Celebrating 10 Years

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The Hematologist Discoverer

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Many medical students of my generation were attracted to hematology as a career because of its intimate connection to discovery. Great role-model hematologists took us to the microscope to discover the cause of the disease affecting our patients and opened our eyes to a new world in which careful analysis of cell size, shape, and color could not only lead to a diagnosis, but could also help establish the patient's likely course and indicate the best therapy. We then tasted our own independent thrill of discovery late at night in the "housestaff lab" or the hospital hematology lab when we were the first to discover what was wrong with our newly admitted patient by analyzing a blood smear, a sputum stain, or a wet prep of urine sediment. Some of us chose to continue along the path of clinical discovery while others opted to try their hand at more basic discovery, and others sought discovery through clinical trials, epidemiology, or health services research connected to public health and public policy. The first group wrote fascinating case reports, whereas the latter groups communicated their discoveries through papers in specialty and general journals, but we all subliminally internalized the belief that all physicians are discoverers.

A number of things over the past 40 years have eroded the model of the physician discoverer, including: 1) The unfortunate denigration of observational science as "descriptive" and case reports as "anecdotal" in favor of statistically robust large clinical trials that contribute to "evidence-based medicine." This has likely discouraged astute clinicians from sharing their important observations and feeling as if their contributions are valued by the scientific community. 2) The demise of the housestaff laboratory, a victim of the well-intentioned Clinical laboratory Improvement Act (ClIA), designed to insure the quality of all clinical lab studies. 3) The increasing estrangement of clinical departments from pathology, with few internist hematologists still presiding over hematology laboratories and blood banks. 4) The increasing automation of clinical pathology testing. 5) The growth of a cadre of clinician educators, many of whom have not participated in discovery-based medicine, combined with a diminished presence of physician/ scientists in clinical activities as both the competition for research funding and the regulatory, administrative, and informatics burdens to maintain clinical privileges have increased dramatically. 6) The growth in the number of PhD investigators in biomedical science, giving the false impression that they are a separate group to whom research can be "outsourced." 7) The increasing acceptance of the insidious notion that physicians only need to know science so that they can apply it to their patients rather than needing to know it because they have a professional obligation to contribute to medical knowledge. 8) The impact of educational debt on clinicians who would like to participate in discovery and the time and administrative demands of current medical business models. 9) The unfortunate tendency to distort the welcome recent focus on the humanistic aspects of medicine as implying a reduced need to advance medical science or, worse yet, a dualism between humanism and science.

One of the challenges in sustaining the physician– discoverer model is the need for individuals to be comfortable while toggling between the culture of clinical medicine and that of scientific discovery. As I have previously noted,[1,2] there are fundamental cultural differences between clinical medicine and basic science investigation, rooted in how each discipline educates and acculturates its trainees. The table below highlights a number of these differences. It is important to recognize them, since they frame each group's world view, and understanding them makes it easier to appreciate how each group is likely to perceive the other. This is particularly important when clinicians with little research training first enter a basic science lab and when basic investigators begin to develop collaborations with clinicians.

The task before us is not to pine for some past time that we have undoubtedly romanticized, but rather to maximize the advantages conferred by the new opportunities available to us today to best capture the positive features of the past. I suggest the following ideas to excite a new generation of physician–discoverers to experience the satisfaction and sheer joy that accompanies being the first person in the world to know something that has the power to heal.

1) Define the physician–discoverer as the goal of medical education and add this clause to the Hippocratic Oath: "I will make careful observations about my patients and share my discoveries with my colleagues so that all patients will benefit." The commitment to discovery should be made on the first day of medical school by formally charging the incoming class of medical students to develop a four-year-long project in which they define a gap in our understanding of medical education and then, with the assistance of senior faculty members, design and conduct a randomized study on themselves to test their hypothesis. The results should be seen as gift to future medical school classes and, more broadly, medical students everywhere. 2) Build "wet lab" experiences into medical school hematology pathophysiology courses, emphasizing how blood smears and bone marrow samples are prepared and analyzed and how hematology and blood bank laboratory tests are performed. Hematology/ pathology conferences are especially valuable when slides are reviewed jointly because they provide an opportunity for sharing thoughts across disciplines and for generating sparks of ideas for further evaluation. 3) Reunite the clinical specialties with pathology by renewed emphasis on teaching clinical and anatomical pathology, joint clinic-pathologic and patient management conferences, reciprocal trainee rotations, and facilitated access for medical students, house staff, and fellows to the clinical pathology laboratories. 4) Help students and house staff share in the initial discovery of disorders affecting their patients and recognize the power and beauty of analyzing blood cell morphology by encouraging them to review blood smears and bone marrow specimens day or night with hematology fellows, faculty, and/or technicians committed to teaching. I have, for example, reviewed blood smears with internal medicine students and residents for many years at Mount Sinai school of Medicine in a format in which I have to create a clinical scenario to explain the morphology without knowing anything about the patient's history, physical, or laboratory findings. This exercise is followed by comparing the scenario to the actual history, followed by a more general discussion of pathophysiology and patient management. 5) Make the FDA package inserts for all laboratory tests being conducted in the clinical pathology lab available electronically to the hospital staff, including the principle of the assay, the instrumentation, interfering substances, common artifacts, and population-based normal values. 6) use the new tools of social media to empower every hematologist in the united states to participate in discovery by creating an ASH website titled "N=1" in which members can upload an interesting case report and other members can add their comments on the case, including suggestions for research follow-up and offers to volunteer to conduct additional studies. I encourage ASH members to add other creative ideas to this list.

I hope that some or all of these suggestions will help light the flame of discovery in a new generation of medical students and trainees who come to see the intellectual excitement and beauty in hematology and the great opportunity to contribute to the health of patients today and in the future.

Table. Comparison of some Cultural aspects of Clinical medicine and Basic science investigation

Clinical medicine	**Basic science**
Timely action required regardless of certainty	Reserve judgment until all evidence is compelling
Focus on that which is unique	Focus on the reproducible and generalizable
Many uncontrolled variables	All variables identified and controlled
Follow practice guidelines and standard of care	Be bold and take risks
Error may imperil someone's life and create	Error is expected and valuable in framing new
Physicians apply new knowledge	Scientists discover new knowledge
Provide care to a steady flow of patients	Need to generate new ideas
Respect for expert opinion	Suspicion of expert opinion
Oath	No oath
Suit and tie	Jeans and T-shirt

1. Coller, Bs. Translational Research and the Physician- Scientist. The Vanishing Physician-Scientist? Andrew Schafer, editor. Cornell University Press, 2009, pps. 67-83.

2. Coller, Bs. Translational research: forging a new cultural identity. Mt Sinai J Med. 2008;75:478-487.