

In this issue: EDUCATION & TRAINING IN LABORATORY MEDICINE IN THE UNITED STATES

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POST-BACCALAUREATE LABORATORY SPECIALIST CERTIFICATIONS AND MASTER'S DEGREES IN LABORATORY MEDICINE

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ABSTRACT

Opportunities to advance one's knowledge and position are available within the clinical laboratory arena. By obtaining a specialist credential in chemistry, hematology or microbiology, a laboratorian has demonstrated advance knowledge and ability in their respective discipline. These specialist certifications open doors within and outside the laboratory profession and may lead to promotion. The specialist in blood banking credential is unique in that accredited training programs are available, some of which are affiliated with universities and graduate credit is granted for program completion. Other avenues available include pathologist assistants programs, diplomats in laboratory management and Master of Science degrees in clinical laboratory science. There are a number of choices available to achieve your professional goal.

INTRODUCTION

Various paths are available for post-baccalaureate studies in the clinical/medical laboratory sciences. Advanced certifications in specialized areas of the laboratory, as well as diplomats in laboratory medicine, are offered by accredited agencies; masters' degree programs are offered by several universities. There are different means to obtaining advanced certification or degrees. Interested individuals must consider what they hope to accomplish after obtaining their advanced certification or degree before deciding on their path.

A variety of agencies provide certification for laboratory professionals in the U.S.A. The American Society for Clinical Pathology (ASCP), American Medical Technologists (AMT) and Department of Health and Human Services (HHS) are agencies offering certification exams and credentials for entry level positions in the clinical laboratory as certified medical technologist/laboratory scientists. Dr. Perry M. Scanlan describes in detail the educational path to the generalist, baccalaureate degree and certification in medical laboratory science in another article in this issue.

Discipline-specific (i.e. non-generalist) certification can be obtained through ASCP in clinical chemistry, cytogenetics, hematology, microbiology and molecular biology. However, the focus of this article will be the ASCP specialty certification examinations for different laboratory disciplines and other post-baccalaureate degree options at the masters' level. In order to qualify for a specialty certification exam, a minimum of a baccalaureate degree is required as well as additional specific clinical experience or education.

SPECIALTY CERTIFICATION

The requirements to sit for an exam to be credentialed as a Specialist in Chemistry (SC), Specialist in Microbiology (SM) or Specialist in Hematology (SH) are very similar.¹ They require a minimum of a baccalaureate degree in the sciences from a regionally accredited university or college, or generalist certification as an MT/MLS(ASCP), or ASCP certification within their particular discipline. They also require full-time acceptable clinical experience in an accredited laboratory facility in their specific discipline. At the baccalaureate level, individuals are required to have a minimum of 3 years experience, while those with a master’s degree or doctorate in a related scientific discipline are required to have 2 years of the appropriate clinical experience. Each discipline has defined experience expectations. (Table 1) There is no published data as to what financial advantages there are for individuals holding these certifications; however, it is more than likely that being certified may improve opportunities for leadership positions with the laboratory.

SPECIALIST IN BLOOD BANKING TECHNOLOGY

The Specialist in Blood Banking Technology (SBB) certification is unique among the specialty programs. There are 4 different routes to achieving the certification as well as a number of different avenues afforded to holders of that certification. Individuals

| Table 1 ASCP Requirements for Specialty Certification Eligibility | |
|---|--|
| SC(ASCP) | Experience within the last ten years in eight of the procedures below: <ul style="list-style-type: none"> • Blood gases • Carbohydrates • Electrolytes • Enzymes • Heme compounds AND Experience required in two of the six areas below: <ul style="list-style-type: none"> • New test development • Procurement of laboratory equipment • Quality control management program • Regulatory compliance • Supervisory experience • Teaching |
| SM(ASCP) | Experience required in four of the areas below: <ul style="list-style-type: none"> • Bacteriology • Molecular Microbiology • Mycobateriology • Mycology • Parasitology • Virology |
| SH(ASCP) | Experience required in the procedures below: <ul style="list-style-type: none"> • Blood smear evaluation and differential • Complete blood count • Instrument maintenance • Miscellaneous tests (e.g., ESR, sickle screen, manual count, reticulocyte) • Quality control performance and evaluation • Routine coagulation tests (e.g., PT, APTT, and D-dimer) • Other coagulation tests (e.g., fibrinogen, factor assays) AND Experience in performing, supervising or teaching five of the procedures listed below: <ul style="list-style-type: none"> • Advanced coagulation (e.g., inhibitor assays) • Body fluid examination • Bone marrow prep or evaluation • budgeting/inventory control/purchasing • Cytochemical stains • Flow cytometry • Hemoglobinopathy evaluation • Method evaluation • Personnel management • Platelet function studies • PT/PTT mixing studies • QA/QI |

with SBB certification work in different types of facilities including hospital transfusion services, community blood centers, independent laboratories, and for commercial suppliers of blood banking reagents and equipment.

According to the 2010 Wage and Vacancy survey conducted by the ASCP, the average salary for staff SBBs was \$59,530 annually, and SBBs in supervisory roles earned an average salary of \$71,138 annually. ² Each of these salaries was approximately 10% higher than comparable non-SBB technologists. In the US, the vacancy rate in 2012 for blood banking staff was at 7% and 6% for blood bank supervisory positions. ²

The different routes to qualify for the SBB certification exam are listed (Table 2).¹

Routes 1 and 2 require at minimum a baccalaureate degree from a regionally accredited college/university while routes 3 and 4 require advanced degrees. Route 1 requires completion of a Commission on Accreditation of Allied Health Education Programs (CAAHEP) accredited Specialist in Blood Banking Technology program. The other 3 routes do not require completion of a program but do require specific clinical experience and completion of specific degrees. Route 2 requires a MT/MLS(ASCP) or BB(ASCP) certification with a baccalaureate degree and 3 years of full time acceptable clinical experience in either the US, Canada or an accredited laboratory within the last ten years. The clinical experience must have been obtained post degree. Route 3 requires a master's or doctorate degree from a regionally accredited college/university in an appropriately related field and 3 years of full time acceptable clinical experience in the US, Canada or an accredited laboratory within the last ten years. Route 4 requires a doctorate degree from a regionally accredited college/university in an appropriately related field and 2 years post-doctorate fellowship in blood banking in either the US or Canada within the last ten years. The areas of clinical experience are specifically defined (Table 3).¹

There are currently 14 CAAHEP accredited SBB programs in the US, however, the Walter Reed program is for US military

| Route | Initial requirements | Work experience |
|-------|---|---|
| 1 | Baccalaureate degree from accredited college/university with specific credits in biology, chemistry and math and successful completion of a CAAHEP-accredited SBB program | Criteria determined by program |
| 2 | MT/MLS(ASCP) or BB(ASCP) certification and a baccalaureate degree from accredited college/university | 3 years full time clinical laboratory experience in blood banking in US or Canada or accredited laboratory* |
| 3 | Master's or doctorate in appropriately related field from accredited college/university | 3 years full time clinical laboratory experience in blood banking in US or Canada or accredited laboratory* |
| 4 | Doctorate in appropriately related field from accredited college/university | 2 years post-doctoral fellowship in blood banking in US or Canada or accredited laboratory* |

* Laboratory accredited by approved accreditation organization; AABB, CAP, COLA, DNV, The Joint Commission (US only, not Joint Commission International), etc.

| | |
|--|--|
| Serologic Testing | <ul style="list-style-type: none"> • ABO and Rh typing • Antibody detection and identification • Crossmatching • Direct antiglobulin tests • Tests for other blood group antigens |
| Routine Problem Solving | <ul style="list-style-type: none"> • Transfusion reactions • Immune hemolytic anemias • Hemolytic disease of the fetus and newborn (HDFN) • Rh immune globulin evaluation |
| Quality Control/Quality Assurance Laboratory Operations | <ul style="list-style-type: none"> • Reagents/equipment |
| Donor Collection, Processing and Testing* | <ul style="list-style-type: none"> • Donor selection, preparation and collection • Processing or confirmatory testing • Component preparation for storage and administration |

*Performance may be demonstrated through performance, observation or simulation

Table 4
CAAHEP-accredited SBB programs in the U.S.

| City, State | Institution | Program Length in Months | Program type | | Enrollment | |
|--------------------|---|---------------------------|--------------|--------|------------|-----------|
| | | | On-site | Online | Full-time | Part-time |
| Tempe, AZ | Blood Systems Laboratories | 24 | | ✓ | | ✓ |
| Pomona, CA | American Red Cross Services | 12 | ✓ | | ✓ | |
| Washington, DC* | Walter Reed National Medical Center | 12-18 | ✓ | | ✓ | |
| St Petersburg, FL | Florida Blood Services | 12 | | ✓ | | |
| Chicago, IL | Rush University | 12 part-time available | | ✓ | ✓ | ✓ |
| Indianapolis, IN | Indiana Blood Center | 12 | | ✓ | | ✓ |
| New Orleans, LA | Medical center of Louisiana | 12 FT 24 PT | ✓ | | ✓ | ✓ |
| Baltimore, MD | Johns Hopkins Hospital | 12 | ✓ | | ✓ | |
| Bethesda, MD | National Institutes of Health | 12 | ✓ | | ✓ | |
| Cincinnati, OH | Hoxworth Blood Center | 16 | ✓ | | ✓ | |
| Houston, TX | Gulf Coast Regional Blood Center | 12 | | ✓ | | ✓ |
| Galveston, TX | University of Texas Medical Branch | 12 | | ✓ | | ✓ |
| San Antonio, TX ** | University Health System and Affiliates | - | - | - | - | - |
| Milwaukee, WI | BloodCenter of Wisconsin | 18-24 mos | ✓ | | ✓ | ✓ |

* Active military officers only FT = full time program, PT = part time program
** Per conversation with AABB, this program is now closed

personnel only (Table 4).^{3,4} These programs must comply with the Standards and Guidelines for the Accreditation of Educational programs in Blood Bank Technology/Transfusion medicine as outlined by the AABB. There are several advantages of attending a CAAHEP- accredited SBB Program.

- Higher pass rate on the certification exam
- Hands-on experiences
- Most are open to individuals with just over 1 year of experience.

Each of these programs is unique in their design and offer different options to their students. A number of SBB programs provide distance learning where students are able to participate online. Other programs are on-site or “face-to-face” and require the student to live in that particular city. Some programs require employment at their institution while enrolled and some may offer opportunities for employment upon completion. There are even a few programs that offer part-time options for students.

Three programs (Hoxworth, Rush University and BloodCenter of Wisconsin) are affiliated with universities and students have the option to work toward their Master of Science degree in addition to the SBB. Students accepted to the Hoxworth Blood Center SBB program are directly enrolled in the graduate school at University of Cincinnati. They offer a 5 term (approximately 15 months) on-site program through the College of Allied Health Sciences. Upon successful completion of the program, they are eligible to take the SBB certification exam and graduate with a Master of Science in Transfusion and Transplantation Sciences⁵. Rush University’s Specialist in Blood Banking program utilizes a learning management system (LMS) to deliver educational activities online. Students have the option to receive graduate credit for completion of the SBB certificate program and apply those credits toward a Master of Science in Clinical Laboratory Management⁶.

BloodCenter of Wisconsin is affiliated with Marquette University, and has additional opportunities for students unlike the other university-based options mentioned previously. Like Hoxworth, students immediately enroll at the university and have the option after earning 18 credits in the SBB program to apply it towards a Master of Science in Transfusion Medicine degree. The BloodCenter/Marquette affiliation is unique in having three tracks of study a student can pursue: Business Administration, Education or Science. Within Business Administration, there are 4 subspecialties – organizational behavior, materials management, finance and marketing. All courses are within the Masters of Business Administration (MBA) program at Marquette. Each of these lay foundations for positions in management. Students who select the education track study curriculum design and learning theories and apply these concepts in instruction and knowledge assessment methods. For those wishing to further their scientific knowledge, the university offers courses to aide them in pursuing areas of research.⁷ Laboratory scientists who have attained certification as a Specialist in Blood Banking (SBB) or are SBB-certified and hold a

Master of Science in a related field are seen in a variety of positions. Many of these examples come from post-graduate employment surveys, examples of individuals within our own organization as well as career brochures and websites. They include:

- Quality and process improvement specialists
- Blood Bank/Transfusion Service Leads, Supervisors and Managers
- General Laboratory Supervisors and Managers
- Executive leaders
 - o Vice-President – laboratory operations
 - o President & Chief Executive Officers of blood centers and other organizations
- Faculty at technical schools, colleges and universities
- Technical specialists for commercial companies
- Product Managers
- Sales Managers

PATHOLOGIST ASSISTANTS

Another post-baccalaureate path in the clinical laboratory is the certified Pathologist’s Assistant. This category was first offered in 2005 and is a growing field. To qualify for the Pathologist’s Assistant exam, one must attend a National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) accredited school for pathology assistants (Table 5).⁹ Pathologist assistants provide various services within the laboratory under the direction and supervision of a Board Certified or Board-eligible pathologist. Their scope of practice includes preparation, gross description and dissection of human tissue surgical specimens, preparation of human post-mortem examinations, as well as other duties that may be assigned from their supervising pathologist.¹⁰

DIPLOMAT IN LABORATORY MANAGEMENT

Technologists who have experience in laboratory leadership and supervision have the opportunity to be certified as a Diplomat in Laboratory Management (DLM). Many of those who make the decision to become certified as a DLM have advanced degrees in business. The experience required for this certification is quite extensive; twenty out of thirty-two eligibility requirements are needed. The requirements are in the areas of Finance, Marketing management, Operations Management and Personal Management (Table 6)¹

MASTER OF SCIENCE PROGRAMS

Besides the Master of Science degree programs we noted for SBBs, there are a number of universities offering graduate level programs related to the health sciences, including the clinical laboratory sciences. Some programs offer curricula that emphasize leadership and management, while other programs are designed to advance scientific knowledge. Additionally, there are masters level programs for individuals who hold a degree in a biologic science, but are lacking the clinical experience required for certification. These MS programs provide the opportunity to gain the required clinical courses necessary to qualify for the generalist MT/MLS (ASCP) certification exam.

| Table 5 NAACLS-accredited Pathologist Assistant programs | |
|--|-----------------------|
| Institution | City, State |
| Quinnipiac University | Hamden, CT |
| Rosalind Franklin University of Medicine and Science | North Chicago, IL |
| Indiana University School of Medicine | Indianapolis, IN |
| University of Maryland | Baltimore, MD |
| Wayne State University | Detroit, MI |
| Duke University | Durham, NC |
| University of Western Onterio | London, ONT (Canada) |
| Drexel University | Philadelphia, PA |
| West Virginia University | Morgantown, WV |

| Table 6 Eligibility requirements for DLM Certification Examination | |
|--|---|
| Financial Management | <ul style="list-style-type: none"> • Billing and collection • Budgets • Capital equipment acquisition • Cash flow analysis • Contract negotiations • Cost analysis • Financial accounting • Materials management: Inventory control • Materials management: Purchasing • Reimbursement issues |
| Marketing Management | <ul style="list-style-type: none"> • Consumer relations • Managed care • Market research • Product development |
| Operations Management | <ul style="list-style-type: none"> • Data management • Information technology • Facilities management • Intra/interdepartmental relations • Licensure/accreditation/regulatory • Performance improvement • Productivity • Risk management/medial legal issues • Safety |
| Personnel management | <ul style="list-style-type: none"> • Conflict resolution • Counseling/disciplinary action • Education and training/continuing education |

INTERNATIONAL STUDENTS

For international students interested in these programs, there are additional requirements for admission. College transcripts often need equivalency evaluations. The list of accepted agencies for most universities as well as ASCP is available on their websites. Universities may require English as a Second Language (ESL) evaluation. TOEFL and other testing scores are set by each individual school so it is important for international students to be aware of specific requirements for each university. GRE scores are also required for almost all graduate school admissions. Again, each school may have their own requirements, so it is important to know what documents to include with the application. Certificate-only programs are often not designed to grant student visas. University-based or affiliated programs will generally have an international student office that can aid in the visa application process.

CONCLUSION

Career paths for laboratory scientists with advanced degrees and specialty certifications are numerous. Finding your passion and directing your energies to that end can be very rewarding, in both the financial sense as well as the sense of personal pride and pleasure in the work. Opportunities are endless if you're willing to try!

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