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Emilia Meike
efmeike@bgsu.edu

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A PRESENTATION PROMOTING MEDICAL LABORATORY SCIENCE

EMILIA MEIKE

HONORS PROJECT

Submitted to the University Honors Program
at Bowling Green State University in partial
fulfillment of the requirements for graduation with

UNIVERSITY HONORS

4 NOVEMBER 2016

_____, Advisor

Dr. Omaruddin, Medical Laboratory Science

_____, Advisor

Amanda Rzicznek, General Studies Writing

1. The Problem

Medical Laboratory Science is an important aspect of health care. Medical laboratory technologists perform complex tests that help doctors diagnose disease and monitor patient health. While this is a vital aspect of the health care system, many people may not be aware of the profession. Additionally, students may not be aware of the education requirements to become a medical laboratory scientist. This poses a problem for the health care industry. There is currently a demand for trained medical laboratory scientists. The Bureau of Labor Statistics reports that the job outlook for medical and clinical technologists and technicians is expected to grow by 16% between 2014 and 2024 (“Medical”). A contributing factor to the need for technologists is the expected retirement of the baby boomer workforce (Small). Currently the College of Health and Human Services promotes the medical laboratory science program at events focused on prospective student such as Preview Days and at events focused on current students such as informational meetings. The programs directed toward high school students cover multiple programs in the college. The medical laboratory science program currently does not have a program solely dedicated to promoting itself to high school students. Personally, I was not aware of the field or Bowling Green State University’s program until after starting college and I know of several other people who have had similar experiences. High school students should be made aware of medical laboratory science before entering college.

2. The Solution

There have been attempts to promote the profession and address the shortage. Some experts have suggested making the career path more defined (Small). Others have shared their

own experiences in the field to bring light to the profession (Rhode). The American Society for Clinical Pathology, a professional organization for laboratory professionals, has created the “What’s My Next” campaign to promote the profession to high school students (“What’s”). To promote the profession at the local level, my project is a presentation for local high school students about medical laboratory science.

The project includes many proven techniques for creating an effective presentation and encouraging students to pursue science and health care careers. The use of a presentation to promote a health care career is supported by research. The study “Experiences Promoting Healthcare Career Interest Among High-School Students from Underserved Communities” demonstrated that exposing students to healthcare programs influence the pursuit of healthcare as a career (Zayas). The presentation consists of a PowerPoint presentation, brochure and activity. PowerPoint presentations are used by professionals to communicate effectively (Medina). A well designed brochure is an effective marketing technique (Ladd). The use of a brochure allows the students to take information home with them for further consideration. The use of an activity should also help the students become engaged in the topic. The study "Alignment of Hands-on STEM Engagement Activities with Positive STEM Dispositions in Secondary School Students" demonstrated that hands on activities have a positive impact on students’ attitudes toward science (Christensen). The activity I created is designed for students to identify healthy and unhealthy cells in pictures of patient blood samples. The idea behind this activity is the students experience the hands-on and decision-making aspects of the field without the need to provide expensive equipment or potentially hazardous patient samples. Together, these components form an effective means of communicating information about the field and Bowling Green State University’s program.

3. The Execution

The presentation was given at Bowling Green High School to Mr. Hans Glandorff's AP Biology class. The class contained eight students, the students were described by Mr. Glandorff as college bound and highly motivated. They were a mixture of juniors and seniors. At the start of the presentation the students were presented with a brochure containing information about the medical laboratory science field and Bowling Green State Universities program. I introduced myself and asked if anyone knew what medical laboratory science was and if anyone knew someone who worked in the field. None of the students knew what medical laboratory science was or anyone who worked in the field. I used this as a transition to begin the PowerPoint presentation and explain the field. During the presentation, I made sure to emphasize that medical laboratory science was a professional field. I explained the scope of the field by discussing the different departments in a clinical laboratory and explaining the job opportunities for medical laboratory science. When the activity was presented, the students worked in pairs to complete the activity. This gave me a chance to interact with the students more. They asked if their answers were correct and I was able to provide feedback. I was able to point out cellular morphologies that indicate disease such as sickle cell anemia and leukemia. The students seemed to enjoy the activity. They found it challenging, but they did well. At the conclusion of the PowerPoint the students were given contact information for myself and the program. So far no one has contacted me with any questions.

At the end of the presentation the students and Mr. Glandorff asked questions about the program and Bowling Green State University. They seemed more interested in college planning and the Honors College than medical laboratory science. I talked about how I became interested in medical laboratory science and how I thought the Honors College would benefit me in the

future. One student asked if I would recommend medical laboratory science to someone who did not want to deal with injured patients. I said, I would recommend it because being a technologist does not involve much patient contact. The students were given magnets and screen cleaners courtesy of the Department of Public and Allied Health.

Overall, I believe the presentation was successful. The students seemed interested and appeared to have learned new information about medical laboratory science. While no students have contacted me for more information about the program, just spreading the information about the profession will combat the lack of awareness.

4. The Future

While the presentation, provided more information about medical laboratory science to some students, more work should be done to further promote the field. A copy of the presentation materials was left with Mr. Glandorff to use with future students. An additional copy was left at Bowling Green High School for other instructors to use. Also, the materials will be available for the medical laboratory science department to use with prospective students. Hopefully, these efforts will encourage more students to pursue medical laboratory science as a career and consider Bowling Green State University.

If others are considering creating a program to promote a medical laboratory science, I would recommend focusing on the college experience as well as the profession. When I was presenting to the students, they had more questions about my experiences as a college student than the medical laboratory science itself. Future presenters should be aware of high school students' interests in the college experience. I would recommend that they incorporate their own experiences into the presentation.

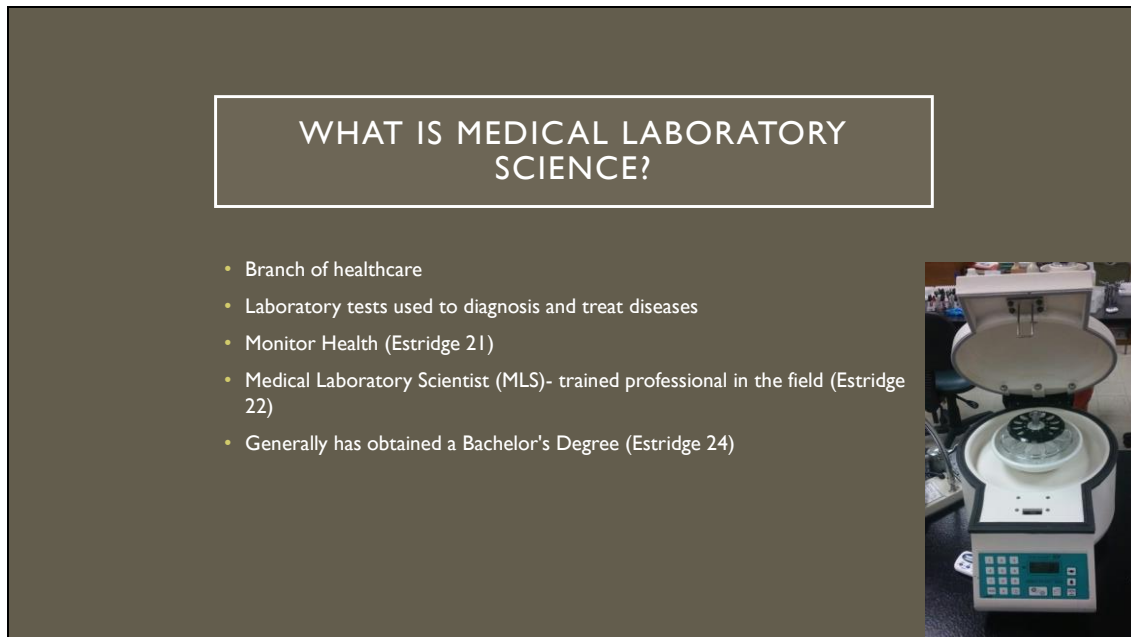
The scope of this project was limited to the Bowling Green community. The issues facing the field of medical laboratory science extend much further than one small part of northwest Ohio. Programs reaching out to high school students should exist in more communities across the nation.

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- Small, Kathy S. *Retention Strategies for Medical Technologists: Addressing the Shortages and Vacancies in the Clinical Laboratory*. Thesis. East Tennessee State University, 2013.
- "What's My Next." *Whats My Next*. American Society for Clinical Pathology, 2016. Web. 08 Apr. 2016.
- Zayas, Luis E, PhD and McGuigan, Denise, MEd. "Experiences Promoting Healthcare Career Interest Among High-School Students from Underserved Communities." *Journal of the National Medical Association*. 98.9. 1523-1531. Web. 9 Sept. 2006.

Appendices

PowerPoint Presentation



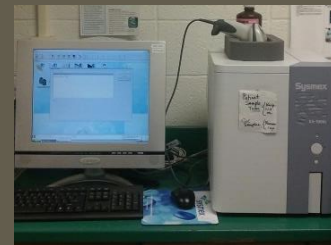
WHAT DO MEDICAL LABORATORY SCIENTIST'S DO?

- Work in clinical laboratories
- Hospital labs and Physicians offices
- Research and Public health labs
- Variety of departments in a clinical laboratory (Estridge 7-9)



HEMATOLOGY

- Examines the quantity, shape and size bloods cellular components (Estridge 12)
- Complete blood cell count (CBC)- RBC, WBC, hemoglobin, hematocrit, RBC indices, WBC differential count, platelet count, morphology (Estridge 203)
- Hematocrit- measurement of the volume of RBC- packed cell volume (PCV) (Estridge 215)
- Anemias and leukemia (Estridge 197)



COAGULATION

- Examines the blood plasma to monitor blood clotting factors in a patient's blood (Estridge 13)
- Prothrombin time- tests the clotting pathways- watch for a fibrin clot to form (Estridge 3994-3997)
- Hemophilia(Estridge 377), anti-coagulation therapy (warfarin) (Estridge 273)



URINALYSIS

- Examines the chemical, physical and microscopic properties of urine (Estridge 13)
- Reagent strips- glucose, bilirubin, ketones, blood, pH, protein, urobilinogen, Nitrite, Leukocyte esterase, specific gravity (Estridge 558-559)
- Diabetes, kidney function, infections (Estridge 558-559)



CLINICAL CHEMISTRY

- Uses analyzers to examine the chemical properties of blood, urine and other bodily fluids (Estridge 13)
- Panels of tests- Kidney, lipid, cardiac, liver, thyroid (Estridge 605)
- Special test- hormones levels and drug panels (Estridge 603)
- Cholesterol, liver enzymes, glucose (Estridge 605)



IMMUNOLOGY

- Uses blood serum to perform tests based on antigen-antibody interactions (Estridge 13)
- Infectious mononucleosis test- antibodies to the Epstein-Barr virus (Estridge 451)
- Rheumatoid arthritis- autoantibodies, IgM (Estridge 463)



TRANSFUSION SERVICES (BLOOD BANK)

- Department tests for the compatibility of donated blood product to patient blood (Estridge 13)
- Uses antigen-antibody interactions; slides, tubes, gels (Estridge 488)
- ABO and Rh factors- and more
- Transfusions, paternity, genetics, forensics(Estridge 488)



MICROBIOLOGY

- Cultures and identifies microorganisms (Estridge 13)
- Bacteriology, parasitology, virology, mycology (Estridge 695-699)
- Gram stains- classify bacteria based on characteristics of the cell wall(Estridge 695)
- Strep throat, pinworm, Influenza, ringworm (Estridge 695-699)



THE PROFESSION

- The field is expected to grow by 16% by 2024, this is faster than average growth ("Medical and Clinical")
- In 2015 the median salary was \$50,550 per year ("Medical and Clinical")
- The American Society for Clinical Laboratory Science www.ascls.org
- American Society for Clinical Pathology www.ascp.org



BOWLING GREEN STATE UNIVERSITY'S PROGRAM

- Bachelor's degree
- First three years- general study and science courses, biology, chemistry
 - Microbiology, anatomy, molecular biology, general chemistry, organic chemistry, biochemistry
- Fourth year- MLS classes at BGSU and an externship at a affiliated clinical site
 - hematology, immunohematology, clinical chemistry
- Some clinical sites include, ProMedica, Wood County Hospital, University Hospitals
- 100% job placement rate ("Medical Laboratory Science")



ACTIVITY INSTRUCTIONS

The following image is an example of the cells found in a blood sample of a healthy patient. The different type of cells have been identified for you.

You will be given cards with other images of cells.

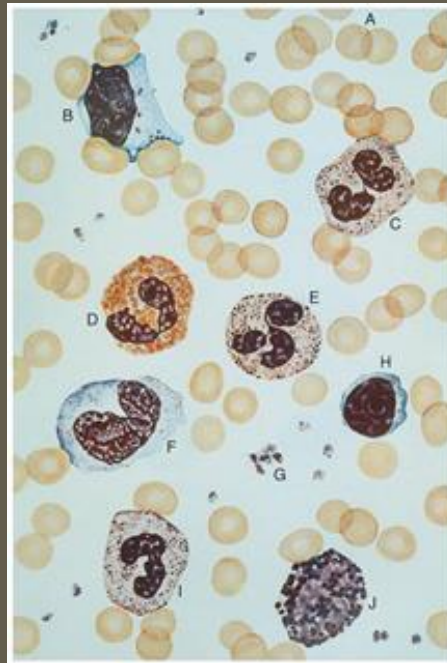
Work in pairs to determine if the sample came from healthy patients or not.









If you can try to guess what type of cell is in the sample.

- A- Red Blood cell
- B, H- Lymphocytes
- C, E, I- Neutrophil
- D- Eosinophil
- F- Monocyte
- G-Platelet
- J- Basophil

(Omaruddin)

(Omaruddin)



Sample Number	Picture (Omaruddin)	Healthy or Unhealthy	Cell type (Omaruddin)	Disease or condition (Omaruddin)
1		Healthy	Neutrophil	N/A
2		Healthy	Eosinophil	N/A
3		Unhealthy	Lymphocytes	Chronic Lymphocytic leukemia
4		Healthy	Monocytes	N/A
5		Healthy	Red Blood Cells	N/A
6		Unhealthy	Red Blood Cells	Sickle Cell Disease
7		Healthy	Basophil	N/A
8		Unhealthy	Red Blood Cells	Teardrop red blood cells-anemia and thalassemia

CONTACT INFORMATION

- Bowling Green State University College of Health and Human Services
Phone - 419-372-8242
Website- www.bgsu.edu/health-and-human-services/programs/department-of-public-and-allied-health/medical-laboratory-science.html
- Emilia Meike – efmeike@bgsu.edu



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Estridge, Barbara H., BS, MT(ASCP), and Anna P. Reynolds, MS,BS,MT(ASCP). *Basic Clinical Laboratory Techniques*. 6th ed. Clifton Park: Delmar Cengage Learning, 2012. Print.

Omaruddin, Romaica Dr. "Hematology Presentation." Bowling Green State University.

"Medical and Clinical Laboratory Technologists and Technicians." *U.S. Bureau of Labor Statistics*. U.S. Bureau of Labor Statistics, 17 Dec. 2015. Web. 14 Mar. 2016

"Medical Laboratory Science." *Bowling Green State University*. Web. 19 Mar. 2016.



Job Outlook

- The field is expected to grow by 16% by 2024, this is faster than average growth ("Medical and Clinical")
- In 2015 the median salary was \$50,550 per year ("Medical and Clinical")
- Bowling Green State University's program has a 100% job placement rate, exclusive of students pursuing graduate degrees ("Medical Laboratory Science")

For more information

- The American Society for Clinical Laboratory Science
www.ascls.org
- American Society for Clinical Pathology
www.ascp.org
- U.S. Bureau of Labor Statistics Medical and Clinical Laboratory Technologists and Technicians
www.bls.gov/ooh/healthcare/medical-and-clinical-laboratory-technologists-and-technicians.html
- Bowling Green State University Health and Human Services
www.bgsu.edu/health-and-human-services/programs/department-of-public-and-allied-health/medical-laboratory-science.html

Contact Info:
efmeike@bgsu.edu

Works Cited

- Ezridge, Barbara H., BS, MT(ASCP), and Anna P. Reynolds, MS, BS, MT(ASCP). *Basic Clinical Laboratory Techniques*. 6th ed. Clifton Park: Delmar Cengage Learning, 2012. Print.
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- "Medical Laboratory Science." Bowling Green State University. Web. 19 Mar. 2016.



MEDICAL LABORATORY SCIENCE

Emilia Meike
Bowling Green State University



What is medical laboratory science?

Medical or clinical laboratory science is the branch of healthcare dedicated to the performing laboratory tests used to diagnosis disease and evaluate health (Estridge 21). A medical laboratory scientist (MLS) is a trained professional in this field (Estridge 22). Medical laboratory scientists work in hospital laboratories, physician's offices and many other clinical and non-clinical settings (Estridge 7-9). To become an MLS, one generally obtains a Bachelor's degree (Estridge 24).

What do medical laboratory scientists do?

A medical laboratory scientist may work in a variety of different departments in the lab.

Hematology- The hematology department examines the quantity, shape and size of blood's cellular components.

Coagulation- The coagulation department examines the blood plasma to monitor blood clotting factors in a patient's blood.

Urinalysis- The urinalysis department examines the chemical, physical and microscopic properties of urine.

Clinical Chemistry- The chemistry department uses analyzers to examine the chemical properties of blood, urine and other bodily fluids.

Immunology- The immunology department uses blood serum to perform tests based on antigen-antibody interactions.

Transfusion Services (Blood Bank)- The transfusion services department tests for the compatibility of donated blood product to patient blood.

Microbiology- The microbiology department cultures and identifies microorganisms.

(Estridge 12-13)

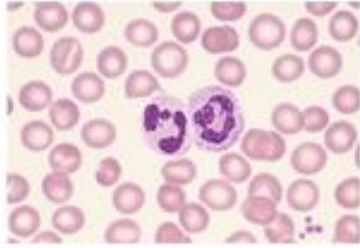


Bowling Green State University Medical Laboratory Science Program

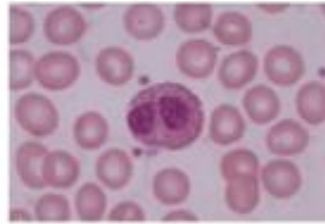
Bowling Green State University offers medical laboratory science as a Bachelor's degree program. Students take a variety of science and math classes as well as general education requirements, then apply to the program during the fall of their junior year. The program includes a six-month clinical practicum completed at a hospital, where students train alongside medical laboratory scientists ("Medical Laboratory Science").

Activity Materials

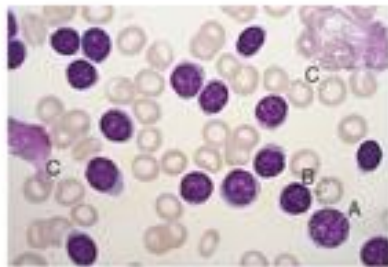
Activity Cards



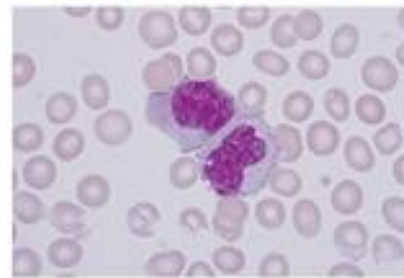
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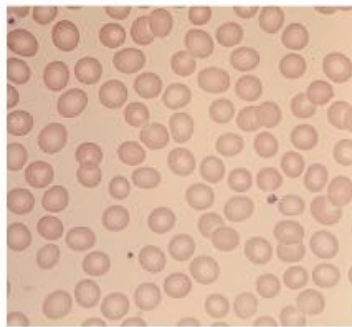
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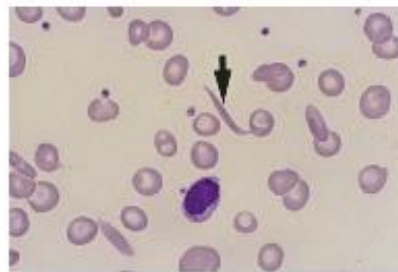
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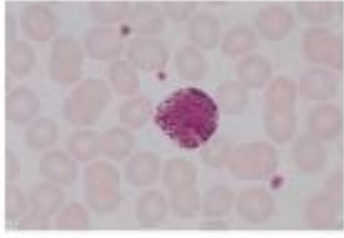
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5.

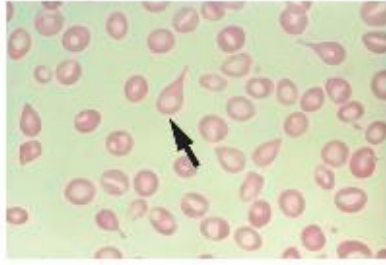


6.



7.

Micrograph of a blood smear showing a large, dark purple, spherical cell with a granular texture, likely a platelet or a small cell, surrounded by numerous smaller, lighter-colored cells.



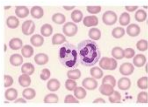
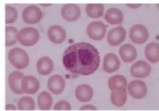
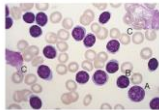
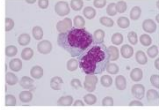
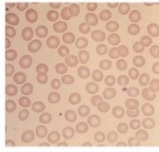
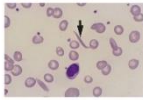
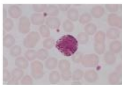
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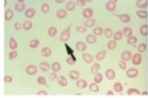
Micrograph of a blood smear showing numerous small, pinkish-red, teardrop-shaped cells. A black arrow points to one of these cells, which appears to be a platelet.

Worksheet

Sample Number	Healthy or Unhealthy	Type of Cell
1		
2		
3		
4		
5		
6		
7		
8		

Key

Sample Number	Picture	Healthy or Unhealthy	Cell type	Disease or condition
1		Healthy	Neutrophil	N/A
2		Healthy	Eosinophil	N/A
3		Unhealthy	Lymphocytes	Chronic Lymphocytic leukemia
4		Healthy	Monocytes	N/A
5		Healthy	Red Blood Cells	N/A
6		Unhealthy	Red Blood Cells	Sickle Cell Disease
7		Healthy	Basophil	N/A

8		Unhealthy	Red Blood Cells	Teardrop red blood cells=- anemia and thalassemia
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