

Luiz Calistro Balestrassi – Founder and President NEUROTEC®- BIOMEDICAL RESEARCH & DEVELOPMENT COMPANY; Esperança Balestrassi – Neurotec Executive Director NEUROTEC®- BIOMEDICAL RESEARCH & DEVELOPMENT COMPANY, Brazil

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Prof. Dr. Luiz Calistro Balestrassi, founder and president of NEUROTEC® - Biomedical Research & Development Company from Itajubá-MG, Brazil, and his daughter Esperança Balestrassi, Neurotec's executive director, discuss the past, present, and future challenges of this pioneering medical device company that started in 1985. In this interview, Dr. Balestrassi – a neurosurgeon by profession – explains the company's success through its innovative spirit, good management and commitment to human's health. Finally he describes the exciting future of the neurophysiological medical field, including what could be the Industry 4.0.



In 1988 you designed the first Neuromap® prototype, an electro-encephalograph. Was it the first of its kind? How has your portfolio evolved in recent years?

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Dr. Luiz Calistro Balestrassi (LB): Yes, this was the first device of its kind in Brazil. It was large, the processor was slow, but we managed to measure electro-encephalogram (EEG) data in the frequency domain instead of time. From then on, universities, research centers, colleagues, experts in health, biological psychiatry, neurology and neurosurgery started to use it routinely in their work. Federal University of São Paulo featured Neurotec as the first Brazilian company to conquer such achievement in electroencephalography history since Hans Berger in Germany. Top engineering from Minas Gerais Federal University also declared Neurotec as one of the best Brazilian companies in the field. Brazil's National Health and Surveillance Agency (ANVISA) and the National Institute of Metrology (INMETRO) certified several of our devices, and it is a matter of pride that our early devices, including the first, are still working. Our devices showcase spectral differences, asynchronies and asymmetries, as well as the activity, mobility and complexity of the brain signal. When EEG detectable changes in vascular or cellular function occur, real-time information is readily available, so the necessary precautions are immediately taken. The clinical neurophysiology team receives EEG information about everything that's occurring, for instance helping to assure anesthesia levels, which will be better controlled. In other words, by providing early diagnosis, our devices allow earlier and more appropriate prescription and treatment. Furthermore, our devices may also help brain death evaluation, favoring organ donation. [Featured_in] Neurotec is one of the few companies to dispense both medical devices and software. Most recently we also launched Monitor Software®,

providing simultaneous EEG and real-time spectral array, allowing quicker diagnosis, and on many occasions helping to select the appropriate medication for a patient in coma or under anesthesia. If a patient is unconscious we need more data about the state of his awareness; without tools to detect this we work in the dark. EEG is a very important tool, and essential to prevent patient harm. **Your company has been rewarded multiple times for its innovativeness. What has made it so successful according to you?** LB: We were granted the prestigious Inova health Award in 2010 and 2016. These along with other awards received are dedicated to the Neurotec team. Neurotec would not have been so successful without teamwork. Indeed, I am a physician, neurophysiologist and neurosurgeon, but our achievements would not been possible without the team of engineers, physicists and mathematicians. [related_story] We also strive to make our devices available to some colleagues that use them free of charge, for the purpose of a better clinical validation, before their market release. This has sparked worldwide interest of masters and PhDs in the field of research and development, which is attested by several national and international scientific publications running on our equipment. Neurotec's secret is resides in the diversification of its client base. Rather than selling to a single client, say the government, we have decided to expand and sell to multiple offices in Brazil and internationally. We built a varied clientele by introducing our devices in medical congresses and focusing more on teaching than on marketing. This has hedged Neurotec against the risk of relying on a single client. As experts in the field we share the physician language, better recognizing patient needs if compared to a general manager with little brain function knowledge. Projects benefitting and protecting patients, nurses, and physicians can be developed. **How has the company navigated the challenges in the Brazilian medical device environment? How big is the organization you have built in the last 30 years** LB: The Apex-Brazil investment association and the Brazilian health Device Association (ABIMO) are two of our partners that help companies develop themselves. The latter is a national entity enjoying worldwide recognition. I believe human beings thrive in adversity. Over 90% of companies are family owned, and they are very strong. These companies have ensured their succession, and thus, they persist. Our company is an example and it is not alone. Neurotec presently has five units, three of each are located in Itajubá-Minas Gerais in an covering area to 60.000 m², and the others two units are located at São Paulo state. We have around 4.000 devices installed in Brazil, with circa 20.000 people involved in their use: patients, suppliers, physicians and employees. Thus, our company may be small, but it can involve the whole world. In spite of modest revenues, Neurotec had never depended on external capital to fund its growth. Initially, money was invested from my private work at office and surgeries into Neurotec's research, and we would argue that most companies' success is due to the ability of growing with their own resources. **How important is international trade for Neurotec and how do you address the challenges of internationalization? If you have partners, what is most important when selecting them?** Esperança Balestrassi (EB): We started exportation to diversify our client base, and our products are now available in Mexico, South Africa, Portugal, and Uruguay. Again, the role ABIMO has played in helping us with international regulations, patents, and current measurements among other things must be highlighted. We are looking forward to increase the company share of exports, taking further advantage of the CE European Certification; due to European Union support this way is paved in the technical sense. All Europe is open to us. However, Neurotec's size hinders its ability to guarantee a perfect after sales service.

We don't want to encounter post-sales concerns in any European country, therefore a solid structure and back up is needed, which will take time to establish. We already have hired Obelis to act as our representative in Europe, and are currently looking for distributors with the same philosophy and concern on post-sales. LB: Regarding my background as a physician, it is mandatory to be concerned about the proper patient care. More specifically, our company is always looking forward to offer patients the most precise diagnostic. Neurotec doesn't want to let its clients unassisted, and consider of paramount importance to be aligned with its partners on the devices location, usage, and post-sales assistance.

The electroencephalograph market in Brazil is poised to be one of the fastest-growing EEG markets in the world. Which segments do you believe will be the growth drivers of tomorrow?

LB: In the years to come several neurology and clinical neurophysiology areas are likely to grow fast, such as imaging methods, occupational medicine, psychopharmacology and pharmacodynamics. In addition, precision on injury topology and topography will increase, as well as brain monitoring development, also helping to better gauge anesthesia levels required. Finally, I think Industry 4.0 will get consolidated. We'll have data remote access and use AI (artificial intelligence) in many applications. It is a great challenge. It is very exciting to think that we may soon be sending wireless brain signals through electrodes placed on our head. The processor, acting as a biological amplifier, could send signals to an internet server, helping the patient and the physician.

How would you summarize the key values of Neurotec? LB: Our goals stand from our principles. Our primary areas of concern are clinical neurophysiology applications, anesthesia, good customer service to health professionals and partner companies, not only sales. For example, at an international healthcare fair, one of our competitors failed to get advertising space for his products; alerted by Neurosurgery Society President, we suggested the company to share Neurotec's booth to present its products. The President said he'd never seen that all his life. We are still friends, always enjoying a healthy competition. You can notice that money doesn't come first. EB: Additionally, we have restored the fauna and flora of several pieces of land in Itajubá, where our factory is located. This year, we planted 3000 species of trees, and the Office of Environmental Enforcement sent us animals kept in captivity so we can work to restore them to the natural habitat.

What is your proudest achievement in a career spanning more than 30 years? LB: Nothing makes me feel better than the sensation of a job well done. We are also happy to contribute to the industry 4.0, believing it will revolutionize the future. Again, nothing surpasses the fulfillment of having created a solid family involved with the company's development. Indeed, one of my daughters is a neurologist, and I work with both my wife and my other daughter. Regardless of my presence, the feedback, suggestions, and even colleagues criticism give me the assurance that the company will go on, thus reinforcing the impression that my contribution will continue as a legacy.

What advice would you give to a young entrepreneur trying to set up a business in this particular sector? LB: It is necessary to find ways of acquiring capital without great dependence, for instance through setting up a co-operative society or a joint venture. Additionally getting the information from regulatory organs is essential for compliance, or else the project could end up uncertified. These organs will also help to understand what is needed in terms of norms and regulations. Finally, any successful entrepreneur will tell you that developing a business in the long run takes a lot grit, determination, intuition and planning. The competition is intense and only these qualities can help you become successful!