

SPECIFIC AIMS: Developmental Research Project Program (DRPP). The DRPP's overall goals are to support the most promising research at Primarily Undergraduate Institutions (**PUIs**). This will be achieved by **1)** developing, establishing, and maintaining the research capacity and culture on the campuses, **2)** promoting the career development of targeted faculty, and **3)** providing opportunities for undergraduates to have meaningful research experiences. DRPP support will build research capacity by providing PUI faculty with 50% release time to engage in significant research, and funding for material support of the lab in terms of supplies and equipment. DRPP faculty will receive science and career mentoring from senior faculty (Executive Committee (**EC**) and Senior Executive Committee (**SEC**) members) on their campus as well as through regular communication with an appointed Research Institution (**RI**) mentor. The enhanced research capacity of DRPP-supported faculty directly influences the overall research culture on campus, primarily through promotion of the research and scholarly activity required for DRPP funding, but also owing to activities such as journal clubs, lab meetings, and campus-wide symposiums that highlight the research of students in all Science, Technology, Engineering, and Math (**STEM**) fields. The DRPP provides opportunities for greater numbers of undergraduates to join the NE-INBRE supported labs. The direct interface with INBRE and non-INBRE students helps generate a pipeline of undergraduates that funnel into biomedical research and health professional careers. All DRPP projects are aligned with the network's scientific themes of Infectious Diseases, Cancer Biology, and Cell Signaling (all research strengths in Nebraska) and thus serve to facilitate communication, promote research collaborations, and enhance mentoring activities that occur between faculty at the RIs and PUIs. DRPPs are the crucial threads that link research activities within the network. Of note, turning PUIs into RIs that have faculty who are competitive for R01 funding is not a goal of INBRE. Additionally, given that there are established mentoring programs in place at the RIs through the COBRE/CTR programs, mentoring junior faculty at the RIs is not a component of our DRPP.

The administrative core (**AC**) provides a mechanism for soliciting applications from the participating PUIs (open to all STEM faculty). The AC oversees **1)** reviewing of applications (a multi-layer process which includes consideration of our Plan for Enhancing Diverse Perspectives (**PEDP**) when prioritizing project applications for funding), **2)** awarding of applications (only meritorious projects will be funded), **3)** management of awarded grants (compliance with NIH rules), and **4)** post-award evaluations (annually to monitor progress and ensure obligations are met). Research experiences and outcomes of the students in the Scholars Program clearly demonstrate the positive value of working in our DRPP funded labs; this is evident in the development of their research skills and subsequent career choices in the research and health professions areas. Funds to support DRPPs will be from the \$1.65M allocation to the PUIs. Goals of the program will be achieved through the following Specific Aims:

Specific Aim 1. Establish and implement an internal mechanism for obtaining a DRPP.

- 1.a. Timeline for solicitation of DRPP proposals.
- 1.b. Funding opportunity announcement (**FOA**) for the DRPP projects.
- 1.c. Applicant eligibility and requirements.
- 1.d. Budget guidelines.
- 1.e. Research proposal.
- 1.f. Renewal process.

Specific Aim 2. Conduct multi-layered peer review process of DRPP proposals.

- 2.a. Scientific review panels: five levels of scientific review.
- 2.b. Review criteria related to science.
- 2.c. Review criteria related to safety, inclusion, budget, and federal regulations.

Specific Aim 3. Supervise programmatic details of an awarded DRPP.

- 3.a. Budget and funding period.
- 3.b. Expectations for faculty participating in the DRPP.
- 3.c. Mentoring plan for DRPP faculty.
- 3.d. Monitoring of progress and compliance.
- 3.e. Compliance with federal regulations.

Specific Aim 4. Assess success of the DRPP program in the previous grant cycle.

Impact Statement: The DRPP meets the critical needs of the network by enhancing the research capacity at the PUIs. Support for faculty release time, laboratory supplies, equipment, and travel provide the resources for each PUI faculty member to develop a research program. This in turn provides opportunities for undergraduate students to gain research experience while studying at the PUIs, thus forming the basis of the pipeline into biomedical research and health-related careers. Lastly, scholarly activities associated with the DRPP provide faculty with the tools to meet the changing requirements for their own career advancements. Thus, the DRPP is an essential mechanism to meet the overall goals of the NE-INBRE Program.

RESEARCH STRATEGY

Specific Aim 1. Establish and implement an internal mechanism for obtaining a DRPP.

Here we describe the solicitation, scope, eligibility requirements, budget details, and the number of years of support per project for the NE-INBRE DRPP program. No current awarded DRPP will carry over into the new grant cycle. All current NE-INBRE PUI faculty will have to re-apply and compete for funding. Based upon the number of applications from the '19 FOA (Table I) and the increase in the number of PUI faculty throughout the network, we estimate ~40 applications for the '24 FOA. We plan to fund ~17 PUI research projects.

1.a. Timeline for solicitation of DRPP proposals.

The FOA will be distributed to all PUIs in the network on 5/1/24: College of Saint Mary (CSM); Creighton Univ. College of Arts and Sciences (CUAS); Doane Univ. (DU); Univ. of NE-Kearney (UNK); Univ. of NE-Omaha (UNO); and Univ. of NE-Lincoln undergraduate (UNL-u) campus. Chadron and Wayne State Colleges as well as Nebraska Indian Community College only participate in the Scholars program because their administration cannot commit to the time-release requirement from teaching (their "Memorandum of Understanding" contains the DRPP program in case this changes during the grant cycle). The announcement will target all STEM faculty, and we will use Deans, Administrators, Dept. Chairs, Sponsored Programs Officials, as well as members of the EC and SEC to distribute the FOA. A "Letter of Intent" to submit a DRPP application will be due to the AC no later than 7/1/24. The "Letter of Intent" will include the

Table I. All DRRP applications submitted for funding in the previous grant cycle.

Campus	PI	Title of proposal
CSM CU	D. Kumari	Enhance bioavailability of potent nutraceuticals
	<u>J. Soukup</u>	Target the glmS riboswitch and exhibit antibiotic properties
	<u>P. Soto</u>	Effect of cofactor molecules on the mammalian prior protein
	<u>M. Nichols</u>	Development of non-linear optical imaging techniques
	<u>E. Gross</u>	Electrochemiluminescence devices for biological applications
	<u>L. Dieckman</u>	Structure/function of proteins that regulate gene silencing
	<u>J. Fletcher</u>	Develop 1,2,3-triazolium salts with antimicrobial properties
	<u>B. Brandsen</u>	Evolving highly active lasso peptides
	<u>A. Shibata</u>	Metabolic cell signaling deficiencies in neuropathologies
	<u>C. Gee</u>	Profiling substrates of bacterial peptide transporters
Doane	K. Hammond	Muscle calcium signaling in Parkinson's Disease
	A. Cavanaugh	Evolution of the Yeast Microtubule Organizing Center
	B. Schofield	Impact of chromatin conformations on gene expression
	L. Colclasure	Agriculture consumer/producer behaviors to prevent infectious disease
UNK	<u>J. Dolence</u>	Sex hormones modulate immune responses leading to peanut allergy
	<u>A. Nuxoll</u>	<i>S. aureus</i> persister immunogenicity and survival within a host
	<u>B. Luedtke</u>	<i>C. burnetii</i> type IVB secretion system linked with host pathogenesis
	<u>K. Shafer</u>	3D printed devices to extract and concentrate whole genome DNA
	<u>M. Moxley</u>	Simulate in vivo conditions to understand enzyme regulation
	<u>M. Patabiman</u>	Adenosine receptors cancer therapeutics
	S. Chandra	Polyamine pathway in exacerbation of breast cancer under diabetes
UNO	Y. Sui	Cannabidiol on pregnane X receptor mediated dyslipidemia
	H. Cao	Hydrogen sulfide in cancer cells by using a nano-fluorescence sensor
	N. Hobbs	Androgen receptor in mediating anxiety-like behavior in mice
	H. Palencia	Synthesize peptides with antibacterial activity to overcome resistance
	<u>P. Davis</u>	Investigating novel chemotherapeutics against the parasite <i>T. gondii</i>
	<u>J. Blankenship</u>	Pathogenic mechanisms in the human fungal pathogen <i>C. albicans</i>
	<u>P. Denton</u>	Immunotherapy to improve NK mediated ADCC against malignancy
	<u>W. Tapprich</u>	Structures in enterovirus genomic RNA that determine virulence
	<u>D. Slivka</u>	Temperature alters cell signaling response associated with exercise
	R. Wong	Cellular signaling dynamics of neuroendocrine and oxidative stress
S. Park	Keap1-Nrf2 as a therapeutic for patients with peripheral artery disease	

PIs in **bold** were funded. PIs underlined were funded based upon the '19 review process, the other PIs were funded based upon the '22 review process. PIs Soto, Patabiman, and Chandra were terminated due to not meeting NE-INBRE requirements. PIs Schofield, Slivka, Tapprich, Kumari, Luedtke, Holmes, and Brandsen left Nebraska. Specific Aim 4 provides the success of these PUI faculty. Of note, while UNL-u faculty are encouraged to apply, historically we do not receive applications due to the vast financial support already available to them. DRPPs do exponentially help our smaller PUIs.

provide a review of the proposal, and name of a mentor. Complete proposals will be due for submission to the AC no later than 10/1/24. The review process will be completed by 2/1/25. Proposals will be prioritized, and the process will allow for announcement of the recipients by 3/1/25 with commencement of funding by the NE-INBRE start date, proposed for 5/1/25.

1.b. FOA for the DRPP projects.

PUI faculty are invited to apply for a DRPP grant proposal, for which funding would start 5/1/25. A major goal of the DRPP is to enhance the development of the research infrastructure on undergraduate campuses in Nebraska by providing support for faculty research in the form of funds for release time, instrumentation necessary for cutting-edge biomedical research, supplies, and other associated expenses. The result from the development of this research infrastructure will be to provide opportunities for NE-INBRE Scholars, as well as other undergraduates on these campuses, to become involved in biomedical research projects supported by this program. Since a primary goal of the NE-INBRE DRPP program is to create research opportunities for undergraduates, we are pleased to report that 532 undergraduates were involved in DRPP funded labs in the previous grant cycle ('20-24). Of these, 152 were NE-INBRE Scholars who produced 29 manuscripts, received 124 awards (including 4 Goldwater Scholarships), and 90% pursued a career in science. Based on our successes thus far, we envision that DRPP support will continue to encourage high-quality, interdisciplinary biomedical research on the undergraduate campuses, enhance collaborative research and

publishing amongst research investigators on all campuses within the NE-INBRE network, and continue with the development of a pipeline of students into research and research-related careers in Nebraska.

1.c. Applicant eligibility and requirements. Faculty at the Assistant Professor level or above who hold full-time appointments at any of the participating PUIs are eligible to apply for DRPP funding. Faculty must document that they will be able to devote 6 calendar months to research/research-related activities. Projects will be single faculty projects and evaluated annually for post-funding productivity. Successful projects will be funded for 2 years, with an opportunity for renewal.

All applicants who are awarded DRPP funding are required to submit additional proposals for extramural funding such as AREA (R15) grants, NSF RUI grants, or other national research funding grant programs by completion of the 2nd year of funding. PIs will be required to publicize their findings in the form of published articles in peer-reviewed scientific journals/presentations at meetings. Additionally, each PI is required to identify a mentor at one of the RIs within the network and include a mentoring plan in their DRPP proposal. The mentor should be an established investigator with relevant experience in research, have external support, and maintain an independent research laboratory; cross-campus and even interstate mentorships (if necessary) are allowed.

Recipients are required to submit a Progress Report to the AC 60 days prior to the end of year 1 funding (to be eligible for the one-time non-competitive renewal of DRPP funding) and the end of year 2 funding (to be eligible to submit a grant for renewal). The report should document progress towards meeting the project's specific aims, as well as productivity metrics. Successful applicants are expected to fully participate in all NE-INBRE activities, including mentoring of undergraduate researchers, and active participation at the annual conference, statewide journal club, and regional/national IDeA Meetings. Recipients will also be expected to actively participate in campus seminars and demonstrate commitment to the development of the NE-INBRE Scholars Program. The report must also include the title of any grant proposal submitted to external agencies for funding along with the date the proposal was submitted, and list any resulting articles submitted or published.

1.d. Budget guidelines. The budget requested for each project is flexible but may not exceed \$45K in direct funds per year for a maximum of two-years for a single PI project. Proposed grant project budgets can include personnel costs - summer salary and release time for the PI. Equipment requests should NOT constitute the major portion of the DRPP budget. All items requested as part of the proposal budget must relate directly to that research project and the goal of providing undergraduate students with enhanced research opportunities.

1.e. Research proposal. Each DRPP grant proposal will contain: **a)** Abstract; **b)** Specific Aims (1 page) that concisely states what the proposed research is intended to accomplish and the overall hypothesis to be tested; **c)** Research strategy (6 pages) that describes the Significance, Background, Innovation, and Approach; **d)** Literature cited; **e)** Identification of extramural funding source(s) that will be targeted; **f)** Statement of relatedness to the scientific themes of the NE-INBRE network; **g)** Information about compliance with federal regulations (i.e., human/animal studies; biohazard safety); **h)** Detailed budget and budget justification; **i)** Description of the PUI environment; **j)** Plan for ensuring rigor and reproducibility; **k)** Plan for authentication of key biological and/or chemical resources; **l)** Identification of the RI mentor and nature of the relationship, and **m)** NIH-style biosketch.

1.f. Renewal process. A DRPP grant may be funded for up to two years. Thus, the process described above to solicit DRPP applications and below to review DRPP applications will be repeated every two years. The only difference is those PUI faculty reapplying for funding will also have to submit their progress reports from year 1 and 2 for review. An additional criterion for renewal is the submission of a proposal for extramural funding.

Specific Aim 2. Conduct multi-layered peer review process of DRPP proposals.

To ensure a fair and rigorous review process, there will be five levels of review for each DRPP proposal. The process models the approach used in NIH review of applications. **Level 1** is analogous to a "Primary Reviewer" (Scientific Expert); **Level 2** is analogous to the other "Study Section Reviewers." Senior faculty members at the RIs and PUIs will serve on study sections to score and prioritize the proposals based on scientific merit. **Level 3** is analogous to review by the "Funding Council." The SEC will prioritize funding based upon having a meritorious score and programmatic needs of the network. **Level 4** is the External Advisory Committee (**EAC**), which will provide oversight for the entire process. **Level 5** is approval by NIGMS. All reviews will be returned to the faculty.

2.a. Scientific review panels: Level 1: Research on the PUIs is highly diverse, and because expertise in all areas is not present at the RIs, we rely on external reviews for initial scientific evaluation. The FOA will indicate that each applicant must submit the names of five external reviewers who are experts in the scientific area of the proposal (and have no collaborative overlap). Two of these reviewers will be asked to provide a critical review of the scientific merit of the proposal and submit a written critique to the AC. The external reviews will provide

information related to the impact and merit of the project as it relates to the specific discipline identified in the proposal. Of note, the external reviewers provide specific information but do not provide the sole evaluation on the merits of the proposal within the context of our scientific themes, campus capabilities and infrastructure, and expectations of the faculty within the context of their own campuses. External reviewers receive modest compensation for their time and effort. **Level 2:** Three study section meetings will convene to review the proposals and critiques of the external reviewers, adopting NIH study section standards and practices. RI Program Coordinator (**RI-PC**, Dr. Caplan) will serve as chair of each study section (for consistency between sections). He has served as a regular panel member of the NCSD study section (NIH) and has chaired American Heart Association study sections. Scientific Theme Directors will serve as vice-chairs of their respective study section. Each Director will work with the RI-PC to recruit investigators to serve as reviewers of proposals in their specific areas. These reviewers will include RI and PUI faculty members of the various COBREs and CTR in Nebraska as well as faculty involved in our Scholars Program with particular expertise in the area of the proposals. Each proposal will have two faculty assigned as Level 2 reviewers and will be reviewed and scored by the study section during its meeting. **Level 3:** The SEC will prioritize proposals for funding. This level of review will focus on the needs and considerations of the larger network as a whole and the campus environment where the various projects will be located. For example, a DRPP grant became available after a faculty member left UNK. After the Level 1 and 2 reviews, the top DRPP application was from CUAS and the second from CSM. Since CSM had no DRPP funding and CUAS six, the SEC felt the network would be best served by awarding the DRPP to CSM. Because of this funding, Dr. Kumari, was able to generate enough data to submit an NIH R15 grant. Under no circumstances will non-meritorious projects receive funding. **Level 4:** All information gathered from each level of review will be provided to the EAC. Their goal is to provide overview of the process and report any areas of concern to the PD/PI. **Level 5:** No research proposal will start until the proposal and all appropriate documentation (e.g., IACUC) is approved by NIGMS Program and Grant Management.

2.b. Review criteria related to science. Goals of NE-INBRE supported research are to advance the understanding of biological systems, improve the prevention and control of disease, and enhance human health. Important criteria are diversification of the biomedical research workforce (see PEDP) and the development of a pipeline that results in undergraduate students pursuing careers in research. A single-digit score (NIH scoring system, 1-9) and bulleted list of strengths and weaknesses for each of the review categories, as well as an overall priority score, using the following NIH-based scoring scale, will be applied.

1. Significance and scientific premise criteria: Does this study address an important biological or behavioral problem? If the aims of the application are achieved, how will scientific knowledge be advanced? What will be the effect of the study on the concepts, methods, technologies, treatments, services, or preventive interventions that drive this field? Is there consideration of the strengths and weaknesses of published research or preliminary data crucial to the support of the application?

2. Innovation criteria: Is the project original and innovative? For example, does the project challenge existing paradigms or address an innovative hypothesis or critical barrier to progress in the field? Does the project develop or employ novel concepts, approaches, methodologies, tools, or technologies?

3. Investigator criteria: Is the investigator appropriately trained and well suited to conduct the proposed study? Is the proposed research appropriate to the experience level of the PI? Has the applicant designated a mentor for their project and provided a brief description of their mentoring plan? Does the investigator present evidence of prior research productivity and successful mentoring of undergraduate students?

4. Approach and scientific rigor criteria: Are the conceptual framework, design, methods, and analyses adequately developed, well integrated, well-reasoned, and appropriate to the aims of the project? Does the applicant acknowledge potential problems and propose alternative strategies?

5. Environment criteria: Does the institutional infrastructure where the study will take place contribute to the probability of success? Does the proposed study benefit from unique features of the scientific environment, subject populations, and/or employ useful collaborative arrangements? Will the research fit into departmental/institutional strategic plans and research priorities? Is there evidence of departmental and institutional support?

6. Authentication of reagents criterion: What is the quality of resources used to conduct research?

7. Contribution to development of the research culture and undergraduate research on the campus criteria: How will the project provide research opportunities for undergraduates? Will the project expand the research culture on campus? Will the project lead to additional research opportunities beyond the immediate DRPP goals? How will the project improve the training environment provided to faculty/students on this campus? How will this project allow faculty to increase research infrastructure needed to obtain extramural support?

8. Scientific themes (Infectious Diseases, Cancer Biology, and Cell Signaling): All DRPP proposals will be evaluated according to their relatedness to the network's scientific themes (binned in one of these three for Level 2: Study section). These scientific themes encompass almost all of the work done at the PUIs, and they are inclusive and less generic than simply "Functional Genomics", the original title ('01) of the NE-INBRE.

9. Diverse teams working together: DRPP applicants will be provided the NE-INBRE PEDP after receiving their letter of intent to submit a DRPP. We will also consider our PEDP when prioritizing applications for funding.

10. NE-INBRE PUI faculty funded in the previous grant cycle: If a DRPP faculty member was funded in the 20'-25' INBRE funding cycle, their productivity during this time in the program will be evaluated. If a grant application is submitted for renewal in the new grant cycle, the progress report from years 1 and 2 will be evaluated for productivity, including any submission of additional proposals for extramural funding.

2.c. Review criteria related to safety, inclusion, budget, and federal regulations. The following items will also be considered for determining merit/priority score (appropriate/not appropriate, along with an explanation if not):

1. Protections for human subjects: Justification for the involvement of human subjects will be evaluated according to the following review criteria: a) risk to subjects, b) adequacy of protection against risks, c) potential benefits to subjects and others, d) importance of the knowledge to be gained, and e) data and safety monitoring for clinical trials. Furthermore, is a Targeted/Planned Enrollment Table format page included?

2. Inclusion of women, minorities, and children: If the proposed project involves the use of human subjects, are minorities and members of both genders, as well as children, eligible for participation? If not, are there justifications for their exclusion?

3. Vertebrate animals: Justification for the involvement of vertebrate animals will be evaluated according to the following review criteria: a) proposed use of the animals with species, strains, ages, sex, and numbers explained; b) adequacy of veterinary care; c) procedures for limiting discomfort, distress, pain, and injury to that which is unavoidable in the conduct of scientifically sound research including the use of analgesic, anesthetic, and tranquilizing drugs and/or comfortable restraining devices; and d) methods of euthanasia. Additionally, how will the DRPP faculty's institute provide the appropriate oversight?

4. Chemical hazards and biohazards: If the proposed research involves the use of biohazards, chemicals or procedures that are potentially hazardous to research personnel and/or the environment, are adequate protections proposed?

5. Budget: Is the proposed budget reasonable and well justified? Does the PI meet the NIH requirement of 0.50% FTE devoted to research and research-related activities? Are sufficient funds available in the grant to provide for all other expenses required to complete the proposed research? Unless well justified, an equipment request should not constitute the major portion of the budget.

6. Data Management and Sharing Plan: Is the approach appropriate for the proposed research?

Specific Aim 3. Supervise programmatic details of an awarded DRPP.

This section details all aspects related to administering, expectations, and oversight of an awarded DRPP. If an investigator vacates a DRPP or is terminated, we will first examine if a meritorious but unfunded proposal can now be funded from the previous call for grants (as was done from original '20 search). If not, then a call for proposals will be made to the entire PUI network and the process above will be repeated (as was done in '22).

3.a. Budget and funding period. Typical research projects at the PUIs total up to \$45K/yr. Funding is available to support ~22 PUI research projects. Currently, we fund 22 research projects, although not all of these projects are at the level of \$45K/yr. The DRPP funding period is two years, and the awards are renewable. The SEC and EAC will conduct annual reviews of progress made by the awardees (discussed in more detail below).

3.b. Expectations for faculty participating in the DRPP. In accordance with the goals of the DRPP program to integrate and further biomedical research across the state and to create a pipeline of talented and experienced students to launch successful careers in biomedical research or the health professions, we will hold certain expectations for recipients of DRPP awards. These expectations will be monitored and objectively evaluated according to the following criteria. DRPP-funded faculty are expected to: **a)** Develop and maintain a research program that is appropriate to his/her research interests, and in alignment with the scientific themes. The research program should also be such that students can become readily involved; **b)** Establish and maintain contact with a PI at one of the RIs who has agreed to serve as a mentor (described in more detail below). The nature of these interactions will vary depending on individual circumstances; **c)** Honor their commitment to

conduct research during the academic year and summer months; **d)** Demonstrate scholarship through research productivity. Initial measures of research productivity include research presentations at the annual NE-INBRE conference and Nebraska Academy of Science Meetings. Faculty are also expected to deliver research presentations at regional/national meetings. The culmination of successful results from research activity in the biomedical sciences results in publication of data in peer-reviewed scientific journals. Therefore, participating faculty members are expected to submit and publish the results of their research in peer-reviewed journals; **e)** Compete for extramural funds. There are numerous opportunities available to obtain additional funding, such as AREA (R15) and R21 grants from NIH; Research in Undergraduate Institutions and CAREER grants from NSF; and funds from charitable organizations; **f)** Provide information concerning progress and activities to their campus EC member and the AC in a timely manner; and **g)** Help contribute to the success of undergraduate research and the NE-Scholars Program. The contributions of all students, providing they are merited, are expected to be reflected by inclusion in presentations and as co-authors on publications.

3.c. Mentoring plan for DRPP faculty. Mentoring of PUI faculty through the DRPP program has multiple integrated and cohesive components that include PUI and RI faculty members as well as resources to find funding opportunities and enhance grant writing.

PUI mentorship: We continue to support senior faculty at the PUIs (i.e., SEC) so they can serve as mentors for the junior NE-INBRE faculty. Their roles are to facilitate the attainment of individual career goals, provide advice related to professional development within the context of the unique PUI expectations for teaching, service and research, provide advice on maintaining appropriate work-life balance, job satisfaction, and document mentoring accomplishments in preparation for career advancement. In addition to SEC faculty, there is an expectation of peer mentoring led by the PUI representative on the EC. The required journal clubs, laboratory meetings, and research activities provide venues where peers can mentor each other within the context of NE-INBRE expectations.

RI mentorship: Another important component of the mentoring plan is the RI mentor. DRPP faculty are required to maintain regular communication with their RI mentors. Furthermore, mentors are expected to provide career guidance related to scientific aspects of the faculty member, such as help with the development and refinement of research proposals, assistance in the development of peer-reviewed publications, and participation in professional activities available at the national level in areas that the mentor and mentee share in common. **Identification of a RI mentor:** Each investigator who submits a DRPP proposal must identify a mentor on a RI campus (preferably within Nebraska). We find it helpful to note that the UNMC Vice-Chancellor of Research (VCR; Dr. Bayles) has purchased a collaborative search tool from Elsevier called Research Nebraska. Users provide research topics into the database in order to search for investigators with publications in the area, also providing metrics. In addition, networking at regional/national meetings can be used as a tool to locate potential mentors. **Formalizing the RI mentor-mentee relationship:** At the beginning of the award, mentors will visit the PUI campuses to present research seminars and hold face-to-face meetings with their mentees; travel funding will be provided by the AC. During this time, the RI mentor and PUI DRPP faculty member will establish an individualized development plan (2 pages), which will be submitted to the SEC for review. The individualized development plan will include the following: **1)** self-assessment (identify strengths and weaknesses; proficiency of your skills); **2)** career development plan; **3)** short and long-term goals; and **4)** implementation plan. The mentor-mentee will review the plan semi-annually and revise/modify as necessary. Each DRPP recipient will submit an Annual Progress Report to his/her mentor as well as to the SEC. Mentors will provide written feedback to the SEC on an annual basis as part of the annual review.

DEI mentorship: DRPP (and our summer RI) faculty are required to attend DEI knowledge and skill training programs as discussed in the PEDP.

Funding and mentoring grantsmanship: Similar to Research Nebraska, the VCR hosts Funding Institutional, an extensive resource to seek potential awards and search request for applications, covering nearly all agencies. Additionally, the NE-INBRE helps support a biennial grant-writing workshop at Creighton University that is open to all NE-INBRE PUI faculty (15 attended '22 meeting). The all-day workshop is entitled "WRITE WINNING GRANTS SEMINAR" by Grant Writers' Seminars & Workshops. The workshop comprehensively addresses both practical and conceptual aspects of writing competitive grant proposals and is appropriate for faculty and postdocs who have had some exposure to writing grants. Each presentation is tailored to meet the needs of the audience. For example, to focus on the funding agency or agencies (federal, private, and/or industry) that is/are of greatest interest to the attendees.

3.d. Monitoring of progress and compliance. Each year DRPP faculty will submit a progress report to the SEC demonstrating their progress towards the expected criteria mentioned above. We have developed a DRPP progress report evaluation sheet to rate each of the following subcategories as satisfactory, probation, or removal: 1) Research progress: summarize the specific scientific findings and advances made related to the work on this project, 2) Student training: list all students working in your laboratory and a brief description of their research, 3) Publications: submitted and published, 4) Presentations: number of faculty and student/Scholar presentations, 5) Funding: submitted and awarded, and 6) Mentorship plan: activities achieved. There is room for specific comments and all sheets will be returned to the faculty. Additionally, the SEC will have feedback from the RI mentor that will be considered during the evaluation process. DRPP faculty will be expected to make progress towards their specific aims; submit at least one research manuscript for peer-review publication by the end of year 2; present their research at a local/regional/national meeting at least once a year; provide students opportunities for meaningful research experiences and to present their findings; apply for independent research funding by the end of year 2; and maintain communication with their RI mentor.

After year 1, all SEC reviews will be provided to the EAC. The NIH has clearly indicated that an investigator may be placed on probation or considered for removal from the NE-INBRE program if review by the SEC and EAC indicates failure to make significant progress toward achieving the specific aims of his/her project and/or achieving the objectives of the NE-INBRE program to provide research experiences to undergraduate students. Faculty who are not making adequate progress will be counseled by PD/PI Dr. Sorgen, reminded of the expectations, and encouraged to focus on their funded research projects. If a DRPP faculty member is going to renew her/his application, a progress report for years 1 and 2 will need to be submitted with the application.

Bi-annually (spring and fall), PD/PI Dr. Sorgen and PUI-PC Dr. Soukup will visit each PUI campus to conduct in-depth interviews with both first- and second-year NE-INBRE Scholars, SC/EC/SEC/DRPP faculty members, and other campus administrators. Discussions with EC and SEC faculty include progress of each DRPP faculty member. Discussions with DRPP faculty include results of the annual reviews (research progress in terms of publications, presentations, and grant proposals), counseling as necessary concerning progress toward meeting expectations, and any concerns over mentoring and administrative issues. Interactions with administrators (SC) are related to ensuring required release time, course loads, and research activities. In particular, during these discussions, needs for new instrumentation to advance research capacity on each PUI campus may be identified. Finally, the NE-INBRE Scholars (most work in DRPP funded labs) orally present their data at the Nebraska Academy of Sciences meeting each April and DRPP faculty and 2nd year Scholars present their data in the form of posters at the NE-INBRE Annual Conference every August. These are additional opportunities to evaluate the quality and progress of DRPP awarded labs.

3.e. Compliance with federal regulations. PUIs are required to adhere to the same federal guidelines as the lead institution and the PD/PI monitors compliance with these guidelines as well as Sponsored Programs and Accounting at UNMC. The PD/PI regularly reviews compliance concerns with the appropriate officials during the twice-yearly visits to each PUI campus. Our subcontracts clearly state that compliance with federal policies and guidelines is a condition for receipt of funding.

Receipt of overlapping research funding: As indicated in the FOA, receipt of a major grant award to a PUI faculty member will be viewed as a milestone and criterion for changing the status of an investigator from “mentored support” to an independent investigator. Investigators who have acquired independent status will continue to be included in NE-INBRE activities and play key roles as mentors. These investigators will be provided access to Multi-user Core Facilities and encouraged to participate in collaborative research efforts. However, consistent with this NIH FOA, NE-INBRE support will not be provided to an investigator who receives a new award if this award overlaps with the NE-INBRE application.

Specific Aim 4. Assess success of the DRPP program in the previous grant cycle.

In response to our '19 FOA, the AC received 32 proposals and 22 were funded, with all but one related to our scientific themes. NE-INBRE funds for individual research projects have been instrumental in recruiting 13 new faculty members to our PUIs. Productivity measures include 110 publications in peer-reviewed journals; 771 presentations at national/international meetings; 148 proposals submitted for internal/external funding; and 96 funded proposals for a total of \$23M received by PUI faculty. In addition, promotion/tenure has been received by 9 PUI faculty members. In response to the evaluation report from DMD consulting (retired '23) and Dr. Spagnol (current Evaluation Coordinator): 95% of our DRPP faculty submitted an external grant proposal and presented at a regional professional meeting (both requirements); 94% agree that “INBRE contributes to the interest and excitement about research as well as contributes to the research culture on my campus,” and 90% attribute NE-INBRE to helping develop/enhance their professional career.