Medical Cytometrix
Intelligently Examined

Executive Summary
August 1st, 2019

Introduction: *Medical Cytometrix Inc.* ("MCI") is a privately held, pre-revenue Canadian technology company headquartered in British Columbia, Canada. The company has a world-class technical and management team of experts with over 140 years of directly applicable industry experience. The Company is developing a cloud-based software solution that automates blood disease detection, identification and classification.

MCI is poised to revolutionize the global blood disease diagnostics industry by bringing to market a comprehensive solution, that leverages recent advancements in Artificial Intelligence (AI), Deep Learning (DL), and Image Processing. The comprehensive solution provides automatic detection, identification and classification of normal and abnormal blood cells (White Blood Cells (WBC), Red Blood Cells (RBC), and Platelets) by analyzing digitally scanned images of blood smears. MCI's patent-pending technology renders results faster and cheaper than any other technology in the market today and is more consistent, accurate and efficient than medical professionals working in the field of blood disease diagnostics (collectively, "MCI's Technology").

Company Profile

- URL: www.Cytometrix.ca
- Industry: Medical Diagnostics
- Employees /Consultants: 8
- Founded: 2016

Management

- **Athan Georgiades MD**
  CMO, Founder & Board
- **Parminder Singh P.Eng.**
  CEO, Board
- **Panos Nasiopoulos PhD**
  CSO & Board
- **Lydia Contis MD**
  CSO, Founder & Board
- **Konstantinos Plataniotis PhD**
  CTO, Founder & Board
- **Ali Lotfi-Neyestanak PhD**
  Technical Development Manager
- **Sarah Georgiades**
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The Problem: Manual review of a peripheral blood smear is one of the traditional methods used to diagnose benign or malignant hematologic disease. Today, this review is initially performed by a trained medical technologist who analyzes stained glass slides of peripheral blood in real time with a traditional microscope (referred to as "Slides"), or reviews digitized images of blood cells on a computer screen that have been digitized through an automated process. Cells that are suspect or cannot be interpreted with confidence by the medical technologist are typically forwarded to a pathologist, hematologist, or other highly trained specialist for a more definitive interpretation. The entire process is time consuming, labor intensive and often results in inconsistent interpretation of the Slide by a medical technologist and/or a pathologist. According to a 2014 study, lab tests diagnostics errors occur nearly 12 million times each year in the United States. That means 1 in 20 lab test results are misinterpreted or incorrect[1].

To improve the flow-through efficiency and to meet demand, hospitals often speed up the analysis process by utilizing digitized images obtained from Slide Scanners to enumerate and identify blood cell types. This creates two very distinct problems. First, we have to recognize that the number of WBC on a typical Slide can range between 2,000-5,000 cells. Today, there is no meaningful approach to evaluate which of these WBC should be chosen for further review and characterization by a medical technologist. Neither medical technologist nor the pathologist will review all WBCs on a Slide. There simply is not enough time. In some cases, WBC selection criteria can be as simple as whatever WBCs are in focus during image digitization process, or whatever WBC are in the middle of the Slide. There are also somewhat arbitrary scanning exclusion zones defined by scanner manufacturers where the scanner does not scan or consider the WBC cells in that area. This lack of meaningful selection criteria increases the potential for

'false positives' and even worse, 'false negatives' errors. A patient therefore can be told that he/she is healthy and normal at the early stages of a disease manifestation because the WBCs that were chosen to be further analyzed were based on an error-prone and irrelevant selection criterion.

Competition

- Sysmex Corporation
- Beckman Coulter
- Abbot Laboratories
- Siemens AG
- Roche Diagnostics
- CellaVision
- TechCyte
- Blood Hound

The Second issue that emerges is that most large hospitals in developed countries have blood scanning instruments, similar to those developed by companies such as *Cellavision*, but these scanners have very little capability beyond simply identifying the type of cells on the Slide. What is needed for a robust analysis is the ability for a system to identify the WBC, calculate the WBC count, identify which WBCs are abnormal based on established criterion, categorize which of the abnormal WBCs have what specific disease state, and finally execute detailed classification of the specifics of the type of disease state. Such examples are Acute Myeloid Leukemia ("AML") and Myelodysplastic Syndromes ("MDS"). Most scanners in the market are incapable of conducting detailed categorization or classification of blood cells to a level the that is required by a physician. Hence, use of such scanner does not completely eliminate the need for a medical technologist or pathologist - a highly skilled medical specialist is still required to confirm the classification rendered by the scanner. As a result, methods and systems currently being used to expedite review and cell diagnosis, even in established hospitals, are bottlenecked by the availability and expertise of a medical technologist and/or a pathologist to correctly identify, classify and/or confirm abnormal cell types. This delay has a very negative consequences on medical professionals being able to provide timely patient care.

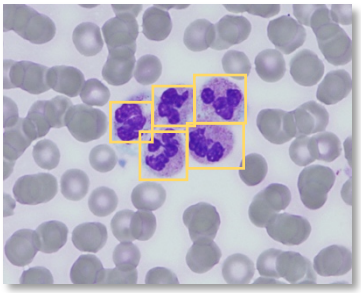
MCI's Technology directly addresses both of the aforementioned issues.

Opportunity: MCI is finalizing Phase 1 development of a cloud-based AI system that will allow anyone, anywhere in the world, who can obtain or has access to a digital images of a blood smear, to upload those images into MCI's web application, have MCI's AI automatically analyze those images using MCI's proprietary DL algorithms, and render a comprehensive report on the characteristics and classification of the analyzed blood cells. A physician will be able to trust and use the generated report/analysis to provide a suitable treatment to the patient from whom the blood was taken. Ultimately, MCI's Technology will be able to automatically detect troublesome trends in malignant and atypical cell counts, giving the physician an added tool to personalize patient treatments before negative trends manifest into clinical disease states in patients. A physician can also use the near real-time technology to confirm that a specific medical treatment is having a positive effect on a specific patient. Access to MCI's service will be available to anyone, anytime, anywhere and on any device (including mobile and pad devices). All that is required is for the user to be registered as a user on MCI's system, a digitized image of a blood smear, a commonly available internet connection, and a web browser. It takes less than 15 seconds for MCI's AI algorithm to analyze a blood smear. As an example, a physician could upload a blood smear image to MCI's web application and have analyzed results, in the form of a report, emailed back to him/her within 5 minutes; irrespective of where the physician is located.

In a world where the number of blood disease experts are on the decline, there is a swelling demand from an increasing world population for faster and more accurate blood analysis, and the variations of number of blood diseases continues to increase. We believe MCI is well positioned to address the unmet global needs of this multibillion-dollar industry[2]. MCI's Technology addresses the global challenge by offering the industry a 'Virtual Pathologist' by way of a Cyto-Diagnostics as a Service ("CDaaS") offering. CDaaS is an AI solution that is consistent and accurate and never tired. A solution where 'false positives' and 'false

negatives' errors caused by human stress and fatigue are minimized. A solution that reduces patient morbidity and mortality while simultaneously improving patient outcomes.

MCI is just at the early stage of fully exploiting the technology that the company has so far developed. Today, we are able to identify and classify only a few specific types of Leukemias. That said, a significant amount of resources has gone into the development of adaptable DL algorithms that, once fully trained to detect, identify and classify one disease state, can quickly be retrained to do the same with different blood-borne diseases. It typically takes 15%-20% of the effort to retrain existing DL algorithms to identify, detect and classify new types of blood-borne diseases. To that end, MCI has already begun work on identifying strains of Malaria, and Myelodysplastic Syndromes (MDS). Based on the approach taken by MCI, the potential to become a world leader in detection, identification and classification of blood borne diseases is very possible.



The healthcare industry classifies MCI's Technology as a component of the next generation digital diagnostics or personalized health; we see ourselves as a solution to a complex problem where there is tremendous opportunity. MCI's Technology can be viewed as a "Laboratory and Medical Professional's (Physician) Tool". CDaaS is not intended to replace the Physician, but rather aid the Physician in rendering a final diagnosis and formulating an effective treatment plan for the patient in question.

Business Model: The global hematology diagnostics market size is expected to grow at an impressive CAGR of 5.85% between now and 2026 while the overall spend in the industry will increase to USD $ 9.54 Billion by 2026[1]. MCI's intends to participate in this high-growth opportunity by owning, operating and offering to a global market, a cloud-based CDaaS service. CDaaS will allow anyone, anywhere in the world, who has access to digital images of a blood smear, to simply upload those images into MCI's web application for an automatic and immediate analysis of the blood smear. Essentially, CDaaS will be a "Virtual Pathologist in the Cloud".

MCI has tremendous potential and growth opportunity in two dimensions: First, MCI intends to expand the capability of its technology (DL algorithms) to be able to detect, identify and classify an extensive catalog of different blood-borne diseases; well beyond what the company initially launches with. Second, MCI's CDaaS can be gradually scaled to address the specific needs of new markets worldwide (e.g. first world, developing world countries, Asia). Together, MCI platform model offers a future-proof revenue stream with high-growth potential and high margins. According to an analysis quoted in *Scientific American;* "More than thirteen billion tests are performed in over 250,000 certified clinical laboratories each year in the U.S.[1]" Interestingly, the cost of a blood test can range between USD $312- USD $1,200 depending on the test that is ordered (there are more than 4,000 blood tests that can be ordered by a physician[3]). The average cost of a blood test cost in the range of $75-$100 USD[4]. The cost of blood-borne diagnostics can range between $5 USD to $25 USD for each blood images diagnosed. MCI will utilize the power of well-trained DL algorithms to automatically analyze images and generate revenue for every image analyzed.

When considering the generalized case of an MCI Owned and Operated CDaaS service, the company will offer tiered diagnostics services that will be priced according to: i) the numbers of images that are diagnosed (minimum digital image resolution will be required); ii) the level of characterization and classification requested by the user; and iii) the speed and priority for the image assessment. Additional

services will be available that may include storage Slide images or patient assessments on MCI's "HIPAA" (Health Insurance Portability and Accountability Act) compliant cloud servers.

In addition to owning and operating its own CDaaS service, MCI will also use the same platform (or replicate a similar platform) to support services offered by third parties that take a license to MCI's Technologies, knowhow and methodologies. Under such circumstances, MCI Technology could be licensed to the third party as a "White Label" or "Private Label" solution. With this in mind, MCI is already in partnership discussions with two major hospital chains in the United States. Other potential partners that have expressed an interest in "White Label" or "Private Label" solutions include, Insurers, Researchers, Universities, Commercial Laboratories, equipment manufactures and Governments.

Accomplishments: MCI was founded in May 2016. Since its formation, the Company has spent more than 3 years developing and refining its technology and is now months away from launching Phase 1 of its cloud-based blood disease diagnostics platform. The company has established working affiliations with subject matter experts from the University of British Columbia, University of Toronto, and the University of Pittsburgh Medical Centre. In the case of UPMC, MCI and UPMC have agreed to conduct IRB trials in conjunction with and MCI and the parties have agreed to commercial terms to share deidentified patient data. All resulting or developed Intellectual Property will belong MCI. The company is in the process of filling 2 PCT patents that are expected to be adjudicated by the United States Patent Office.

To date, MCI's team has analyzed and performed detailed classification of more than 1,500 patient cases with known disease states. In each case, the blood smear images of abnormal WBCs were painstakingly mapped by experienced hematologists to a defined disease state and were further used to train MCI's DL algorithms. Today, MCI's Technology is 98%+ accurate in being able to automatically distinguish between RBC, WBC and platelets, and calculating their respective cell counts from a digitized image. MCI's DL algorithms are now able to perform detailed classifications of abnormal WBC at the following accuracy levels:

Priority	Disease	Detection Probability
1	Acute Lymphoblastic Leukemia (ALL)	Probability of accurate detection > 90%
2	Chronic Lymphocytic Leukemia (CLL)	Probability of accurate detection > 70%
3	Acute Myeloid Leukemia (AML)	Probability of accurate detection > 90%
4	Chronic Myelogenous Leukemia (CML)	Probability of accurate detection > 70%
5	Myelodysplastic Syndromes (MDS)	Under Development

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