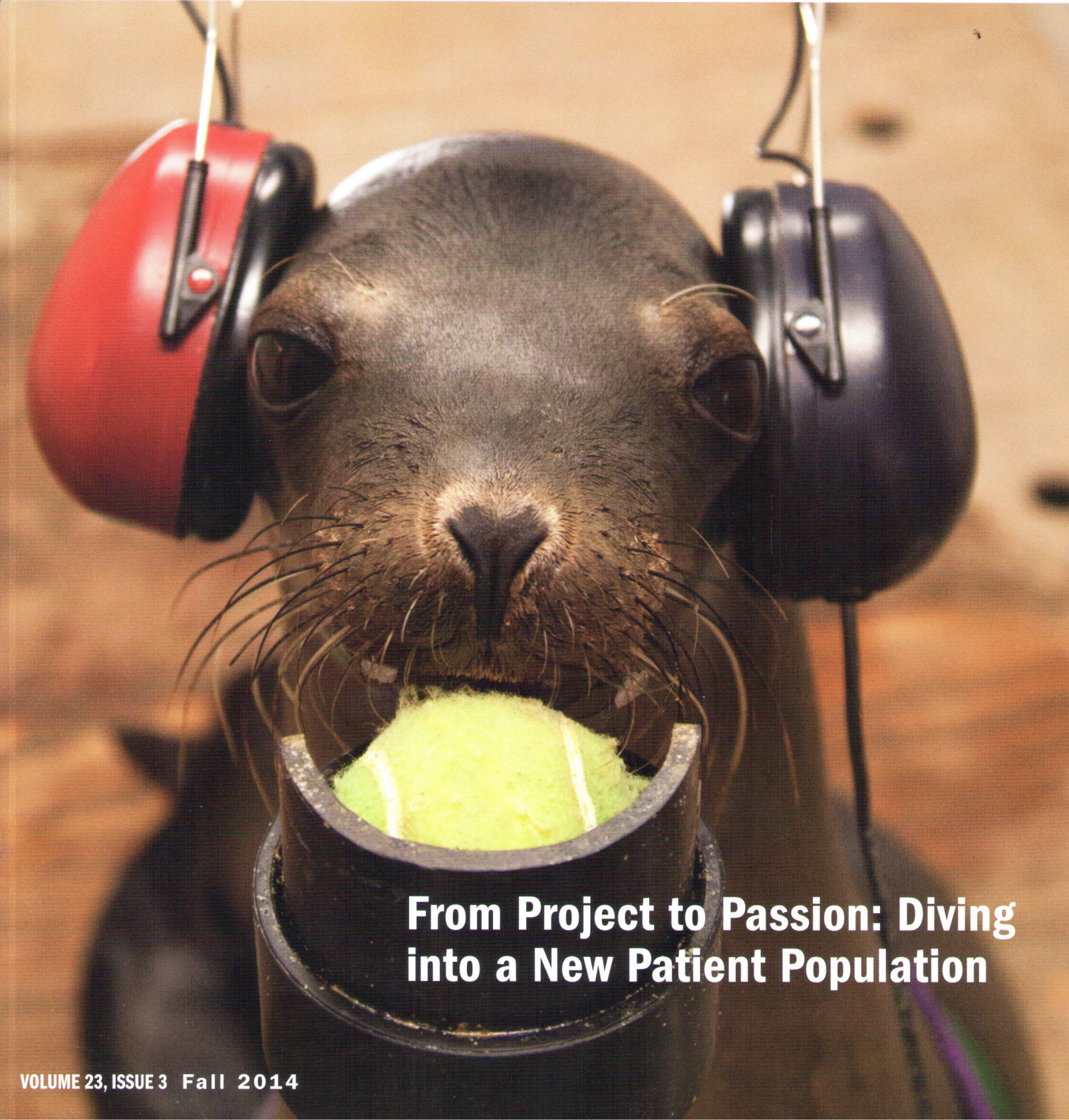


# LifeLines

For the Southern California Life Science Community

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**From Project to Passion: Diving into a New Patient Population**



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Biocom, a member driven organization is here to assist life science companies like yours to fulfill your most ambitious goals. We can help your company with saving money, advocacy, increased visibility, networking opportunities, capital development and workforce development.



## WELCOME

**By Joe Panetta,**

*President and CEO, Biocom*

### OUR BUSY SUMMER

Welcome to the fall 2014 edition of Lifelines. I am writing this in Biocom's temporary offices, where we are eagerly anticipating completion of our new member-friendly offices on Torrey Pines Mesa.

It has been a busy summer, as we plan for our final move next February. We look forward to welcoming you to our new facility, which will provide an improved space to meet with newly formed start-ups, established pharma and device companies and the many research entities that will surround us. I again want to thank Alexandria Real Estate and our board member Brent Jacobs of Cushman Wakefield for creating this exciting opportunity.

Since our last issue, we have enjoyed a very successful BIO 2014 annual convention. During the convention, more than 14,000 people came to San Diego from across the globe to network, enjoy panel presentations and hear from such prominent leaders as former Secretary of State Hilary Clinton, Sir Richard Branson and Governor Jerry Brown. By all accounts, it was one of the most successful BIO conventions ever, led locally by our board members Magda Marquet and Steven Mento.

But it could not have been so successful without the help of our business partners in San Diego. In particular, I'd like to thank the San Diego Convention and Visitors Bureau and the San Diego Regional EDC for their support. Finally, Mayor Kevin Faulconer was tireless in meeting with foreign delegations and enthusiastically addressing the convention with a rousing welcome from San Diego's life science community.

In this issue, we celebrate some not-so-familiar aspects of Biocom's efforts, as well as those of our extended life science community. In our cover story, Cammy Duong of Canale Communications again joins us, this time to focus on the research being done on diabetes and aging, using dolphins as study subjects, at the National Marine Mammal Foundation. If you attend Biocom's Annual Dinner on November 20, you will have a chance to hear more about this cutting-edge research.

As a reminder of why we go to work each day in this industry, as we plan for our upcoming annual dinner, our Events Department takes a look at some of the amazing patient advocates we've featured over the years.

Much of our work on the public policy front supports our large therapeutic and medical device membership. However, this month our Public Policy VP Jimmy Jackson discusses our efforts to better inform the public and legislators about the facts surrounding genetic modification of salmon and other fish. In this case, calls for labeling and more health effects studies were not supported by the scientific data.

In addition, our Purchasing Group story focuses on some of the different programs we offer to help scientists. Our Biocom Institute column will tell you about Fatigues to Lab Coats, our program for veterans entering the life science industry. Also, while many members have participated in our annual San Diego Festival of Science & Engineering, we also offer STEM and other educational programs for teachers and students leading up to next year's Festival.

The capital markets have been very good to our life science companies over the last two years, with the IPO market at an all-time high for our industry. But the real life-blood of our success in Southern California has come from active VC investing. Our roving reporter, Mandy Jackson returns this month with a story on recent venture transactions and discusses some of the capital formation programs that Biocom offers our members.

I look forward to our continued success as an industry, and hope to see you soon at one of our many Biocom functions.

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## COVER STORY

By Cammy Duong, Canale  
Communications

# From Project to Passion: Diving into a New Patient Population

Coming Together to Accomplish Something Bigger Than Ourselves

In the 1960s, Sam Houston Ridgway, D.V.M, Ph.D., an experienced Air Force veterinarian, was called on by the Navy to provide medical care for dolphins, which were being studied for their speed and agility. This interaction between humans and marine mammals soon blossomed into a partnership to locate undersea mines, recover lost objects and find enemy divers. The

partnership helped researchers learn about marine mammal health and intelligence, which has been described in more than 1,000 peer-reviewed scientific publications.

More than 40 years down the road, Dr. Ridgway's fascination with dolphins led to the founding of the National Marine Mammal Foundation (NMMF). As a nonprofit, the NMMF aims to protect the health and welfare of marine mammals and humans through research, conservation and education.

The NMMF's research, an extension of their work with the Navy Marine Mammal Program (MMP), led to the establishment of a dream team of experts for the foundation's scientific advisory board. Led by Gregory Poland, M.D., director of the Vaccine Research Group and the Mary Lowell Leary Professor of Medicine and Infectious Diseases at Mayo Clinic, the board includes experts from the Salk Institute for Biological Studies, the Centers for Disease Control and Prevention, the University of California, San Diego, Duke University, Stanford University and the University of Minnesota.

The foundation's research has significant applications to human health. "After almost seven years, we have reached a critical tipping







point with our marine mammal translational research that is aimed to benefit both human and dolphin health,” said Stephanie Venn-Watson, D.V.M., director of the Translational Medicine and Research Program at NMMF. “Today, we have momentum, excitement and a growing community of human health physicians and

scientists in diabetes, aging and infectious diseases joining our dream team. This growth in world-renowned scientists is being paired with sound science and potential breakthroughs in understanding how dolphins may help prevent, manage and treat diabetes in humans.”

The foundation’s long-term relationship with marine mammals has led the dolphins and sea lions of the program to willingly cooperate by providing blood samples, ultrasounds and CT scans, as well as participating in hearing tests. This allows researchers to gain greater insights into their overall wellbeing. For example, given a simple command when it’s time to have their blood drawn, dolphins are responsive by flipping their tails up so researchers can draw blood for research.



### The Breakthrough

While the Navy Marine Mammal Program is not well known to the public, the Navy is allowing limited, escorted access to its facilities to raise awareness about the NMMF and its research. The 80 dolphins housed at the facility work in open waters and are monitored around-the-clock by experienced veterinarians who have established rapport with the marine mammals.

The research and environment differ significantly from the

traditional researcher and mouse relationship that exists within life science laboratories. Researchers look at dolphins as a new patient population and experiments are based on evaluating the dolphins’ natural physiological state, as opposed to manipulating it.

In 2010, the NMMF made a remarkable discovery that made headlines around the world – dolphins may hold the key to curing diabetes in humans.

“Our journey started with an amazing and unexpected finding that dolphins, before they ate their breakfast, had blood value changes similar to people with diabetes, versus later in the day, after they ate, their blood changes mimicked those in people without diabetes,” said Dr. Venn-Watson. “This led us to believe that dolphins could have a switch that could turn a diabetes-like state on and, more importantly, off.”

The foundation discovered that dolphins can display pre-diabetes-like symptoms, but never progress to Type 1 or Type 2 diabetes. They’re working with prominent local research institutions, such as the Salk Institute of Biological Studies, to expand on these findings.

One element that has been helpful in this research is an incomplete sequence of a dolphin genome, which revealed that genes related to glucose metabolism are similar between dolphins and humans. Additionally, the foundation has discovered that humans are more similar in many physical characteristics to dolphins than they are to chimpanzees, and that as dolphins get older, they exhibit common disease states with humans, such as high triglycerides, chronic inflammation, and high cholesterol. The foundation hopes to partner with an organization to fund the sequencing of the remaining dolphin genome to see what other similarities may exist between humans and dolphins.

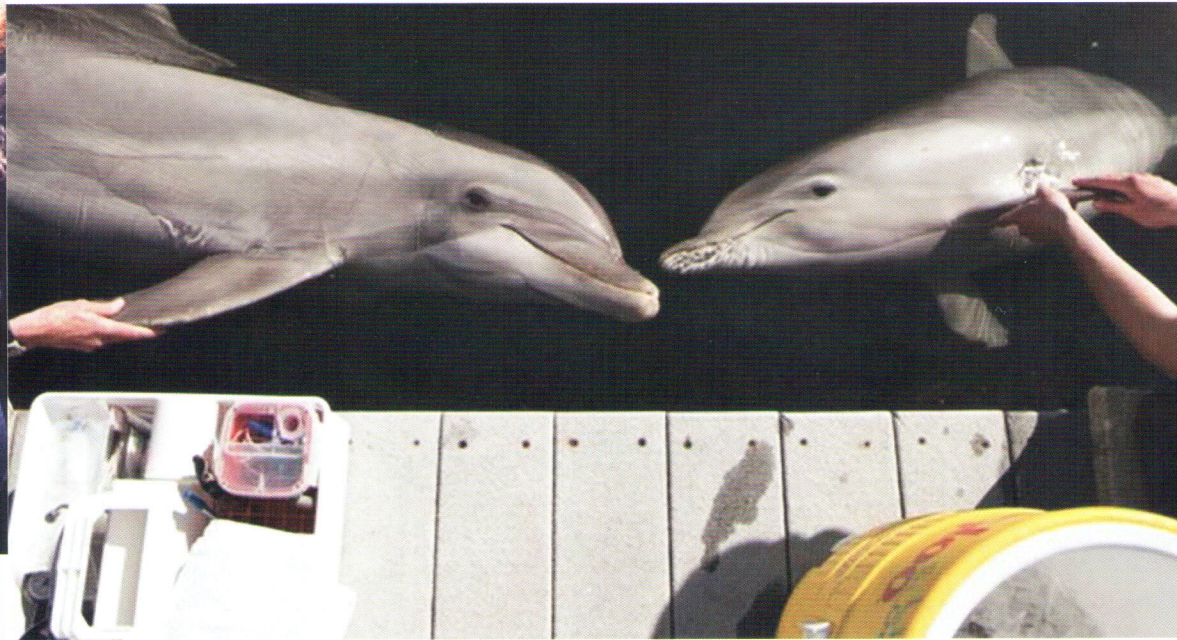
### The Other Branches of Focus

While diabetes is the foundation’s primary focus, their work spans into other sectors, such as aging and infectious diseases.

Current research conducted in atherosclerosis by Evan Muse, M.D., Ph.D., KL2 Clinical Scholar and Cardiovascular Research Fellow at the Scripps Translational Science Institute, may illuminate the relationship between metabolic syndrome and vascular disease in dolphins and could translate into cardiovascular







over 10 years compared to wild dolphins assessed from 1994 to 2003. During 2013, 30 percent of the MMP dolphin population was older than 30 years, with the oldest dolphin being 52 years – demonstrating that a high proportion of dolphins in this managed population are surviving beyond reported expected ages of free-ranging dolphins<sup>1</sup>.

### The Challenges

As the foundation continued to share its research, the biggest hurdle was getting the scientific community on their side.

“The primary challenge is one of scientific silos,” said Dr.

Poland, Director of the Immunization Clinic and the Director of the Program in Translational Immunovirology and Biodefense at the Mayo Clinic. “The veterinary and human medical and research communities, surprisingly, have not learned from each other to the degree that would actually benefit both camps. Our job will be to join in the increasing chorus of voices and professional organizations that do recognize the importance of ‘one health’ and promote its importance to scientists, funding agencies and the public. We will all be better off and more quickly advance the science and translate that into medical advances when we work together and learn from one another.”

Another challenge, noted earlier, is not having access to the full dolphin genome. Having the full genome would be a giant step towards translating the findings from working with marine mammals into something substantial for the human population.

### The Future

As we wait for a life-changing breakthrough that could revolutionize diabetes care, the statistics remain the same – more than 29 million people have diabetes in the United States and 450 million will fall victim to the disease by the year 2030, according to the American Diabetes Association.<sup>2</sup> Given this global health crisis, the foundation will dedicate significant resources towards diabetes over the next five years.

A recent two-day, TED-like clinical meeting hosted in San Diego by the Office of Naval Research, the MMP, and the NMMF brought 50 world-renowned researchers from 38 nonprofit, academic and government organizations from all over the country to discuss how to improve marine mammal health, as well as potential applications to human health. At the meeting, the researchers helped establish

disease prevention in humans.

On the infectious diseases front, David Relman, M.D., The Thomas C. and Joan M. Merigan Professor in the Departments of Medicine and of Microbiology & Immunology at Stanford University, has been looking into the bacteria (microbiome) that make their homes in marine mammals.

“What happens to dolphins in the water may be an indicator of changes in the natural environment that will have an impact on us as well,” said Dr. Relman. “Every animal has their own story on what their microbiome does for them, but so far we have had very little information on mammals that live in the sea. That’s interesting to me because there could be fundamental differences in the microbiomes of animals that choose to call the sea their home as opposed to those that live on land.”

Part of the reason the marine mammals make such good subjects for these studies is because of how well they are cared for. The foundation’s emphasis on providing the utmost care for the Navy’s and other marine mammals is driven by passion and a primary mission. The marine mammals are further ensured the best care through the program’s accreditation by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC) and routine animal care and welfare reviews by the Navy’s Bureau of Medicine and an Institutional Animal Care and Use Committee.

With such protocols in place, the foundation’s population of marine mammals is the longest surviving. A recent study published in the *Journal of the American Veterinary Medical Association* found that in a population of 103 dolphins living under the care of the United States Navy Marine Mammal Program (MMP) assessed from 2004 through 2013 had a median age of death increase by



a five-year strategic plan with four big focuses on how to prevent, manage and treat diseases in marine mammals, many of which are also present in humans. This bold program seeks to:

1. Find the diabetes "off" switch
2. Cure diabetes with a diet of fish
3. Stem the negative effects of high blood sugar
4. Monitor diabetes using breath



Other research priorities include geriatric health and Alzheimer's disease. The foundation is also looking at its longest surviving sea lion population and monitoring their health. This study was prompted by an unusual event in 2013, when more than 1,000 dead sea lion pups were washed ashore in San Diego.

"By taking marine

mammal research into the digital era and incorporating these lessons in humans, we can apply it to a whole new population," said Dr. Evan Muse. "The crossover is the dolphin version of the 'quantified self' in understanding basic physiology."

As a result of greater visibility, the foundation has two patents pending for research tied to nutrients in fish consumed by the dolphin and detecting diabetes technology through breath.

The research conducted by the National Marine Mammal Foundation is not only diving into the commonalities between dolphins and humans and translating that into greater insights and better treatments for both species, it's also giving hope to families impacted by diabetes.

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3. Photos are credited to the United States Marine Mammal Program



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