but most needed additional core facilities, renovation, and upgraded instrumentation

- All PDs were accomplished researchers (with one exception); wide variation in number of experienced investigators at baseline (ranging from 2 to 11)

- Great variation in size of postdoc and grad student pool (avg = 76 postdocs, 916 graduate science students)
### Exhibit 3

**Process Evaluation of the COBRE Program**

**COBRE Centers’ Access to Medical Centers and Graduate/Postdoctoral Students in Scientific Fields at Baseline (FY 2000)**

<table>
<thead>
<tr>
<th>COBRE</th>
<th>Lead Institution</th>
<th>Med Schools and Major Medical Centers Participating in COBRE</th>
<th># Graduate Science Students</th>
<th># Postdocs in Science and Health Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR1</td>
<td>University of Arkansas</td>
<td>University of Arkansas for Medical Sciences (UAMS)</td>
<td>837</td>
<td>74</td>
</tr>
<tr>
<td>DE1</td>
<td>University of Delaware</td>
<td>None</td>
<td>994</td>
<td>100</td>
</tr>
<tr>
<td>ID1</td>
<td>University of Idaho</td>
<td>Boise VA Medical Center</td>
<td>715</td>
<td>24</td>
</tr>
<tr>
<td>KS1</td>
<td>University of Kansas - Lawrence</td>
<td>University of Kansas Medical Center (KUMC)</td>
<td>3,631</td>
<td>250</td>
</tr>
<tr>
<td>KY1</td>
<td>University of Louisville</td>
<td>University of Louisville School of Medicine</td>
<td>769</td>
<td>105</td>
</tr>
<tr>
<td>KY2</td>
<td>University of Kentucky</td>
<td>University of Kentucky College of Medicine</td>
<td>1,233</td>
<td>205</td>
</tr>
<tr>
<td>ME1</td>
<td>Maine Medical Center Research Institute (MMCRI)</td>
<td>Maine Medical Center Research Institute (MMCRI)</td>
<td>459</td>
<td>70</td>
</tr>
<tr>
<td>MT1</td>
<td>University of Montana</td>
<td>None</td>
<td>1,025</td>
<td>77</td>
</tr>
<tr>
<td>NE1</td>
<td>University of Nebraska at Lincoln</td>
<td>University of Nebraska Medical Center (UNMC)</td>
<td>1,971</td>
<td>193</td>
</tr>
<tr>
<td>NV1</td>
<td>University of Nevada Reno</td>
<td>University of Nevada School of Medicine</td>
<td>730</td>
<td>0</td>
</tr>
<tr>
<td>COBRE</td>
<td>Lead Institution</td>
<td>Med Schools and Major Medical Centers Participating in COBRE</td>
<td># Graduate Science Students¹</td>
<td># Postdocs in Science and Health Fields¹</td>
</tr>
<tr>
<td>-------</td>
<td>------------------</td>
<td>-------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>OK1</td>
<td>University of Oklahoma Health Sciences Center (OUHSC)</td>
<td>University of Oklahoma Health Sciences Center (OUHSC) Oklahoma State University Center for Veterinary Health Sciences</td>
<td>2,042</td>
<td>153</td>
</tr>
<tr>
<td>OK2</td>
<td>Oklahoma Medical Research Foundation (OMRF)</td>
<td>Oklahoma Medical Research Foundation (OMRF) University of Oklahoma Health Sciences Center (OUHSC) Oklahoma State University Center for Veterinary Health Sciences</td>
<td>2,042</td>
<td>153</td>
</tr>
<tr>
<td>PR1</td>
<td>University of Puerto Rico - Medical Sciences Campus</td>
<td>University of Puerto Rico - Medical Sciences Campus</td>
<td>1,285</td>
<td>7</td>
</tr>
<tr>
<td>RI1</td>
<td>Brown University</td>
<td>Brown University Medical School</td>
<td>671</td>
<td>65</td>
</tr>
<tr>
<td>SD1</td>
<td>University of South Dakota School of Medicine</td>
<td>University of South Dakota School of Medicine</td>
<td>195</td>
<td>4</td>
</tr>
<tr>
<td>VT1</td>
<td>University of Vermont College of Medicine</td>
<td>University of Vermont College of Medicine</td>
<td>450</td>
<td>90</td>
</tr>
<tr>
<td>WV1</td>
<td>West Virginia University</td>
<td>West Virginia University School of Medicine Marshall University School of Medicine</td>
<td>1,442</td>
<td>44</td>
</tr>
<tr>
<td>WY1/2</td>
<td>University of Wyoming</td>
<td>None</td>
<td>643</td>
<td>69</td>
</tr>
</tbody>
</table>

Q2. How did the COBREs implement the major activities recommended by NCRR?

• 11 centers actively recruited junior and senior investigators and 7 focused only on junior investigators; great variation in size of startup packages (largest = $400K from COBRE and other sources)

• Some centers offered 1- to 2-year pilot project awards ($8K-$100K)

• Most centers held work-in-progress meetings, workshops on different topics, and annual retreats/symposia; most found they needed to strengthen their mentoring program after 2-3 years

• All COBREs recruited an EAC of accomplished researchers and met with them 1-2 times/year (sometimes by conf call); nearly all EACs expressed enthusiasm for their center

• 16 centers established an IAC and met with them 2-4 times/year
Q3. How successful were the COBREs in achieving the process goals for centers?

- 86 investigators recruited during Years 1-6 (>90% into tenured or tenure-track positions); overall retention of junior investigators was high (70-80%)

- 11 centers created permanent academic positions (avg = 2.5 new positions); 5 new PhD and 2 MD/PhD programs launched

- 11 centers developed new core facilities (21 new cores, 39 enhanced cores, 5 new research buildings); 6 centers received C06 grants and 14 received COBRE supplements to expand space

- More subprojects implemented than expected (avg = 10.9); 81% of subprojects directed by a junior investigator

- 81% of junior investigators were mentored; avg release time = 41%; 41% had at least 1 postdoc
Q4. What were the characteristics of the COBRE junior investigators when they joined the program?

- More males than females (72% vs. 28%)
- Mostly PhDs (91%) + 5% MD/PhDs + 3% MDs + 1% DVM/PhDs
- Several years of research training experience:
  - Average = 8.0 years since completing doctorate
  - Nearly all had been postdocs
  - 45% had served on a T32, F, or K grant
- Substantial experience publishing in scientific journals (avg = 1.4 articles/year, 99% first authors, 57% senior authors)
- Some experience with grant applications/awards; 65% had applied for a PHS grant, 42% were successful (mostly F32s); 30% had applied for an R01, 0% were successful
Exhibit 14
Process Evaluation of the COBRE Program

Percent of Junior Investigators with Previous NRSA or K Grant Experience

Based on an analysis of non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107). Data source: IMPAC II.
Exhibit 15
Process Evaluation of the COBRE Program

Percent of Junior Investigators with Previous Scientific Publications

Based on an analysis of non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107). Sole-authored articles were counted as first-authored but not senior-authored publications. Data source: PubMed.
Based on an analysis of non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107). Sole-authored articles were counted as first-authored but not senior-authored publications. Data source: PubMed.
Percent of Junior Investigators with Previous PHS Grant Applications and Awards

Based on an analysis of non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107). PHS subprojects were counted as grants. Data source: IMPAC II.
Q5. How successful were the COBRE junior investigators in achieving the program’s goals?

- 99% published in scientific journals, averaging 2.0 articles/year***

- Major change in authorship patterns; 60% had new first-authored articles and 88% had new senior-authored articles***

- 88% applied for a PHS grant, 65% were successful (mostly R-type grants)**; 80% applied for an R01, 40% were successful***; 24% received a large non-PHS grant; 36% received a smaller non-PHS grant

- 79% of junior investigators had a tenured or tenure-track position

- Only 7% left research during Years 1-6 (some temporarily)

- Surprisingly, the only baseline characteristic predictive of future success was having applied for an R01**

***Significant improvement in performance since joining COBRE (p < .001), **(p < .01)
**Exhibit 19**

Process Evaluation of the COBRE Program

**Percent of Junior Investigators Who Published After Joining COBRE**
(Compared to Pre-COBRE Performance)

Based on an analysis of the peer-reviewed scientific articles published by the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107), comparing their performance before and after they joined the program (through Sept 2007). Sole-authored articles were counted as first-authored but not senior-authored publications. Data source: PubMed.

*** Significant improvement in performance (p < .001).
Exhibit 20
Process Evaluation of the COBRE Program

Average Number of Publications Per Year
(Compared to Pre-COBRE Performance)

*** Significant improvement in performance (p < .001).

Based on an analysis of peer-reviewed scientific articles published each year by the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107), comparing their performance before and after they joined the program (through Sept 2007). Sole-authored articles were counted as first-authored but not senior-authored publications. Data source: PubMed.
Exhibit 21

Process Evaluation of the COBRE Program

Average Number of Abstracts and Presentations Per Year After Joining COBRE

Based on an analysis of abstracts and presentations given at major research conferences per year by the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107), from the time they joined the program through Sept 2007. Data source: COBRE annual progress reports.
Exhibit 22

Process Evaluation of the COBRE Program

Percent of Junior Investigators Who Applied For / Received a PHS Grant (Compared to Pre-COBRE Performance)

*** Significant improvement in performance (p < .001).  ** (p < .01)

Based on an analysis of competitive PHS grant applications submitted by and awarded to the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107), comparing their performance before and after they joined the program (through Sept 2007). PHS subprojects were counted as grants. Average Grant Award Rate was calculated by determining for each grant applicant the percent of his/her applications that were funded, and then averaging these percents for the group as a whole. Data source: IMPAC II.
Exhibit 23
Process Evaluation of the COBRE Program

Types of Academic Positions Held by Junior Investigators

Based on an analysis of the positions held by the non-R01 junior investigators who received substantial COBRE support during Years 1-3 (N=107) as of Sept 2007. Data sources: IMPAC II, web searches.
Exhibit 24
Process Evaluation of the COBRE Program

Overall Achievement of Program Goals by Junior Investigators

Each non-R01 junior investigator who received substantial COBRE support during Years 1-3 (N=107) was given only one rating summarizing the extent to which the person achieved the major goals of the program by Sept 2007, based on the person's PHS grants and peer-reviewed publications after joining COBRE. Average Grant Award Rate was calculated by determining for each grant applicant the percent of his/her applications that were funded, and then averaging these percents for the group as a whole. Data sources: IMPAC II, PubMed, web searches.
Q6. Did any COBREs experience positive or negative events over which they had no control?

- The most difficult unforeseen challenge was loss of the PD or associate PD due to unexpected death or departure from the institution

- Some centers faced unanticipated state and/or institutional funding constraints

- Some faced lengthy delays in hiring new personnel and construction/renovation of new facilities

- A few centers experienced very positive events (e.g., substantial increase in state funding for research, institutional decision to create more research positions)
Major findings of the evaluation

- There was considerable variation among the 18 COBREs with respect to their baseline characteristics, implementation of different program activities, and emphasis on specific goals.

- The centers did an excellent job of recruiting and retaining new research faculty, core directors, and EAC members, but more attention should be given to recruiting female junior investigators.

- A large majority of junior investigators (over 80%) achieved a reasonably high level of research success and performed as well as a group of K22 awardees with similar baseline characteristics, but several centers could enhance their mentoring programs.

- The COBRE program has been very effective in strengthening the research infrastructure of the participating institutions.

- The success of the program has been broad-based; 13 centers (nearly 75%) performed exceptionally well in one or more areas.
Strategies found to be most effective

• Conducting rigorous assessments of research progress and monitoring core facilities

• Emphasizing pilot projects as well as subprojects

• Developing a good COBRE website and other outreach strategies

• Establishing a formal mentoring program, selecting mentors with care, and giving junior investigators a supportive environment with adequate protected time, postdocs, and constructive feedback

• Selecting EAC members with care, communicating with them on a regular basis, and encouraging them to assess junior investigators

• Reaching out to senior administrators, communicating with them on a regular basis, and encouraging them to serve on the IAC

• Leveraging COBRE funds to obtain additional support for the center
Other factors related to success

- Strong state support for research
- Strong institutional support for research
- Fortuitous timing of the COBRE initiative
Conclusions

• The evaluation findings illustrate how effective the COBRE program has been in strengthening the research infrastructure of institutions located in IDeA states.

• The results also underscore the success of the COBRE program as a mechanism for training junior investigators.

• Many COBRE participants commented on how much they have benefited from the program.