

Applying the Science of Nature to Antibiotics

by Jean Paul
The Suit Staff Writer



Nicholas Landekic, CEO of PolyMedix Inc., has taken the road less traveled in the pharmaceutical business. After more than ten years working for big pharma and in research, he had earned a secure place in their workforce. But with true entrepreneurial spirit, he eschewed that comfort and went out on his own. Today, he is working on a class of new drugs that imitate antimicrobial peptides to kill bacteria, with the bacteria unlikely to develop resistance. PolyMedix calls these new antibiotic compounds “defensin-mimetics.”

Landekic traces the origins of his work to Dr. Michael Zasloff, the scientist who, in 1986, discovered that the skin of the African Tree frog harbors armies of protein-like germ fighters, which Zasloff isolated and dubbed magainin – the Hebrew word for shield – and found that “squads of these agents literally patrol a frog’s skin, attacking and destroying bacteria cells that threaten infection.”

“Every higher form of life produces the host-defense proteins against bacteria,” Landekic explains. “They kill bacteria physically, not biochemically,” he added. “When Zasloff discovered these host-defense-proteins, many in the scientific community thought it was the Holy Grail.”

Landekic noted that Dr. Zasloff’s research was “the first to discover the class of agents known as host-defense-proteins, which has since been found in virtually all higher life forms. This includes humans, in whom the agents are called ‘defensins,’” he said and further explained that the host-defense-proteins are a key component of the immune system; all higher life forms use them as a first line of defense against bacteria. He said studies point out that bacteria have modest or no capability to resist antimicrobial peptides. This increases the potential application of the peptides. The way the host-defense-peptides work can be used as the basis to create new forms of antibiotics to battle bacteria that have developed resistance to conventional drugs.

“These are great discoveries to kill bacteria,” Landekic added. “A recent study by APIC (the Association for Professionals in Infection Control), showed a dramatic increase in drug resistance, with about 70% of infections now being resistant to at least one conventional antibiotic.”

These new antibiotic agents, he said, are the first of their kind to directly address the serious medical problem of bacterial drug resistance. “The host-defense-proteins punch holes directly in bacterial cell membranes via a biophysical rather than biochemical mechanism of action,

which makes resistance unlikely to develop,” he added. “Using a proprietary computational drug design technology, PolyMedix has studied how these host-defense-proteins work and developed fully synthetic, artificial small molecules which have the same mechanism of action and mimic their activity. Our lead compound in this effort is called PMX30063, with which we have completed two Phase 1 human clinical studies, and recently started a Phase 2 clinical trial for the treatment of Staph infections.”

Landekic further stated that the data from two Phase I clinical studies demonstrate that PMX 30063, a defensin mimetic antibiotic compound, are encouraging. Accordingly, the new compound was “generally safe and well tolerated in the trials.” Researchers found that single and multiple doses of the drug were well-tolerated at levels suggesting that the therapy could be beneficial. Additionally, it was found that a single dose of the compound provided bactericidal activity against four different strains of Staph bacteria, including two MRSA’s, in blood samples drawn from subjects in the study.

After having earned his Bachelor’s from Marist College and his M.S. in biology from Indiana University, Landekic secured an MBA from the State University of New York at Albany. “I had a great interest in life science. But the business side also interested me a great deal,” Landekic said, explaining why he opted for an MBA before plunging into his corporate Odyssey.

At 52, this entrepreneurial biologist has placed himself centerstage in the world of Biomedical Science. With more than 25 years of experience on the corporate side of pharmaceuticals, his resume reads like a Who’s Who in the industry: President and CEO for two years at Locus Discovery, Senior Vice-President of Corporate Development & Investor Relations at Guilford Pharmaceuticals, four years in Business Development at Cephalon, and in strategic marketing and new product planning at Bristol-Myers Squibb, then positions in finance and business development at Johnson & Johnson. “Spending several years at the major pharma companies gave me phenomenal opportunities,” Landekic said from his corporate office in Pennsylvania. “But in any large pharmaceutical company, it’s very bureaucratic.”

Having cut his teeth in the pharmaceutical industry, he ventured out on his own in 2002 and founded PolyMedix, Inc., an innovative company that prides

itself on research and development. “I’m more entrepreneurial,” he said. “For example, when I went to work for the company Cephalon, at the time it was a small company. And it became a larger, more successful company,” he added, “It took twenty years to gain this experience, and I knew I wanted to create a company with a combination of rational drug design and a rational business model. That’s why I started PolyMedix.”

Landekic is ever on top of new developments. Through computer technology, for example, a new matrix for advanced biomedical research has been made available. When scientists at the University of Pennsylvania created state-of-the-art computational techniques, PolyMedix used those techniques to create small synthetic organic molecules and polymers, which are easier to make than peptides. Both forms utilize the same mechanism of action and have comparable germ-fighting capabilities as do host-defense-proteins.

Landekic explained that receiving funding for research and development has been a challenge over the years, due to the economic downturn. “It is tough securing adequate financing,” he said. “A lot of times, you don’t have enough money.” While he’s used to hunkering down in the trenches, fighting for funding in the pharmaceutical industry, he acknowledges that the collapse of financial markets in 2008 was problematic. “It’s been a challenge because now many investors don’t want to invest long-term. The financial markets need to take risks in this research. Everyone wants a big return quickly, but it takes time and money to develop these kinds of new drugs,” he added. “It is a high risk, in exchange for the possibility of high rewards. Most investors today prefer small short term profits.” PolyMedix has taken the long view in order to come up with better alternatives to conventional antibiotics.

