

Radon Reminders from Your Pocket: Improving Radon Testing through the Radon Smartphone Application

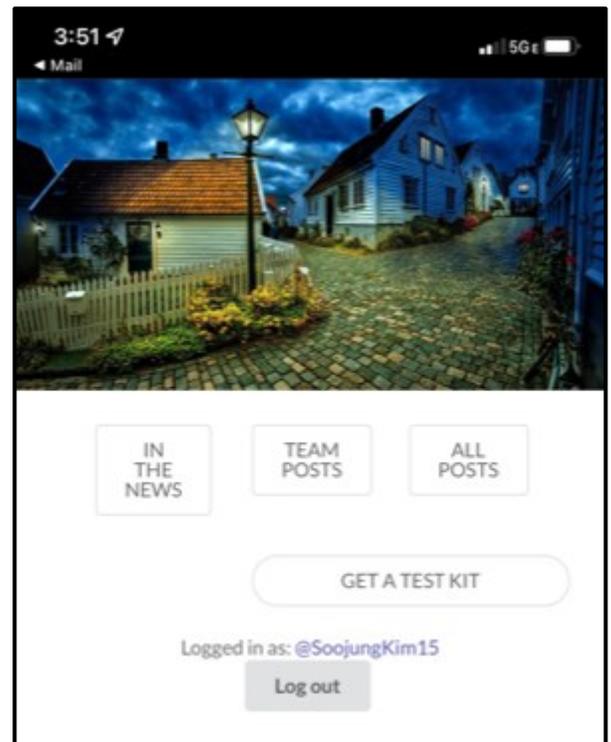


Soojung Kim, Ph.D., M.P.H, associate professor in the UND Department of Communication and DaCCoTA awardee, was recently awarded a research grant from the Prevent Cancer Foundation as a co-investigator. She submitted the grant alongside the PI, Dr. Schwartz, Ph.D., M.P.H, Ph.D., professor and chair of the Department of Population Health and director of the Biostatistics, Epidemiology, and Research Design Core for DaCCoTA. The award amount is \$100,000 for a second-generation clinical trial of a radon app for smartphones to promote radon testing, titled *“Testing Radon communication methods: A clinical trial of smartphone app vs print brochures”*.

Dr. Kim’s research focuses on the strategic use of social and mobile media. One of her interests is increasing the awareness of public health issues and changing health behaviors by using effective social and mobile media strategies.

Dr. Kim became interested in radon while pursuing her MPH. She began talking to Dr. Schwartz after he shared some of his stories on radon research during one of the MPH courses. He explained how radon mitigation was not so much a public health problem but a communication one: how to motivate people to actually test and remediate their houses for radon. ***“I became fascinated by this topic because that’s where my passion lies, at the interaction between public health and communication. I thought I could make a significant contribution to this public health issue,”*** explains Dr. Kim.

Radon gas is a natural source of ionizing radiation that results from radioactive decay in soils and rocks. It is the largest cause of lung cancer after smoking and causes thousands of deaths a year in the US. It can be easily detected in homes using commercial tests and remediation can substantially reduce the levels of radon. Despite this, public knowledge on radon hazards is low and it remains difficult to engage the public. ***“It’s hard to get people to pay attention to a tasteless, colorless, odorless gas that will kill you from lung cancer in 30 years,”*** says Dr. Schwartz.



Screenshot of radon app in action

To improve public knowledge on radon, Dr. Kim has been working on developing a radon app. Using the early career award supported by the UND, she developed a beta version of the radon app and performed a pilot intervention study. Following that—in collaboration with Dr. Schwartz, Dr. Marilyn Klug (Ph.D., UND), and Dr. David Schmitz (MD, UND)—she was awarded a DaCCoTA Feasibility Pilot Project to improve the functionality of the app and run randomized clinical trial research. Her Prevent Cancer Foundation Grant will expand the clinical trial scope from college students to the general homeowner population.

So far, she's found that the smartphone app significantly increased radon knowledge, self-efficacy, and response efficacy. Students were also able to order a free radon test. The results were published in *BMC Public Health* under the title "*Communication radon risk via a smartphone app: a pilot intervention study*".

These results provide promising methods for engaging the public on a hard-to-detect but preventable lung cancer risk factor. This is especially relevant in North Dakota, which has the highest indoor radon level in the nation.

The future of her research is to improve the use of the radon app to motivate people to follow through with testing their homes. "*The question is, how can we promote this radon app when there are no monetary incentives and it's not within a highly controlled clinical trial setting. We want to understand how we can promote this radon app among individuals so that it is widely used,*" concluded Dr. Kim.

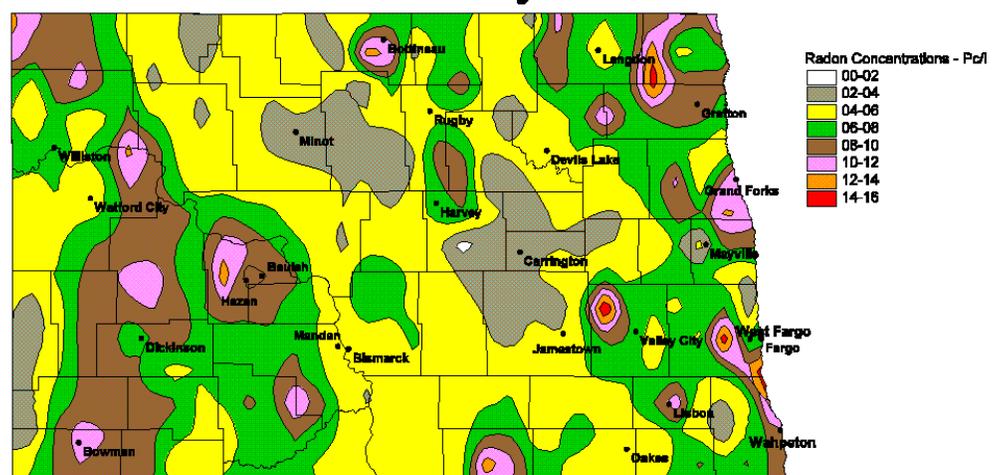
Dr. Kim would like to acknowledge Dr. Schwartz for his support and mentorship. She would also like to thank UND for being extremely supportive of her collaborative research endeavor. Finally, she would like to thank all the undergraduate students who've taken part in the clinical trials over the years. Her team would not have been able to continue work at this rate without them.

The radon app can be accessed at the following location: <https://linktr.ee/undradon>.

Residential radon levels across North Dakota, as measured by the ND State Department of Health and the EPA. The EPA recommends remediation for levels about 4.0 pCi/L. Over half the homes survey had levels above 4.0 pCi/L.

More information on the radon home survey can be found at: <https://web.archive.org/web/20150419130329/http://www.ndhealth.gov/qa/iaq/radon/Home88.htm>

Radon Home Survey - 1988



Exploration of Exosomal Collective Attributes for Cancer Screening and Treatment



Dr. Dali Sun, a biomedical faculty in the Department of Electrical and Computer Engineering at North Dakota State University, researches the development and application of novel diagnostic biosensing schemes for cancer. His overarching goal is to improve cancer outcomes by developing accurate diagnosis methods and implementing these methods into clinical practice. He has invested in hands-on training experience in various engineering techniques (bioengineering, optical, electrical, electrochemical, biochemical, and mechanical) to understand their pros and cons, as well as their potential applications. This has allowed him to solve many practical clinical problems with novel integrated solutions that take advantage of different techniques. Most of his research topics have been inspired and generated by such cross-disciplinary explorations.

With a 5-year survival rate of less than 5%, pancreatic ductal adenocarcinoma (PDAC) is a devastating disease with little prognosis change over the past 25 years. None of the available biomarkers possess a sufficiently high accuracy to be implemented for screening, even in high-risk patients. Therefore, there is a pressing need for the development of noninvasive but highly discriminatory methods for the detection of PDAC. Exosomes secreted by tumor cells actively participate in tumor progression and metastasis and contain multiple biomolecules that reflect the status of their parental tumor cells. Although the biogenesis is still not clear, exosomes released into circulation are under intensive study mostly for their pivotal clinical potential for noninvasive detection. Most of these studies focused on exosomal single protein/RNA/DNA, or molecular signatures based on multiplex assays. To date, none of the candidate markers have been validated as adequate for clinical prognosis or diagnosis, which underlies the problem in current exosomal marker discovery approaches.

Dr. Sun has been studying the collective attribute of exosomes by scrutinizing the secondary structure of the exosomal proteins. Through multiple experimental methods such as Circular dichroism, Fourier transform infrared spectroscopy, fluorescence staining, and bioinformatics, his results have strongly suggested that the tumor cell secretes more β -sheet rich proteins through exosomes than the normal cell. To translate these findings into a clinical cancer screening assay and validate the efficacy in a comprehensive clinical cohort, his team developed a fast screening method combining immunoprecipitation and fluorescence staining. They have termed this method **EvIPThT**.

EvIPThT is time-saving (1.5hr), simple to operate, has low sample consumption (200 μ L serum), and has full automation compatibility. Those attributes make **EvIPThT** an ideal translational method to fill the gap between detection technology and clinical practice. The team tested the method in a pilot cohort study and the result are promising: the assay has enough power to differentiate between cancer cases and healthy controls. Furthermore, the readout of the assay showed no relevance to the most popular markers currently in use (ex. CEA and CA19-9), highlighting a complementary diagnostic method.

The results of this study were published in the high-impact journal ACS Sensors as the cover article under the title “ *β -Sheet Richness of the Circulating Tumor-Derived Extracellular Vesicles for Noninvasive Pancreatic Cancer Screening*”. It won the top 10 readership the first month published, indicating the impactful nature of the research.

Inspired by the exosomal study, Dr. Sun’s research, “*Exosomal Contents Guided Amino Acids Treatment for Pancreatic Cancer*”, was recently awarded by NIH (1R21CA270748), as a game-changer solving cancer treatment dilemma under the R21 grant mechanism. R21 grants are intended to encourage exploratory and developmental research by providing support for the early and conceptual stages of project development. The award amount is \$169,469 for a project that will run until January 2024. Through this grant, Dr. Sun’s team will further explore the exosomal attributes for potential therapeutic and diagnostic applications.

Dr. Sun would like to acknowledge DaCCoTA for supporting his research, providing valuable help, and offering useful suggestions. Individuals include Dr. William G. Mayhan, Dr. Colin Combs, Dr. Mark Williamson, Christian Buresh, Tabatha Lemke, and Miranda Ruitter. Dr. Sun also appreciates the other team members who’ve worked hard on this project: Dr. Wenjie Xia from Civil, Construction, and Environmental Engineering (North Dakota State University); Dr. Sijo Mathew and Dr. Ang Guo from the School of Pharmacy (North Dakota State University); as well as Dr. Preston Steen (Sanford Roger Maris Cancer Center) and Dr. Pankaj Singh (University of Nebraska Medical Center) who served as mentors for this project.



Core Component Highlight: Professional Development Core

The Professional Development Core seeks to build an integrated program of education and career development focused on:



- Developing early-stage investigators that will understand how to work in interdisciplinary teams and maintain long-lasting collaborations with clinical and basic scientists
- Providing training for practicing community clinicians so they can then become effective collaborators in research projects
- Providing scholars with professional development activities that will aid them in becoming competitive for extramural funding and building them into the next generation of mentors
- Providing mentors with training in communication, expectations, independence, team science, and inclusiveness

Funding Mechanisms:

- **DaCCoTA Basic Scholars Program:** provides support for up to 5 years to stimulate the development of new clinical and translational research investigators. Awardees are expected to address basic health-related clinical and translational research that affects populations in North and South Dakota.
- **DaCCoTA Community Engagement Scholars Program:** provides support for up to 5 years to stimulate the development of new clinical and translational research investigators. Awardees are expected to address community-based and health-related clinical and translational research that affects populations in North and South Dakota.
- **Clinical Research Opportunities Program:** provides 20% release time to community-practicing, hospital-based clinicians to allow for participation in training activities and collaboration in cancer-focused clinical translational research. The goal of the program is to begin to shift translational research in the Upper Midwest to an enterprise informed by the patient.

Current Initiatives:

- Intellectual Property information session, featuring NIH personnel
- Mock Peer Review covering successfully funded NIH R21 applications
- Spring 2022 RFAs
 - DaCCoTA Basic Scholars Program
 - DaCCoTA Community Engagement Scholars Program
 - Clinical Research Opportunities Program

“The Professional Development Core guides researchers to self-efficacy through engagement, encouragement, and empowerment.”

-Dr. Lee Baugh, Core Director

Recent Training Resources

Statistical Training Resources (<https://med.und.edu/daccota/berdc-resources.html>)

Making Time for Longitudinal Data
BERDC Special Topics Talk 10
Dr. Mark Williamson
Biostatistics, Epidemiology, and Research Design Core

Frontiers of Statistics
BERDC Special Topics Talk 11
Dr. Mark Williamson
Biostatistics, Epidemiology, and Research Design Core

Running the Statistical Gauntlet in SPSS
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Dr. Mark Williamson
Biostatistics, Epidemiology, and Research Design Core
DaCCoTA, University of North Dakota

Bite-sized Statistics
Lesson 5:
Two-sample
T-tests

**Neat Tricks & Clever Quips 5:
Searching Scientific Sources**

**Beautiful Demos Five: Multiple
Linear Regression Made Elegant**

Call for Applications

The goal of the Dakota Cancer Collaborative on Translational Activity (DaCCoTA) is to stimulate the growth of expertise and engagement in health-related clinical and translational research (CTR) in the Dakota region.

The **Professional Development Core** (PDC) is currently seeking proposals for the following funding mechanisms:

1) DaCCoTA Scholars Program - The purpose of this award is to stimulate the development of new CTR investigators. Awardees will receive salary support (50% FTE plus fringe) that guarantees a minimum of 50% protected research time for the project and up to \$160,000 in annual research support for up to 5 years. The DaCCoTA will provide the first three years of funding, and the final two years will be funded by the applicant's home institution (contingent on adequate progress). The DaCCoTA Scholars Program offers both a basic and community engagement track and early career faculty are encouraged to apply.

2) Clinical Research Opportunities Program - This program provides 20% release time (up to NIH cap) to community-practicing, hospital-based clinicians to allow for participation in training activities and collaboration in disease-focused CTR. The goal of the program is to begin to shift translational research in the Upper Midwest to an enterprise informed by the patient. It is not intended that supported individuals will become full-time, independent investigators with funding for their research projects. However, it is expected that providing an understanding of CTR and tools for identifying unmet medical needs will allow trained clinicians to become effective collaborators. Individuals may collaborate with both clinical and non-clinical scientists to help identify unmet clinical needs that can become the focus of translational research efforts.

Applications for each program can consider the multilevel manifestations of disease (e.g. neurological, psychiatric), demographic risks, and social impact. Applications should focus on **T2-T4** translational research, although T1 studies will be considered if there is a clear plan to progress to T2-T4.

Letters of intent are due **March 15, 2022**. Full applications will be invited from selected applicants and will be **due May 16, 2022**. The full RFAs are available at the Professional Development Core website (<https://med.und.edu/daccota/professional-development-core.html>).

Call for Applications cont.

The goal of the American Indian Collaborative Research Network (AICoRN), a practice-based research network, is to foster partnerships with providers to address health needs in the region.

The **American Indian Collaborative Research Network (AICoRN)** is currently seeking proposals for the following funding mechanisms:

AICoRN Community Engagement Pilot Grant: These \$80,000 pilot awards are designed to provide seed funding to support activities related to the development of new or emerging partnerships with underserved, Tribal and rural populations or to perform pilot studies that will strengthen community-based relationships, relationship-based care, and potentially produce preliminary data for future competitive grant applications. Eligible applicants should be named partners in AICoRN. Current partners include the UND Centers for Family Medicine in Bismarck and Minot, Monument Health, Oyate Health Center, Community Health Association of the Dakotas (CHAD), ND Department of Health, UND Department of Indigenous Health, the Great Plains Tribal Leaders' Health Board, among others. Interdisciplinary or transdisciplinary research that includes collaborations across a range of disciplines including but not limited to medicine, mental health, psychology, nursing, physical and occupational therapy, and social work to address research from a multidisciplinary perspective. Preclinical, translational, and clinical research investigations will involve a *clinician and non-clinician team* ideally inclusive of rural or American Indians who share expertise, knowledge, and skills to produce a scientific collaboration.

Applications should focus on **T2-T4** translational research, although T1 studies will be considered if there is a clear plan to progress to T2-T4.

Letters of intent are due **March 15, 2022**. Full applications will be invited from selected applicants and will be **due May 16, 2022**.

Recent Events

- Virtual Informational Session, hosted by the PDC (February 2022)
- Announcement of Request for Proposals Virtual Information Session, hosted by AiCoRN and the PDC (March 2022)

Upcoming Events

- March 2022
 - **NIH R21 Mock Peer Review**, hosted by the PDC (March 28th)
- April 2022
 - **Core Training Event: Biostatistics Resource Overview**, hosted by the Biostats Core (April 27th)
 - **Intellectual Property Session for DaCCoTA awardees**, hosted by the PDC (TBD)
- May 2022
 - **Core Training: Grant Budget Preparation**, hosted by the PDC (TBD)

Annual Symposium



The American Indian Collaborative Research Network and Dakota Cancer Collaborative on Translational Activity invite healthcare providers and other stakeholders interested in research to join the conversation and participate in this year's summit and symposium.

- **Sanford Center -Sanford Health, Sioux Falls, SD**
- **Virtual Option Available**
- **Educational Opportunities**
- **Poster Sessions**
- **DaCCoTA Awardee Presentations**
- **Networking Opportunities**

Check the DaCCoTA Symposium Website for updates as additional information becomes available:

<https://med.und.edu/daccota/symposium.html>