

Environmental and Occupational Health Monitoring Solutions using Detailed, Microscopic, Non-Invasive Biological Tissue Analysis



Photo by Jeffrey Bosdet

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Interview conducted by:
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CEOCFO: Dr. Christensen, what is your concept for TrichAnalytics?

Dr. Christensen: Our company is all about improving environmental and occupational health. We provide an innovative analysis of biological tissues at a microscopic level to help companies with their environmental and occupational health issues, notably the detection of heavy metal exposure. We have a very unique method of analysis using laser technology that allows us to analyze tissues, in particular hair, in a way that other commercial labs are unable to do. As a result, using, for example, a single hair we can provide very precise and accurate information about temporal changes in metal exposure in that individual.

CEOCFO: Would you explain a bit of the science?

Dr. Christensen: We specialize in the analysis of growing biological tissues. By analyzing growing biological tissues, we can extract the temporal information on people's or animal's health. If we take a hair as an example, a hair is composed of approximately 4 to 4.5% sulfur. As it grows, the metals and elements circulating in your blood will bind to that sulfur. Therefore, as your hair grows it acts almost like a tickertape, recording chronologically what is going on in your body. It is the same with nails, feathers, and fish scales; any kind of tissue that grows. We extract that information on a temporal scale so that we can look at a person's health or an animal's health over time as it pertains to environmental exposure, changes in diet, or following mitigation to prevent further exposure.

CEOCFO: How are you extracting it?

Dr. Christensen: We use what is called laser ablation. These lasers are very small; only about 0.03 to 0.05 mm wide. Therefore, we are able to focus on very small tissues, like a single hair. We put a single hair on a microscope slide and ablate it with the laser beam. So as the laser moves down the hair, it burns it which then releases all the elements

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(and metals) bound to the hair. We then measure what is released off the hair by using mass spectroscopy. This same procedure can also be done with other growing tissues: birds (feathers), tiny insects and fish tissues, such as ear stones (otoliths) and scales.

CEOCFO: *Is it that people have not thought of doing this or that there have not been lasers available? What is it that you have figured out that others have not?*

Dr. Christensen: Laser analysis has been around for a while. I believe it was developed mostly for geologists and geochemists. It was already being used commercially, in universities and for geological purposes for analyzing rock chemistry. However, its biological use has been very sporadic. We were the first to ever use it to study mammals and other wildlife, with the exception of fish tissues. I stumbled upon it by accident because I had the intention of using the technology for grizzly bears. I went to look up how other people did it so I could use the same method. Lo and behold, no one had done anything like it, so we had to create the method ourselves. Our applications keep growing depending upon the needs of our clients. We want to provide non-invasive solutions to monitor environmental and human health, and we can be creative to achieve those goals.

CEOCFO: *Do you have enough quantity of what you are measuring that there is room for error?*

Dr. Christensen: We only need one hair to do the analysis, but we always request three to five for that very reason. Sometimes we analyze something and everything is fine, but if ever we get an unexpected value that may be somewhat worrisome, we may want to run at least one other test to understand what is going on and to make sure that it is a real signal. Therefore, it is nice to have extras. We have an extensive quality control process to ensure that analytical and environmental error can be quantified and controlled.

CEOCFO: *Who is turning to you for services and help?*

Dr. Christensen: We actually have a really interesting and diverse clientele. We were initially working with mining companies and other industries like power, and oil and gas in terms of their environmental monitoring requirements. We have now started moving into occupational health with industries such as welding and mining by monitoring the long-term health of their workers. We are also supporting other researchers to non-invasively monitor elemental deficiencies like iron, zinc, iodine, and magnesium, and how these elements may be linked to health problems, particularly in Third World countries.

CEOCFO: *Is your approach accepted in the medical community and the environmental community or is there skepticism?*

Dr. Christensen: I think my biggest skeptics are likely on the human side. However, we have done some pretty incredible research with wildlife that shows very clearly and strongly that this is a very accurate tool to monitor long term changes in diet and health exposure in mammals, including humans. They were captive grizzly bears, so we could monitor the changes in their diet daily and characterize how that was reflected in their hair. I think people are skeptical because of the way hair mineral analysis is currently being done. It has even been called quackery. I tend to slightly agree but only because of the way they analyze the hair, which is an outdated method that can only provide an average. Their analysis requires clumps of hair; hair that has been

exposed to the environment. Therefore, hair can, in certain instances, get exposed to dust and things in the atmosphere that will influence the interpretation of the results. You also have the impact of hair products and washing that can influence the results, particularly for soluble elements. At TrichAnalytics, we only use protected hair that has never seen the light of day, notably the root. This provides the most accurate information that you can get out of a hair. Only for a few elements would I ever analyze in the exposed strand. Our approach is widely accepted within the scientific community, but we still need to educate those unfamiliar with the advantages of our methods, particularly in regard to human health.

CEO CFO: *What is your strategy to educate?*

Dr. Christensen: It will mostly be about on-going research, publishing and presentations. I am currently writing a paper about the impacts of smoking, renovating, and welding on external contamination of hair rendering the exposed strand non-useful for monitoring internal exposure to metallic elements. As to educating people, we have on-going speaking engagements in various cities with environmental and industrial organizations who are interested in the benefits of our methods. We also provide stories on the various applications our tools can support through social media, like Twitter and Linked In. Additionally, we work with our media team to promote our analytical stories in newspapers, magazines, radio shows, and on-line.

CEO CFO: *Where or how does cost come into play? Does it matter to people if they are getting the good information? Do you own the equipment or are you using the equipment in a university? What is your business model?*

Dr. Christensen: We are currently renting a lab at a university. We are looking to design and build our own lab by the end of this year. The university lab has been a great experience. They charge us by the hour to use their machines and then we use our staff to run the machines. It's a great opportunity because it is a beautiful, multimillion dollar lab that we are able to use. Our prices are based on the sample processing time, the lab fees and the amount of time it takes to report on the results. We do have to do a lot of quality control to reduce risk of liability for us and for our clients. Our business model allows us to keep overhead at a minimum, so we can keep our cost to the clients as low as possible. We provide value to our clients through high quality data, decreased costs associated with analysis, faster turnaround time for results, more detailed information, and use of non-invasive methods.

CEO CFO: *Do you see reaching out to individuals more than say, doctors or environmental organizations or are you doing it all?*

Dr. Christensen: Our current focus is environmental and human health monitoring for the mining and welding industries, environmental consultants, and the government. We will always be interested in talking and educating individuals about what we do at TrichAnalytics, but for now, we focus on organizations that have need of support within their bigger monitoring programs.

CEO CFO: *Would this be outside of the Canadian health system or do you need to be inside in some way?*

Dr. Christensen: We are currently outside the Canadian health system. However, we are looking to collaborate with various health agencies in the future on a provincial level, federal level, and even, internationally. It is important to be collaborative, so their support and endorsement of our

approach can be used for easier integration into occupational monitoring programs. Currently, some exposure monitoring is conducted using needles and is very invasive. In this way, exposure monitoring and prevention become challenging in the workplace. We feel our non-invasive methods can provide a pain-free, long-term and preventative solution for at-risk workers.

CEOCFO: *Are you seeking funding, investments or partnerships?*

Dr. Christensen: At the moment, we are currently trying to do this through our own funding, but are open to discussions with investors or potential partners. As our company is technologically innovative and conducts continuous research, we also have access to various funding opportunities within the government, as well as research tax credits.

CEOCFO: *Is there licensing required? Do you fall under regulatory control?*

Dr. Christensen: Certain projects will require that the labs have certain certifications. Therefore, we are working towards that as well.

CEOCFO: *What surprised you so far in the process as you have embarked on this business venture?*

Dr. Christensen: I would say that what surprised me the most was the time it takes to build up your client base and obtain regular income. You think that you have a great idea and provide such a unique and promising service, but you need to convince others that your idea can be the solution to their problems. So, it takes time to understand your client's problems, devise an analytical solution, and work with them to develop the sampling program. This process takes time, and can be irregular and seasonal.

CEOCFO: *Why is this an idea and a company to watch? Why is it important to take a look at TrichAnalytics, Inc?*

Dr. Christensen: TrichAnalytics Inc. uses advanced laser technology to extract precise and detailed information from single hairs and other tiny, non-invasively collected tissues, to help monitor "metal" health. In some cases, we are able to travel back in time by days, weeks, months, and even years by using tissues grown over those time periods. What other company purports to "time travel" to monitor your metal exposure?

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