



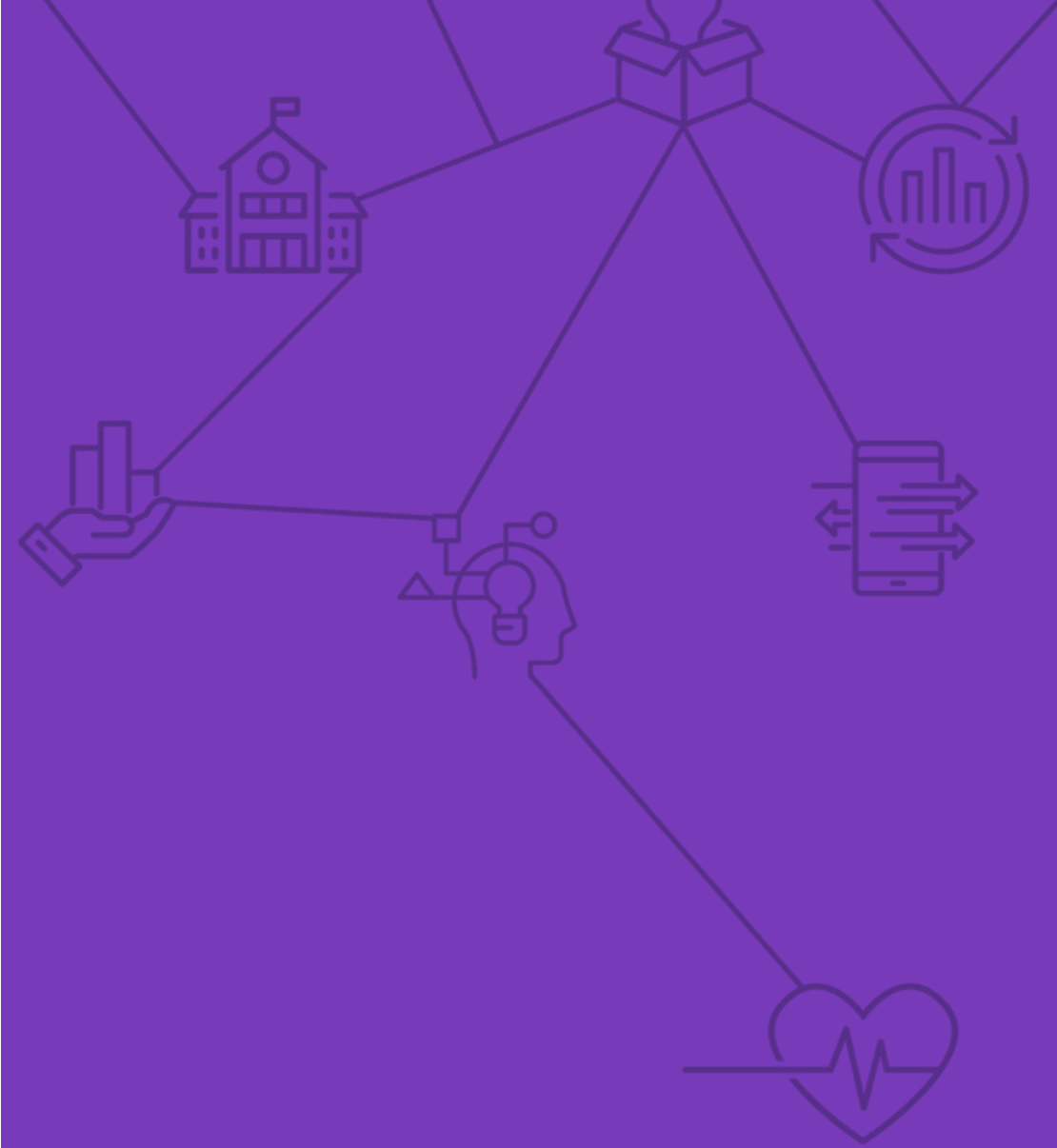
Pathway(s) to becoming a nurse scientist

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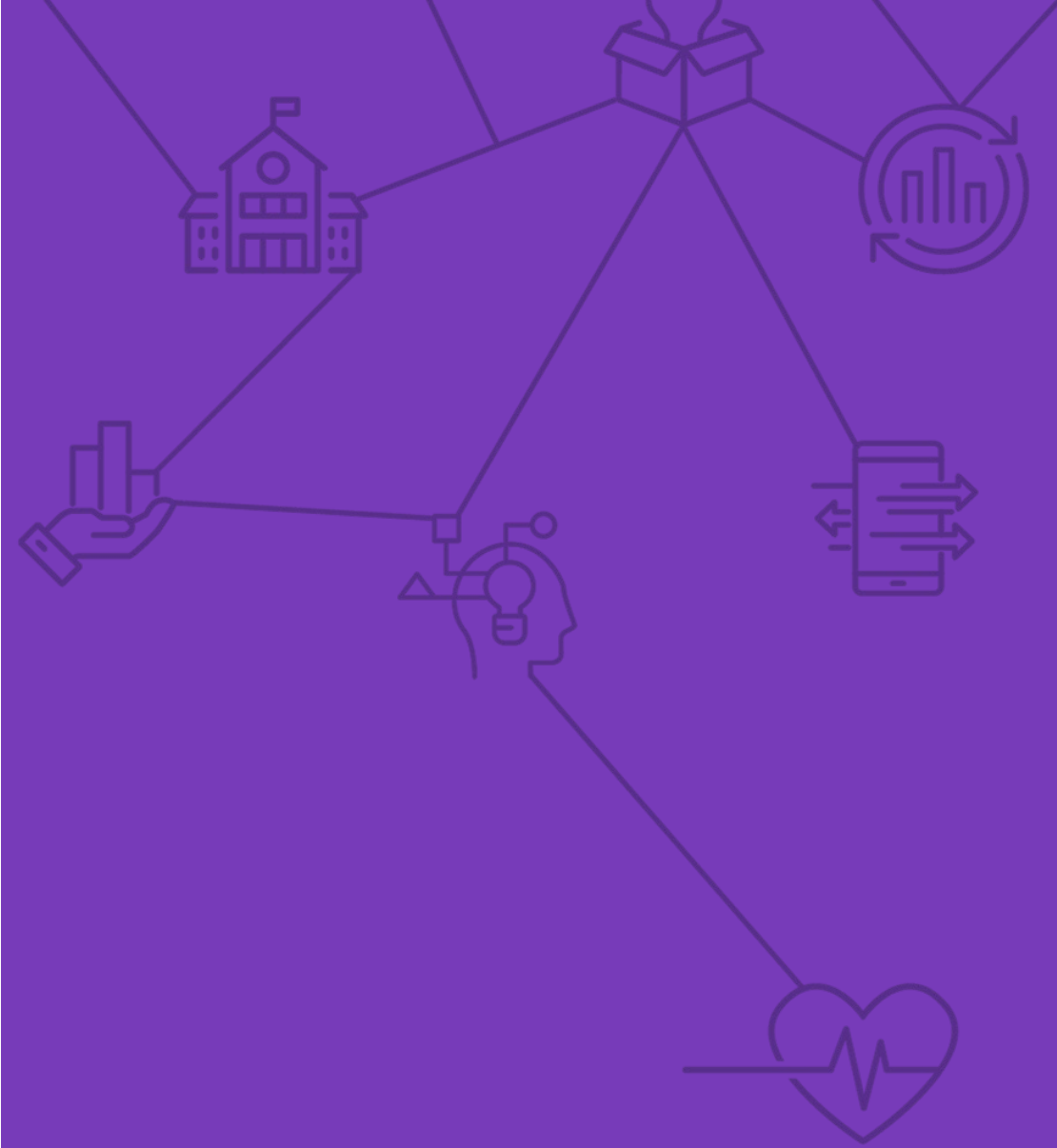
Disclosures

No relevant disclosures



Objectives

- Who is a nurse scientist?
- Brief history
- How to become a nurse scientist
- My path
- NINR Muscle Disease Unit





Nurse Scientist



“There are not two sciences. There is science, and the application of science, and these two are linked as the fruit is to the tree.”

—Louis Pasteur

“We are not the National Institutes of Basic Sciences, We have to make the case for what biomedical research has to offer the public.”

— Francis S. Collins

“Knowing is not enough, we must apply. Willing is not enough, we must do.”

— Johann Wolfgang von Goethe

Nurse Scientist

Nurse Scientists are adept at studying how individuals respond to illness or adapt to changes, using data and observations derived from nursing/clinical settings in the design and development of their basic and applied research.

- PhD-prepared licensed registered nurses who received training to conduct research
- Build the bridge from “bench to bedside and back” (translational research is bi-directional)
- Team (multidisciplinary, interdisciplinary, and transdisciplinary) scientist



Grady, 2010
PMID: 20494692



Nurse Scientist

The Nurse Scientist is a nurse with advanced preparation (PhD in nursing or related field) in research principles and methodology, who also has expert content knowledge in a specific clinical area.

The primary focus of the role is to:

- (1) provide leadership in the development, coordination and management of clinical research studies;
- (2) provide mentorship for nurses in research;
- (3) lead evaluation activities that improve outcomes for patients participating in research studies at the Clinical Center; and
- (4) contribute to the overall health sciences literature. The incumbent is expected to develop a portfolio of independent research that provides the vehicle for achieving these primary objectives.

<https://clinicalcenter.nih.gov/nursing/careers/roles.html#cns>



Nurse Scientist is a knowledge broker

Knowledge broker – connects science and society by building networks and facilitating opportunities among producers and users to share knowledge, learn from it, apply it meaningfully in research, practice, education, and policy, and to create new knowledge together.

- Forming and sustaining partnerships
- Facilitating knowledge application
- Creating new knowledge

Major strategies central to each component: establish, engage, educate, empower, and evaluate

- Boundary spanner
- Systems thinker (move across formal and informal organizational structures)
- Social entrepreneur (deliver innovative products/services)



Thompson & Barcott, 2019
PMID: 30354032



Nurse Scientist translates science into practice and policy

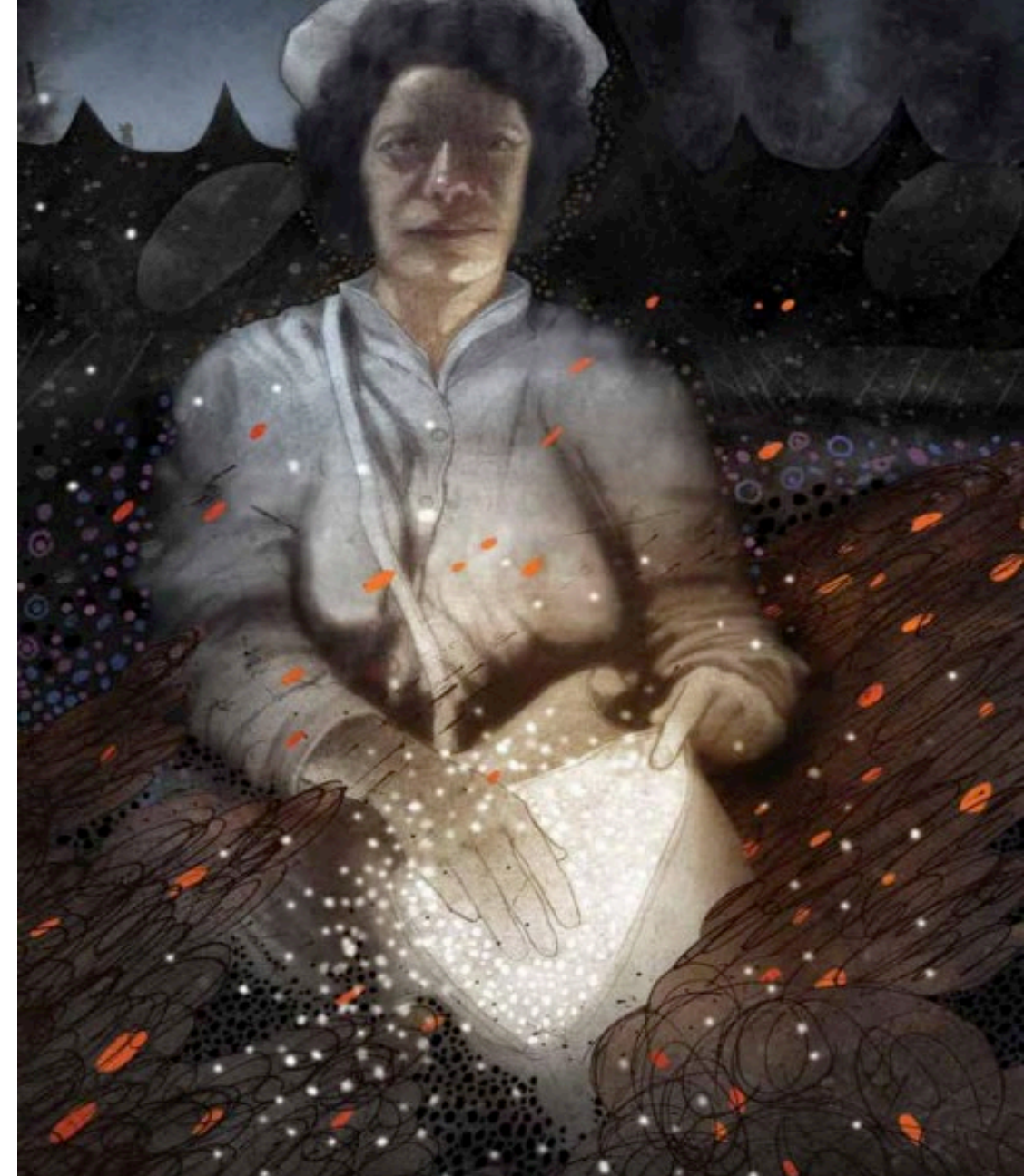
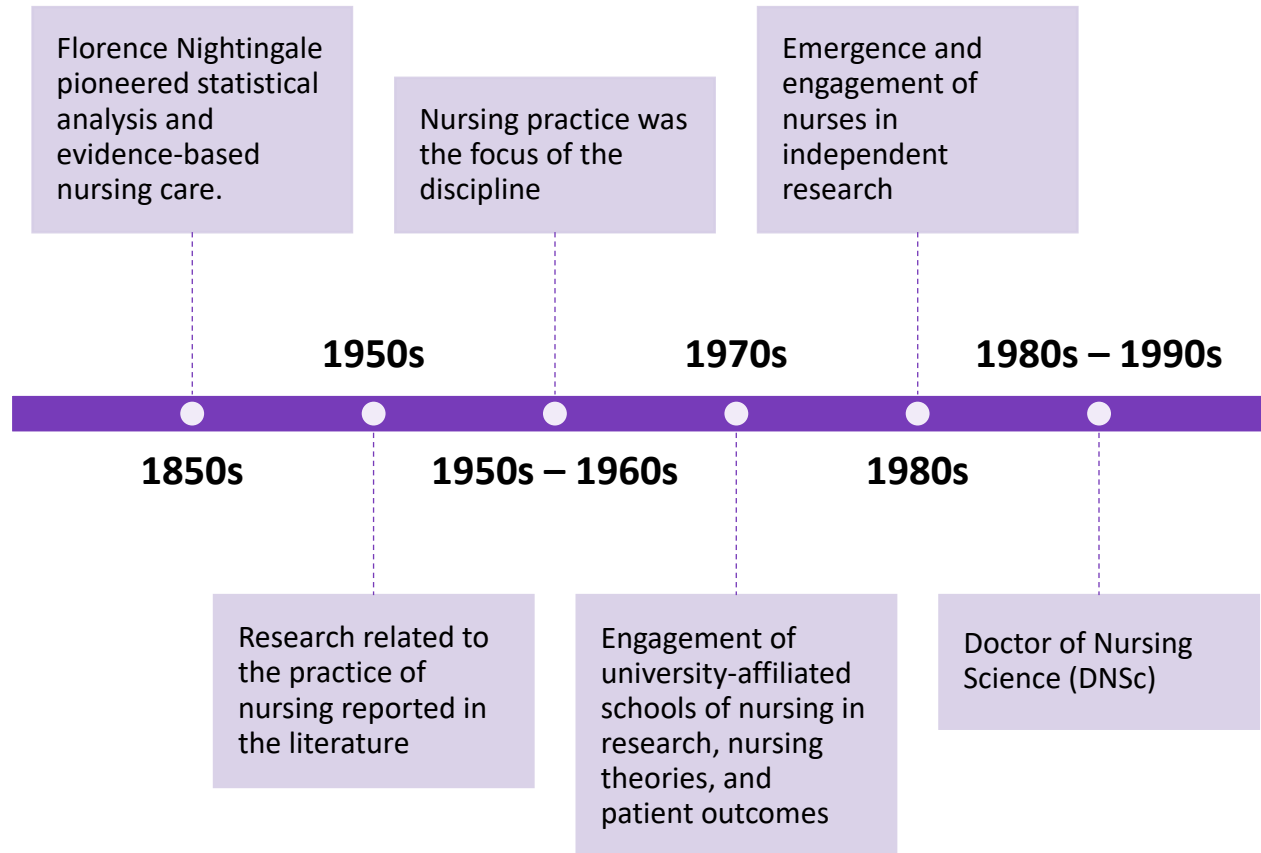
- Provides the most effective strategies to accelerate translational research (on a realistic timescale)
- Synthesizes and applies scientific knowledge within specific social, institutional, and human constructs.
- Knowledge translation versus translational medicine: incorporation of basic science innovation into new tests and treatments, versus uptake of validated tests and treatments into clinical practice.
- Knowledge includes facts (*episteme*), skills (*techne*), and practical wisdom (*phronesis*).
- Importance of tacit knowledge (knowledge which is difficult to write down or transmit) and how this is built from experience, shared across communities and linked to action in context (performative/constructivist approaches to knowledge).



Greenhalgh & Wieringa, 2011
PMID: 22179293

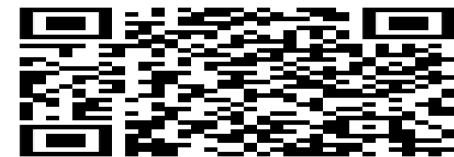


History and philosophy of (nursing) science



History and philosophy of (nursing) science

- A foundation for exploring whether scientific results are truth. Nursing science provides knowledge to describe, explain and predict outcomes which gives legitimacy to the discipline of nursing.
- Philosophical foundations of science: rationalism and empiricism
 - **Rationalism:** emphasizes the importance of *a priori* reasoning as the appropriate method for advancing knowledge. A priori reasoning utilizes deductive logic by reasoning from the cause to an effect or from a generalization to a particular instance. An example in nursing is to reason that a lack of social support (cause) will result in hospital readmission (effect).
 - **Empiricism:** the empiricist view is based on the central idea that scientific knowledge can be derived only from sensory experience (i.e., seeing, feeling, hearing facts). This approach, called the inductive method, is based on the idea that the collection of facts precedes attempts to formulate generalizations (the research-then-theory strategy). Example, formulating a differential diagnosis requires collecting the facts and then devising a list of possible theories to explain the facts.
- Nurse scientists should be familiar with the long history of science in nursing.
- Possess knowledge and skills in theoretical, methodological, and analytical approaches to conduct research.



Gale, 1979



Oncology Nurse Scientist

- Clinical practice – Research questions – Generation of new evidence

“The role of the oncology nurse scientist can be wide ranging. Traditionally, most research is developed, funded, implemented, analyzed, and disseminated through the PhD-prepared academic scientist in an institution with research capabilities and within a tenure-track position.”

[Oncol Nurs Forum](#). Author manuscript; available in PMC 2021 Jun 11.

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doi: [10.1188/19.ONF.769-774](#)

PMCID: PMC8195614

NIHMSID: NIHMS1694806

PMID: [31626617](#)

Mentorship for Nurse Scientists: Strategies for Growth From the Oncology Nursing Society Research Mentorship Task Force

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Pathway(s) to becoming a Nurse Scientist



Pathway to a career as a Nurse Scientist

BSN or other non-nursing degrees

- Other non-nursing degrees considered for advanced degree admission on an individual basis

MSN

- Not a pre-requisite for most PhD nursing programs
- Real-world clinical experience

PhD

- Research interest that matches faculty expertise
- Gain theoretical, methodological, and analytical approaches to conduct nursing research
- Demonstrate expertise in an area of study from a nursing and transdisciplinary viewpoint

Employment

- Government
- Academic nursing research
 - Funding: 1. NINR, 2. NCI, 3. NIA
- Healthcare institutions

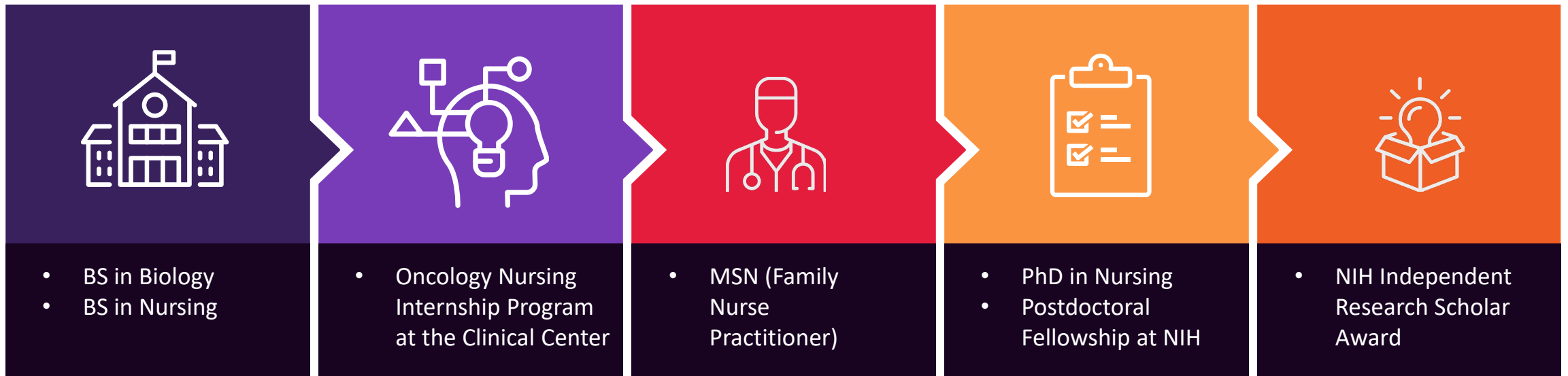
Nursing science needs you!

- Nursing faculty are now retiring at an accelerated pace including tenured nurse scientists (National League for Nursing, 2021).
- The pipeline for sustaining and replenishing senior nurse-scientist faculty is at a critical impasse during these times of the great retirement and resignation (Bourgault et al., 2022)
- The passage of the 2022 Omnibus bill reflects an increase budget commitment to nursing research (National Institute of Nursing Research [NINR], 2022a).
- Each year, thousands of nursing students are turned away because faculty positions remain vacant (American Association of Colleges of Nursing [AACN], 2022b).
- Nurse-scientist faculty with expertise in clinical areas (e.g., perinatal, cardiovascular, oncology) that align with real-world clinical health care practice are needed.



Bloch & Glasgow, 2023
PMID: 36631306

My trajectory to Nursing Science



USPHS Commissioned Corps Officer

Track

- O-2/LTJG: **Clinical Research Nurse I**
- O-3/LT: **Clinical Research Nurse II –III**
- O-4/LCDR: **Nurse Consultant** (NIH Graduate Partnerships Program and USPHS Long-term Training Program)
- O-5/CDR: **Nurse Scientist**



<https://www.usphs.gov>



Muscle Disease Unit

Functional Characterization of Genetic Variants of Uncertain Significance in Skeletal Muscle Excitation-Contraction Coupling Disorders

Unicorns, Zebras, Superheroes, Arch-villains, Mermaids.....



NCATS: Rare Diseases Are Not Rare! Challenge 2018

- Research on rare diseases leads to advances in common diseases such as cancer, heart disease, diabetes, stroke, and other major health problems.

Rare insights

Rare (orphan, neglected) diseases

- <200,000 individuals affected
- ~7000 (low prevalence) diseases
- 50% children
- 95% with no therapeutic options
- Most are genetic, have a genetic component, and are congenital
- >90% without FDA-approved Rx
- NIH
- Applicability of public health approach (primary prevention) is limited

RARE DISEASES IN AMERICA

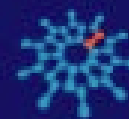
There's a 1 in 10 chance
you know someone!

People who suffer from
a rare disease often face:

- devastating medical problems
and symptoms
- difficulty getting a clear diagnosis
- limited availability of information
on their condition
- limited or no treatment options
- feeling alone or isolated



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NORD
rare diseases.org

Rare insights on health and economic inequities



Source: The IDeaS Initiative: Pilot Study to Assess the Impact of Rare Diseases on Patients and Healthcare Systems.

	Without RD	With RD
Av. Annual cost	\$5,862	\$8,812-\$140,044
Medicare/Medicaid	\$2,211	\$4,859-\$18,994

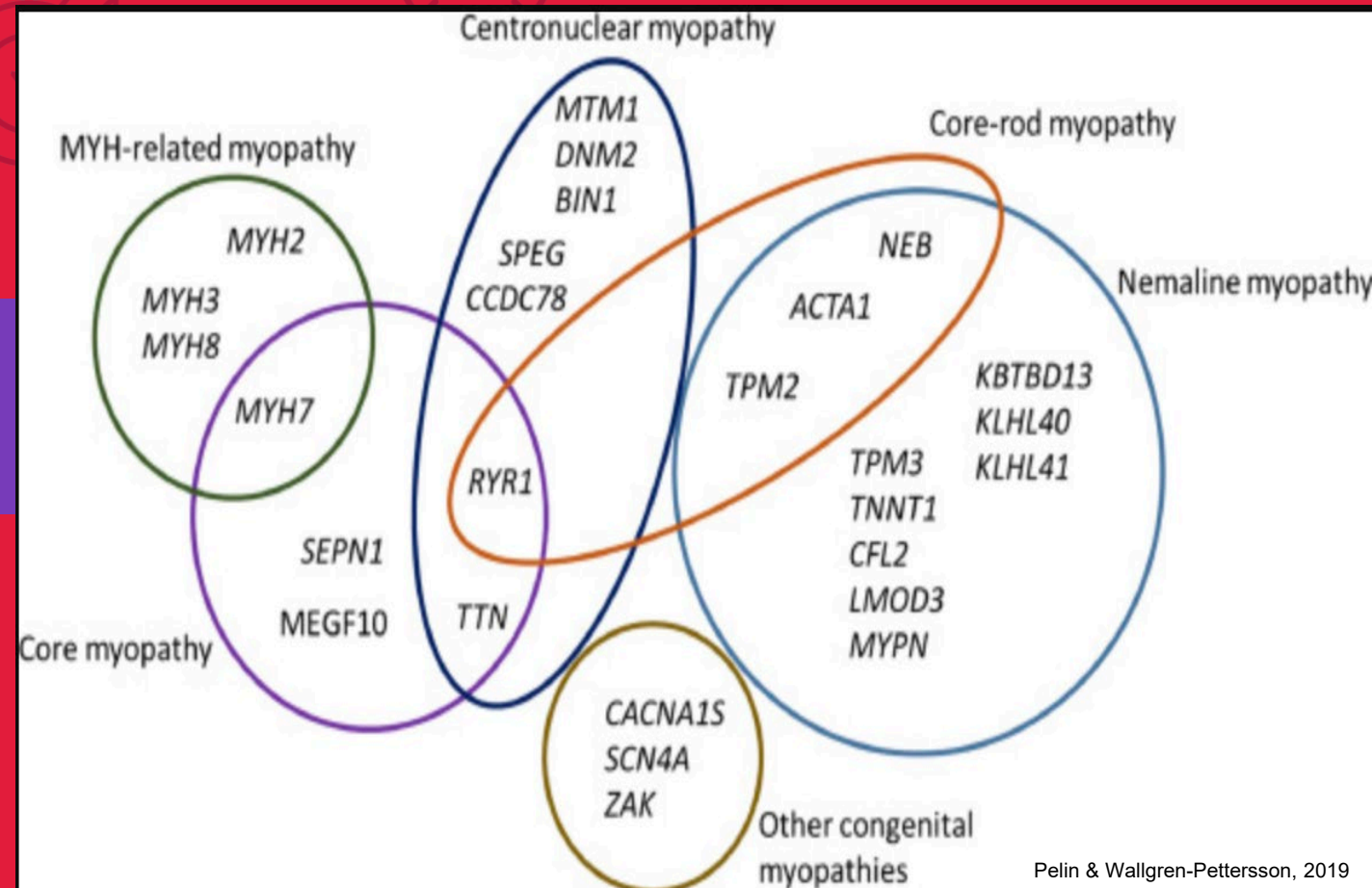
- Only 20% of RD have ICD codes
- Advances in genetic analysis can speed disease identification and reduce cost of care
- Disease-modifying treatments are desperately needed.

Common themes among rare diseases

- Difficult and delayed diagnoses
- Case definition for surveillance are usually lacking
- International Classification of Diseases (ICD) codes not assigned or poorly defined
- **Underlying molecular or physiologic mechanisms are unknown**
- Specialized or coordinated care is in short supply
- Standard of care for treatment and rehabilitation are not evidence-based
- **Longitudinal data collections are scarce**
- **Development of medications and treatments is slow to non-existent**
- Screening strategies lack efficiency
- **Scope and capacity of most registries and databases are limited**

Valdez, Ouyang, Bolen: Public Health and Rare Diseases: Oxymoron No More. 2016

Congenital Myopathies

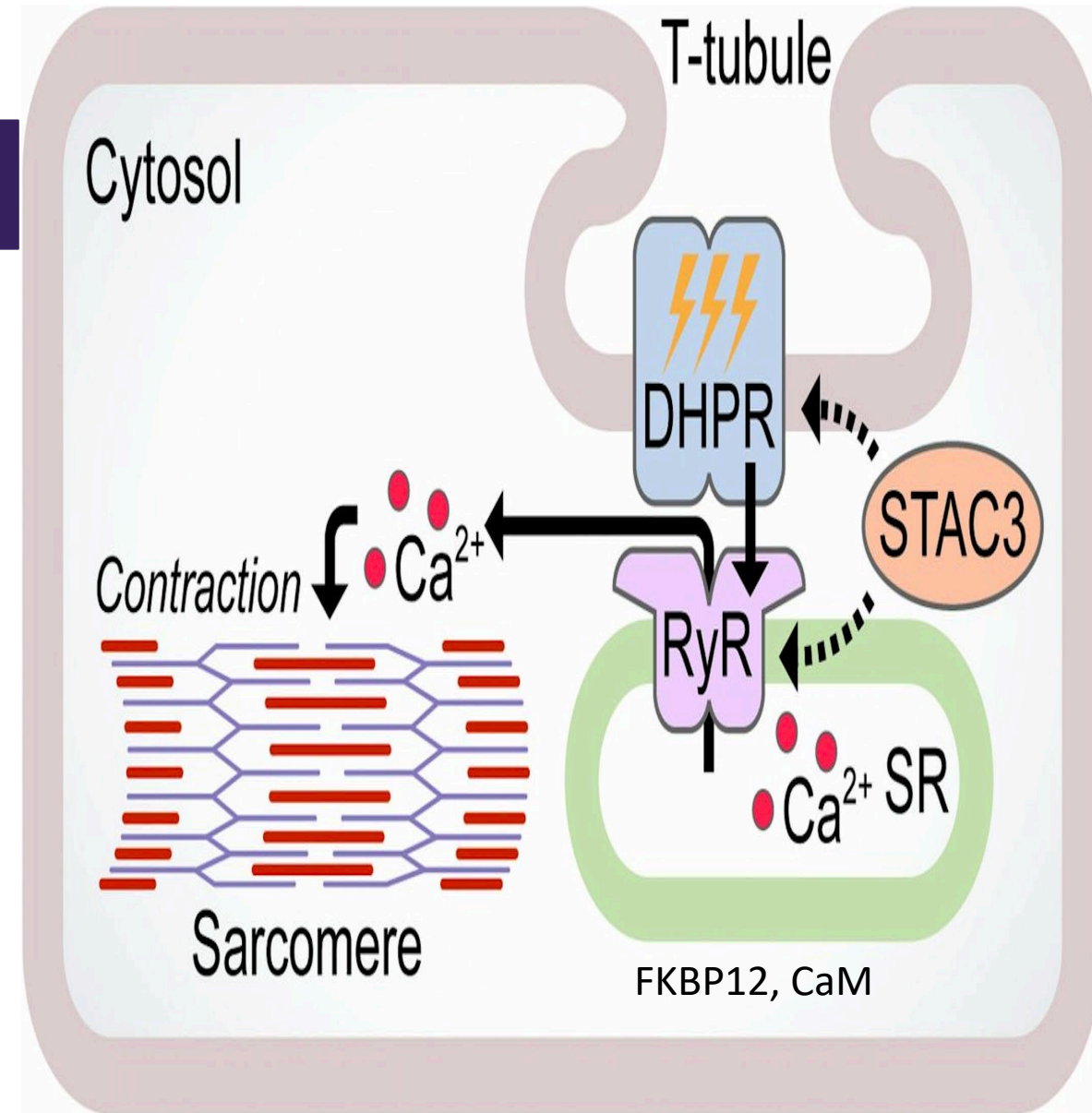


Research focus

Excitation-contraction (EC) coupling disorders

ECC

- Series of events that links electrical depolarization to muscle contraction
- Requires the function of two Ca^{2+} channels (DHPR and RyR) and other accessory proteins
- Pathogenic variations in coding genes lead to CM
- No approved treatments
- Functional characterization needed for therapeutic investigation



Research work

Preclinical

- Cell models
 - hiPSCs
 - Primary muscle cells
 - HEK-293
- Animal models
 - Zebrafish
 - Mouse

Clinical

- Phase I (Rycals)
- Phase II (NAC)
- Credentialing plan (NINR/NINDS)

Infrastructure

- *RYR1* comprehensive database

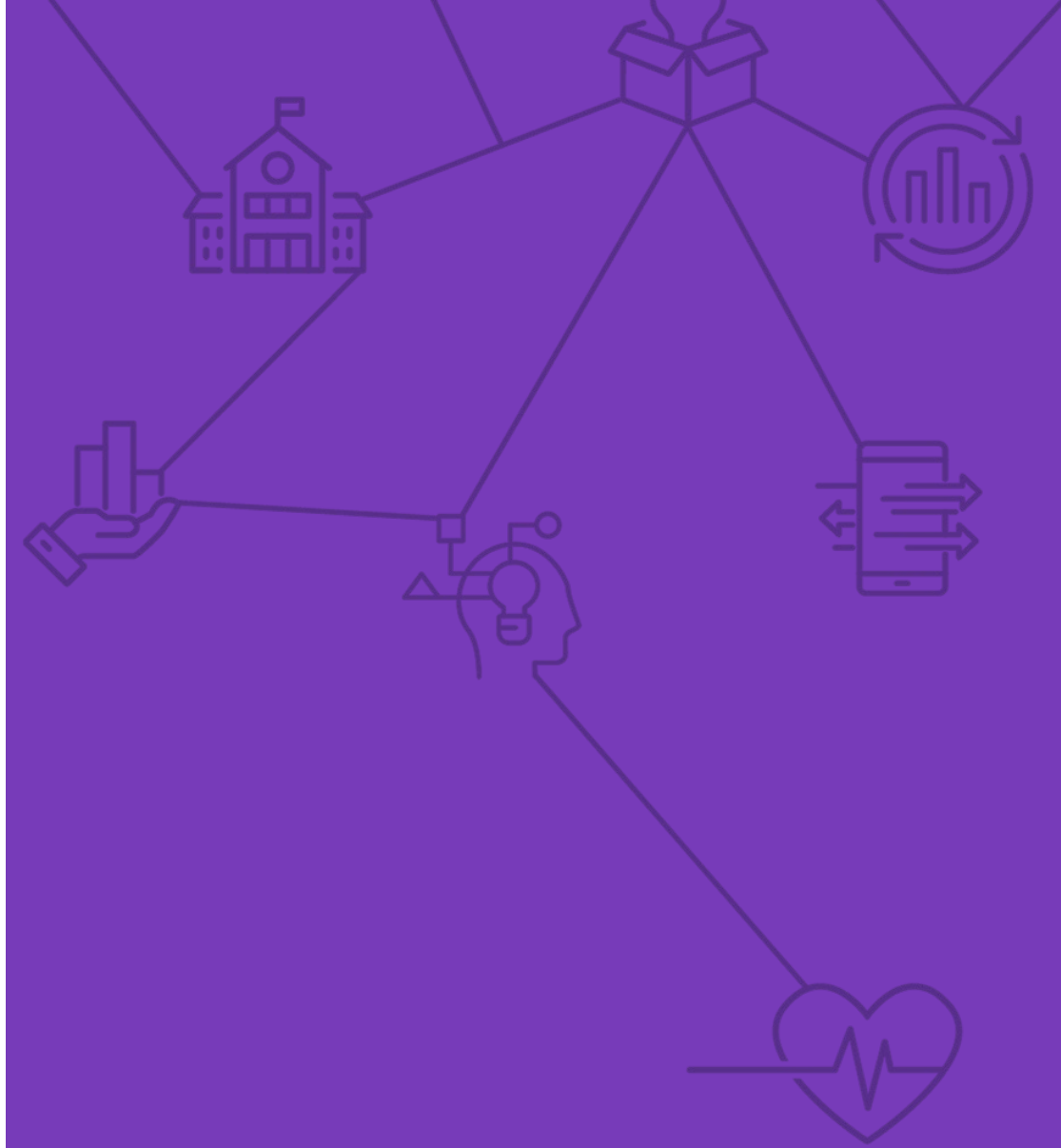
Natural History

- *RYR1* NH Protocol (completed scientific review)

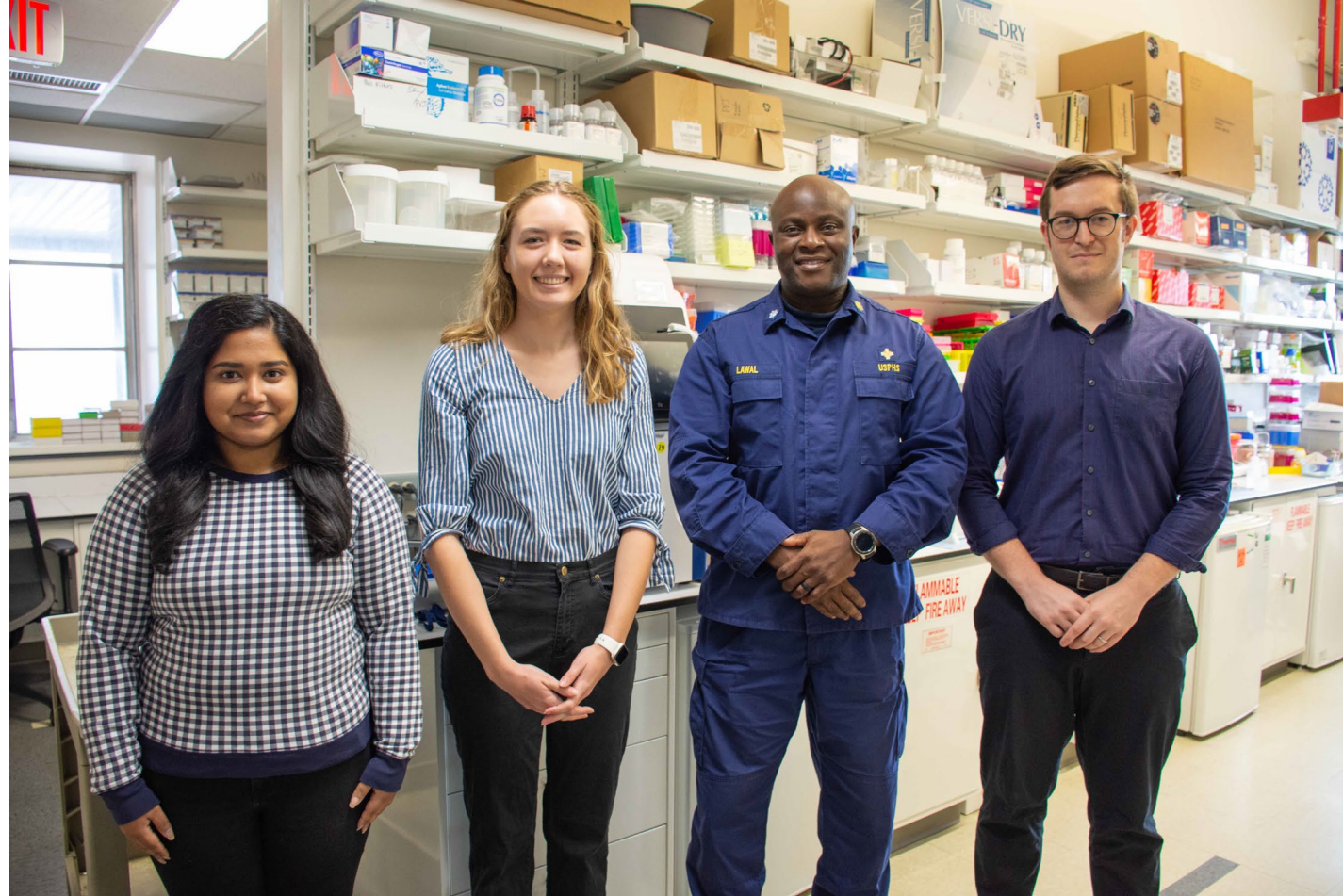
Summary

Nurse Scientists

- PhD-prepared licensed registered nurses
- Fastest track is a BSN-PhD program
- Build nursing's body of knowledge through independent research
- Knowledge brokers
- Are in short supply



NINR Muscle Disease Unit





THANK YOU!

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