


# The “Race” Toward Diversity, Inclusion, and Equity in Pathology: The Johns Hopkins Experience

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## Abstract

With 3.8% black trainees in 2012, pathology had significantly fewer trainees from groups underrepresented in medicine compared to other specialties. To address this, faculty in the Johns Hopkins Department of Pathology established an outreach program and funded rotation for students underrepresented in medicine and from disadvantaged groups. The aims were to increase exposure to the field and improve diversity, inclusion, and equity in pathology. A 1-month rotation for students underrepresented in medicine was established in 2013. Rotation schedules tailored to each rotator’s interests included resident conferences and individual faculty meetings. In 2016, a proactive outreach program was established. Faculty visited historically black medical schools and underrepresented in medicine student groups at other institutions, where they gave a “Careers in Pathology” presentation targeted to second- and third-year medical students. Faculty also attended underrepresented in medicine student conferences and participated in high school student programs to further expand the underrepresented in medicine pipeline into medicine and pathology. Since 2016, fourteen outreach presentations have been delivered. The number of rotators increased from 1 in 2013 to 18 in July 2019. Rotators self-identified as African, African American, Hispanic, and Native American. Most were second- to fourth-year medical students, and 1 was a pathology resident. Six rotators are currently pathology residents, and others are strongly considering applying to pathology. The outreach efforts account for the success of our rotation, which, in turn, has had a positive impact on interest in pathology. However, we recognize barriers to retention and intend to incorporate additional professional development activities to further address equity.

## Keywords

diversity, medical student, outreach, pathology, pipeline, underrepresented in medicine

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## Introduction

Pipeline programs, outreach initiatives designed to encourage and support preprofessional and professional students to pursue a specific area of training, are well established throughout medicine. For example, in 1956, the National Institutes of Health established the Experimental Training Program as a means to expand the physician-scientist workforce.<sup>1</sup> This program evolved into the successful Medical Scientist Training Program (MSTP). As of 2016, this program has supported over 10 000 MD–PhD students, many of who have become impactful physician-scientists.

Pathology-specific pipeline programs have been effective in drawing students into pathology. The pathology post-sophomore fellowship (PSF) at the University of Rochester, implemented in 1926 by Dr George H. Whipple, initially aimed

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to encourage students to spend a year engaging in advanced study, research, and teaching.<sup>2</sup> This pathology PSF has since evolved and expanded into a pathology pipeline program, offering medical students an opportunity to engage in advanced pathology study and research and to have an experience similar to that of a first-year pathology resident. Pathology PSF programs at many institutions continue to be an effective recruitment method. Recent data from a survey of the Program Directors Section of the Association of Pathology Chairs demonstrate that 60% of pathology PSFs ultimately select pathology as a specialty, with an estimated 60% of PSFs pursuing a career in academics.<sup>3</sup> These efforts are particularly important in the face of declining US medical student interest in pathology.<sup>4-6</sup>

In the context of the well-established precedent that pipeline programs are effective at the undergraduate medical student level and in pathology, there is an opportunity to establish a pipeline program aimed at increasing diversity, inclusion, and equity in pathology. In 2012, Deville et al showed that the percentage of black trainees in pathology was significantly lower than the percentage of black trainees in the total graduate medical education pool, with a lower percentage of black trainees compared to neurological surgery and orthopedic surgery.<sup>7</sup> Of the 2257 trainees in Accreditation Council for Graduate Medical Education (ACGME) accredited residency and specialty graduate medical education programs in 2016, 7.9% were of Hispanic origin, 3.8% were black, 3.4% were multiracial, and there was 1 American Indian/Alaska Native and 1 Native Hawaiian/Pacific Islander.<sup>8</sup>

Herein we describe a novel pathology diversity pipeline program consisting of an active outreach program and a funded rotation in the Johns Hopkins Department of Pathology for students underrepresented in medicine (UIM) and other disadvantaged groups. The goals of these efforts were to establish an effective pathology pipeline program to expose students UIM to the field and to improve diversity, inclusion, and equity in our department and more broadly in the field of pathology.

## Methods

In 2013, the members of the Diversity Committee of the Johns Hopkins Department of Pathology established the Johns Hopkins Pathology Rotation for Students Underrepresented in Medicine. The Association of American Medical Colleges (AAMC) defines UIM as “. . . racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population.” In order to participate in the rotation, rotators self-identifying as UIM are first required to submit an application, including a personal statement and curriculum vitae, to a pathology administrative coordinator. Completion of the preclinical curriculum, including successful completion of a basic histopathology course, is strongly recommended. However, more junior applicants are not excluded. One of the core aims of the rotation is to increase diversity in pathology and expand the pipeline in the field; thus, we did not want to discourage interest at an early, perhaps more

impressionable, point in a student's education. Medical students or residents seeking academic credit are also required to fulfill criteria required by the Johns Hopkins University School of Medicine and submit additional materials. These additional materials for medical students attending Liaison Committee of Medical Education-approved US and Canadian medical schools or schools with a formal affiliation with Johns Hopkins University School of Medicine include an elective application, letter of recommendation/good standing from the Dean's office, official transcript, immunization records, confidentiality agreement form, and honor code signature page.

Applications are reviewed and approved by the members of the Johns Hopkins Pathology Diversity Committee (JHPDC). Once an application is approved, housing and transportation arrangements are made by a pathology administrative coordinator. Financial support for travel to and from Baltimore, Maryland, and for housing for the duration of the rotation is provided by the JHPDC and primarily comes from philanthropy. The estimated cost per rotator, excluding travel, is approximately US\$1550 and includes US\$1250 for housing and US\$300 for Johns Hopkins University School of Medicine registration fees. Travel expenses are variable and dependent on from where the rotator is traveling.

Prior to the start of the rotation, each rotator is requested to submit a list of specific interests in anatomic and clinical pathology. A member of the JHPDC then arranges the rotator's schedule, tailored to the student's interests, in conjunction with division-specific pathology education coordinators. Rotators are scheduled for one-on-one advising and mentoring meetings with several pathology faculty, including senior and junior faculty members of the JHPDC, the Director of the Residency Training Program, and the Director of the Department of Pathology. At the end of the rotation, rotators participate in an exit interview to discuss their experiences. For rotators receiving academic credit, formal feedback is obtained from faculty who worked directly with each rotator, and the evaluation form provided by each rotator's medical school is completed.

The standard duration of the rotation is 4 weeks and, if the rotator desires, may extend up to 8 weeks. In general, rotators spend 1 to 2 weeks working with pathology trainees and faculty on general or subspecialty anatomic and clinical pathology services. These services include the surgical pathology consult service, gastrointestinal pathology, genitourinary pathology, gynecologic pathology, hematopathology, autopsy, forensic pathology, medical microbiology, and transfusion medicine. Rotators work directly with residents, clinical fellows, and faculty, and attend daily resident lectures, and participate in service-specific conferences.

Prior to 2016, information regarding the rotation was disseminated primarily via e-mail to the leadership of other medical schools. To enhance the visibility of the rotation, in 2016, we initiated an active outreach program where faculty and trainee members of the JHPDC contact medical schools of historically black colleges and universities (HBCU) and UIM student groups at non-HBCU medical schools. An

informational brochure entitled “Careers in Pathology” created by the JHPDC is distributed, and an inquiry is made about potential opportunities to meet in-person with their students. If there is an opportunity to meet with the students, members of the JHPDC, as well as the Department Director, travel to the institution and engage with the students by giving a 30-minute “Careers in Pathology” presentation. This presentation is followed by a 30-minute question and answer session. The presentation has a welcoming tone and includes information on pathology as a career, the various subspecialties of pathology, options for pursuing pathology residency and fellowship programs, specific information on the pathology residency training program at Johns Hopkins, and information on our rotation. Although the sessions are open to all medical students, the target audience is second- and third-year medical students who are undecided on a medical specialty and have an opportunity to do an elective rotation.

In addition to the aforementioned formal medical student informational sessions, the JHPDC seeks other opportunities to increase equity in pathology and expand the pipeline by engaging preprofessional students. In 2016 and 2018, members of the JHPDC attended the Student National Medical Association Annual Medical Education Conference and distributed the “Careers in Pathology” brochure while speaking to individual medical and premedical students. In 2017 and 2018, the JHPDC, and the Director of the Department, participated in National Native American Youth Initiative by hosting information sessions introducing high school students to pathology and giving a tour of the Johns Hopkins Hospital.

## Results

Between January 1, 2016, and April 1, 2019, the JHPDC has delivered 14 outreach presentations to 9 different institutions/student groups (Table 1). The number of participants in the outreach presentations ranged from approximately 15 to 80. Eighteen students/residents participated in the rotation between 2013 and July 2019 (Table 2). Notably, 17 of the 18 rotators participated after the initiation of the outreach component in 2016. Thirteen rotators were female, and 5 were male. Student rotators represented 6 different medical schools, including 2 medical schools of HBCUs, a US medical school with a greater than 3 American Indian or Alaska Native matriculants in 2015, a medical school in Puerto Rico, a state public medical school, and an osteopathic college of medicine. At the time of their rotations, 5 students were in their second year of medical school, 8 were in their third, 3 were in their fourth year, 1 was a third-year undergraduate student, and 1 was a pathology resident. Three rotators self-identified as African, 8 as African American, 5 as Hispanic, 1 as Native American, and 1 as “other.” Most rotators ( $n = 16$ ) completed a 4-week rotation. On average, students rotated on 3.6 services, which most frequently included surgical pathology consults, microbiology, and autopsy (Table 3). One first-year medical student chose to rotate for 8 weeks, while 1 undergraduate premedical student completed an abbreviated 2-week rotation.

**Table 1.** Outreach Presentations From 2016 to 2019.

Program	Classification of Institution or Organization	Year of Presentation
P1	HBCU Medical School	2016 and 2017
P2	Group for Medical Students UIM at non-HBCU Medical School	2016
P3	Group for Medical Students UIM at non-HBCU Medical School	2016 and 2017
P4	SNMA AMEC*	2016 and 2018
P5	HBCU Medical School	2017 and 2018 <sup>†</sup>
P6	Group for High School Students UIM	2017 and 2018
P7	Group for High School Students UIM	2018
P8	Group for Medical Students UIM at non-HBCU Medical School	2018
P9	HBCU Medical School	2019

Abbreviations: HBCU, historically black college and/or university; UIM, under-represented in medicine; SNMA, Student National Medical Association; AMEC, Annual Medical Education Conference.

\*Participation in the Residency Programs Exhibit.

<sup>†</sup>2018 includes both one presentation delivered to medical students and participation in the institution’s residency fair.

**Table 2.** Rotators (N = 18) From 2013 to 2019 With Current Training Position.\*

Rotators	Current Position (2019)
R1	Internal medicine practitioner
R2	Medical student
R3	Internal Medicine resident
R4	AP/CP Pathology resident
R5	AP/CP Pathology resident
R6	OB/GYN resident
R7	AP/CP Pathology resident
R8	AP/CP Pathology resident
R9	Pathologist
R10	Surgery resident
R11	Internal Medicine resident
R12	Medical student <sup>†</sup>
R13	AP/CP Pathology resident
R14	AP/CP Pathology resident
R15	OB/GYN resident
R16	Undergraduate student
R17	Medical student <sup>†</sup>
R18	Medical student <sup>†</sup>

Abbreviations: AP, anatomic pathology; CP, clinical pathology.

\*Seven past rotators are currently completing residencies in pathology, and 3 are medical students strongly considering applying to pathology residency programs.

<sup>†</sup>Medical student strongly considering applying to Pathology Residency Programs.

Six individuals who rotated through the program are currently trainees in anatomic and clinical pathology residency programs, and several other medical students are strongly considering applying to pathology (Table 1). Three individuals who rotated through the program are currently internal medicine residents.

**Table 3.** Eighteen Students Completed Rotations on 12 Services (Mean of 3.6 Services per Student) for at Least 1 Week Each.\*

Rotation	Number of Students (%)
Surgical Pathology Consults	16 (89%)
Microbiology	9 (50%)
Autopsy	10 (56%)
Hematopathology	6 (33%)
Neuropathology	6 (33%)
Gastrointestinal pathology	5 (28%)
Medical examiner	4 (22%)
Gynecologic pathology	3 (17%)
Transfusion medicine/apheresis	3 (17%)
Cytopathology	2 (11%)
Molecular pathology	1 (6%)
Genitourinary pathology	1 (6%)

\*The majority of students completed rotations in surgical pathology consults, and many also sought exposure in microbiology and autopsy pathology.

Feedback from our pathology outreach presentations and rotation has been strongly positive (Table 4). Students have remarked that they enjoy spending time on various services, appreciated the hands-on immersion into pathology as a medical specialty, and were pleasantly surprised by the welcoming environment. One rotator commented,

During my month on the rotation, I gained invaluable experience through a tailored yet comprehensive exposure to subspecialties in pathology... I highly recommend this invaluable opportunity to all medical students regardless of their career path. The experience has and continues to benefit me daily during my pathology residency...

Another rotator reflected,

There were so many things I was exposed to at Hopkins that have been of great benefit to me so far... I cannot express enough how impactful this experience was for me, and I definitely hope that many other medical students who share a similar background as mine can have this opportunity.

For those who are currently pursuing or plan to pursue a career in pathology, participation in the Johns Hopkins Pathology Rotation for Students UIM has consistently been noted as playing a pivotal role in their career decisions. Those who selected other medical specialties have also commented that the knowledge and experience gained by rotating was essential to their understanding of human disease processes, despite their choosing a different career path.

## Discussion

The Johns Hopkins Department of Pathology outreach program and funded rotation for students UIM effectively introduces students UIM and other disadvantaged groups to pathology and supports those with an interest in a career in pathology. In our experience, active outreach with direct student engagement

**Table 4.** Representative Subjective Rotator Feedback.

“The residents made sure I was participating to my comfort and I got to fill a few cassettes with tissue samples and get my hands dirty handling the organs and orienting them for gross conference. This was a great week to familiarize myself with general anatomy and disease.”

“The residents were excited to have a student with them and tried to make sure I was involved, but also that I was doing things that would be useful to my education.”

“I learned about Pathology as a profession, but more importantly my eyes learned a new appreciation for histology and disease process. I learned about language to explain what I saw and how that language conveyed a diagnosis to a practitioner.”

“My participation in the Underrepresented Minority Program represents a crucial and seminal moment during medical school which solidified my decision to not only become a pathologist, but to strive to cultivate and emulate the positive traits of the pathologists at Johns Hopkins whom I encountered.”

“I also appreciated that we were able to sit down and speak with various faculty members, including the chair and residency program directors. This was a great way to learn more about the program, receive career guidance, and understand more about pathology from an academic perspective.”

“I appreciate the opportunity to rotate at Johns Hopkins for 2 months. It changed the way I approached my 3rd year rotations and has solidified my love of pathology.”

was more effective in generating interest in the rotation, and the active outreach directly accounts for the increased number of rotators starting in 2016. The subjective feedback highlighted the overall positive impact our program has had on rotators, including those selecting a medical specialty other than pathology. Long-term data on research experience, publications, fellowship selection, and faculty appointments are required to determine whether this program has had an impact on career paths and decisions to choose a career in academics.

Historically, pipeline programs such as the AAMC Project 3000 by 2000 have aimed to increase diversity, inclusion, and equity at the medical student level.<sup>9</sup> However, the challenge of increasing diversity does not end at matriculation into medical school. Of those students UIM who matriculate into medical school and successfully graduate, the subsequent significant challenges and barriers to successfully recruiting students UIM to enter medical specialties, pursue an academic career, and finally remain on faculty and successfully earn promotion are well documented.<sup>10-14</sup>

A well-described barrier medical students UIM face is the impact of limited resident and faculty diversity within a specialty, residency program, and/or academics.<sup>15-19</sup> The outreach component of our program sought to diminish this perception in pathology by providing an initial introduction to the specialty by pathology faculty and trainees UIM from an academic program. By engaging larger UIM student audiences in a meaningful way, the active outreach by UIM faculty and trainees increased the visibility of pathology as a medical specialty, careers in academia, our funded rotation, and consequently increased rotation enrollment.

A significant strength of our program is the funding provided to increase the accessibility of the rotation for economically disadvantaged students and students UIM. Away elective rotations provide students with increased exposure to a specialty, and an opportunity to interact with a residency program as a prospective applicant. These rotations can have the even more important role of helping students feel welcomed and as a valued member of the clinical team, key elements of inclusion. Despite the critical role of away rotations in the residency selection process, the associated travel and boarding expenses limit their accessibility. The additional significant costs of applying to residency, reported by Oladeji et al, to be an average of US\$4420 in 2014, further exacerbate the financial burden of the fourth-year medical student.<sup>20-23</sup> When considering these combined elective and residency application expenses in the greater context of established racial disparities in medical student debt, pipeline programs such as ours must strongly consider providing financial support.<sup>24</sup>

Our successes parallel the successes of other medical student pipeline programs. The Johns Hopkins Department of Otolaryngology-Head and Neck Surgery (OHNS) Clerkship Program for Underrepresented Minority Students is a mentored student clerkship that saw 6 prior rotators successfully match into OHNS and increased overall rotator interest in academic medicine.<sup>16</sup> Similarly, the Nth Dimensions program, a 3-stage pipeline program with a focus on procedure-based specialties, notably observed an overall 72.3% match rate into procedure-based specialties for a cohort of 118 medical students between 2005 and 2012.<sup>25</sup> More recently, a comprehensive radiology graduate medical education diversity recruitment plan developed and implemented at Vanderbilt University Medical Center similarly engaged in recruitment activities and provided early exposure and mentoring opportunities for students interested in radiology.<sup>26</sup> Their combined efforts resulted in an increase in the number of radiology residents UIM within their program from 0% (2013-2014 academic year) to 20% (2018-2019 academic year) and also within the overall radiology applicant pool.<sup>26</sup>

The impact of self-selection by qualified candidates committed to applying to pathology residency is a potential limitation of our rotation. In an effort to limit the effects of self-selection, we delivered our outreach presentations to larger student audiences and did not restrict our efforts to pathology medical student interest groups. The outreach efforts also included undergraduate and high school student groups with the goal of engaging students at an even earlier point, where they certainly are not committed to career choices, and are at an even greater risk of being lost from the pipeline into medicine.<sup>27-33</sup>

The ongoing limited diversity in pathology is concerning, although it is not difficult to understand the context. The Johns Hopkins pathology residency program admitted the first Hispanic trainee in 1967 and the first black trainee in 1979.<sup>34</sup> In contrast to other medical specialties where direct interaction with a diverse patient population and visible health-care disparities serve as driving forces to increase

diversity, pathologists in general have limited direct patient contact. Interestingly, in 2012, diagnostic radiology also had a significantly lower percentage of black, Hispanic, and female trainees.<sup>7</sup> The limited opportunities for direct patient contact in both pathology and radiology have perhaps dampened the profound effects of a diverse patient population and health disparities and thus delayed the drive to improve diversity.

Herein we demonstrate that when combined with in-person outreach efforts, a pathology pipeline rotation for groups UIM can successfully encourage and support students to pursue a career in pathology. This is particularly critical in pathology, a specialty with not only declining medical student interest but also with historically fewer trainees UIM. For greatest impact and efficacy, efforts such as our outreach program and rotation must be a component of a larger organized and sustained institution-wide commitment to diversity, inclusion, and equity at all levels. This should consist of at least active participation of institution leadership, initiatives to improve diversity recruitment and retention through diverse and unbiased committees, institutional support and funding of pipeline initiatives, and institution-wide efforts to decrease unconscious bias.<sup>16,26,35,36</sup>

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