



By Alan Lewis

ABOVE: Keynote being delivered by Dr Eadric Bressel, director of Movement Research at Utah State University

A new age of technology is dawning – but are we ready to accept new attitudes and treatments in our swimming pools and spas? The 15th annual World Aquatic Health Conference (WAHC) was held this year at the Charleston Marriott in South Carolina, where the National Swimming Pool Foundation (NSPF) continues its focus on aquatic research and education.

In his keynote presentation, Eadric Bressel PhD reviewed the benefits of the scientific literature wherein aquatic activities are shown to be more beneficial or on par with land-based activities which improve physical and cognitive health. He pointed out that there is evidence in the research pointing to marketing aquatic activities for elite athletes as well as those with disabilities.

Professor Bressel's aquatic research examines how athletes adapt to various physical movements necessary to perform therapeutic exercise and thereby proves the numerous health benefits of water activity, as compared to similar adaptations performed on dry land.

The format for this WAHC differed from those in the past. While the main elements of the conference were conducted in the Charleston Marriott, six locations were chosen as WAHCities in Boston, Colorado Springs, Dallas, Los Angeles, Minneapolis and Niagara Falls. The main elements of the WAHC were broadcast to these locations at appropriate times. This allowed many who were unable to reach Charleston to attend broadcast lectures nearer their homes.

Thus this WAHC had a record attendance of nearly 600 people including representatives from Australia, Austria, Canada, China, France, Israel, the Marshall Islands, Mexico, Poland, Ukraine, the United Arab Emirates, the United Kingdom and the United States.

Seven main streams of topics were presented:

1. Elements of WAHC
2. New Industry Technology
3. Recreation Water Illness Prevention
4. Facility Management and Design
5. Advanced Service Concepts
6. Increasing Fun and Reducing Risk
7. Improving Water and Air Quality

There were simply too many subjects to deal with here, but I will choose those that might be more important and relatively new to most readers, and present them in this and the following issue. First up is UFB.

Ultra-fine bubble technology

Without a doubt, ultra-fine bubble technology (UFB) was the most significant of the technologies discussed, presented by Michael Geyer from Pure Vision Technologies for the first time at a WAHC.

Also known as nano-bubble technology, this technology is not new and has been developing in many parts of the world, particularly in Japan, for more than a decade in areas such as agriculture, waste water conservation and recycling, fish farming and cultivation, and aquaponics.

Now Geyer, who is based in Phoenix Arizona, has finally produced two devices for swimming pools and spas as well as bodies of water such as lakes, decorative pools and fountains. Geyer reports that he has installed his products in well over 100 pools around the USA.

The product for commercial pools is known as AquaGen, while Aqua Fuzion is for residential pools. Both systems dissolve oxygen into the water itself and discharge it in the form of tiny bubbles which are only one-tenth of a micron in size. They are too small to be seen with the naked eye and so Aqua Fuzion researchers need a sophisticated and a very expensive facility with which to measure the number

of bubbles produced, using a laser beam to count the bubbles in the water.

It might be hard to believe, but we were told that these machines make roughly 100,000,000 ultra-fine bubbles in one millilitre of water!

Because they are so small, they cannot break the surface tension of a water molecule and hence remain in suspension in the water for weeks at a time.

Water enhancer status

All-in-all, because of the huge number of bubbles, the collective sum of oxygen bubbles amounts to a large area of contact between the oxygen and particles, micro-organisms and contaminants that are usually present in swimming water.

It is reasonable to assume that these bubbles do oxidise many of the contaminants in the water.

However, Geyer decided to add ozone to the system to greatly increase its disinfecting capability. In addition, he added oxygen concentrators to the system so that indoor pools can also benefit from the purification of the air in the pool hall.

When these products were submitted to the National Sanitation Foundation (NSF) for approval, the authorities thought there would be insufficient disinfection and oxidation of the water in public pools, where the bather loads are high.

So these products were awarded NSF approval as a "water enhancer". At the same time, they required that the public pools or spas have at least 1.0 ppm of free chlorine in the water. So until it is proven that the combination of oxygen and ozone fine bubbles together are satisfactory, the addition of chlorine will remain the practice. By running ozone through the Aqua Fuzion, both the oxygen and the ozone molecules are atomised 1000 times smaller than typical systems.

It must be emphasised that where ozone bubbles are of larger diameter and visible to the naked eye, we know that these are not of any value to disinfection, because they would immediately rise to the surface and gas-off by breaking the surface tension of the water and joining with the rest of the oxygen in the air above the pool.

Therefore, the size of the bubbles is vital because when they are that small, they will remain in suspension much longer and are more likely to oxidise unwanted micro-organisms in the water.

Although it is not greatly significant, sensing of the ORP in this water is a good indication of the power of the bubbles to oxidise. However, a pool running as

described above will still need the 1ppm of free chlorine at this stage of the development of this technology. Beyond that, more research is needed to measure the effectiveness of the breakdown of organics in the pool.

We know that the oxygen bubbles are negatively charged, and hence will latch onto and surround organic positively charged particles which are present. The next step is to research the effects of millions of bubbles on cryptosporidium, giardia and other pathogens that frequent swimming pools. Since these pathogens are anaerobic, we can assume they cannot survive in a highly alkaline, oxygenated environment. What remains to be discovered is just how much oxygen is needed to do the job.

WAHC Highlights

The 15th annual WAHC session topics included interlock safety, national water safety plans, legal issues in aquatics, preventing sexual harassment and predators, facility management and design, and learn-to-swim initiatives.

Dr James Amburgey, a water filtration researcher at the University of North Carolina at Charlotte, was a breakaway hit throughout the conference, bringing humour, candour and urgency to the broader discussion of water filtration and water quality. Dynamic Genesis faculty Feras Irikat also proved popular presenting WAHC's new Design & Engineering track. A colour psychologist, Irikat's sessions on colour theory and the art of innovation highlighted the diverse industry concerns that have come to typify the audience that gathers for the WAHC. Kerstin Hewitt, an environmental health specialist in California, clarified just how energising that diverse audience can be: "I always come back with such renewed enthusiasm for the work we and others do in conjunction with recreational water facilities."

Attendees from the Environmental Health (EH) sector have a growing presence at the WAHC, making up around 17 per cent of all registrants.

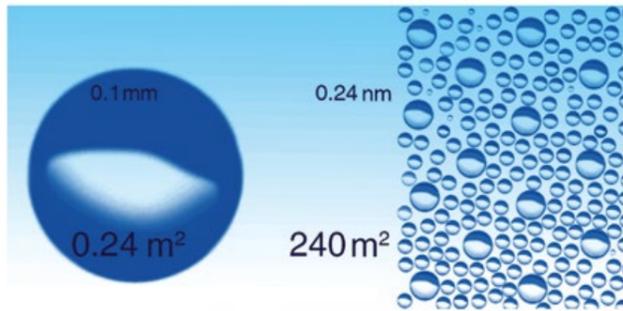
The 16th Annual WAHC will be held in Williamsburg, Virginia, October 16–18, 2019. Early registration begins in April 2019. Interested presenters and attendees can learn more at thewahc.org.

BELOW LEFT: Colour theory class led by Feras Irikat

BELOW RIGHT: The new UFB technology has been installed in more than 100 pools in the USA



1000x times more surface / ml



ABOVE: The smaller bubbles stay suspended in the water, enabling oxidation of contaminants

ABOVE RIGHT: The technology can make roughly 100,000,000 ultra-fine bubbles in one millilitre of water

The benefits of UFB

Even though this technology is not yet prevalent, there have been many incidents reported of those with ailments such as inflammations, swelling, psoriasis, eczema, scars and wounds, burns, arthritis and even skin cancer wounds healing after regular visits to a pool treated with UFB. The reports suggest healing does take place and help the sufferers recover promptly from their maladies.

This needs much research – but would add enormously to the aquatic industry if it was proved true and may help thousands with ailments that might need a simple solution such as bathing in UFB water.

UFB systems have been installed in the Mesquite Groves Aquatic Centre in the City of Chandler in Phoenix. This happens to be the highest use municipal public pool in the state of Arizona. Below is a chart showing the reduction of chemical costs for the annual fiscal years after the installation of the new systems:

- 2013-2014: \$83,482
- 2014-2015: \$73,170
- 2015-2016: \$49,661

Chlorine and bromine have been in use for more than a century but have never been able to help sufferers in such a way. We can hope that this new science will lead to a revolution in thinking about just how we should treat swimming pool water, and hopefully Geyer and his associates will push forward with the essential research needed to ensure better water in our swimming pools and spas.

RIGHT: Learn to Swim Success Stories Q&A, JJ Ayers-Millar and Basir Robertson, City of Charleston Recreation Department

The Elements of WAHC panel with (left to right) Scott Bowron (NCAquatics), Joseph Stefanyak (Jeff Ellis & Assoc.) Dr James Amburgey (University of North Carolina), Dr Darla Goeres (Center for Biofilm Engineering, Montana State University), Dr Michael Beach (CDC's National Center for Emerging Zoonotic Infectious Diseases)



bubble behaviour



Next time

- In the next article I will look at the research into further important aquatic industry issues including:
 - Understanding the neglected insidious biofilms, by Darla Goeres PhD;
 - Future filtration needs, by James Amburgey PhD;
 - Links between water and air quality in chlorinated swimming pools, by Ernest “Chip” Blatchley;
 - Drowning risk factors and prevention strategies, by Julie Gilchrist PhD
 - Surface bound organic contamination disinfection and swimming pool filtration, by Vance Fiegel;
 - Legionnaires’ disease: steps to reduce risk in aquatic venues, by Jasen Kunz MPH;
 - Standard of care in design, construction and implementation to improve water and air quality, by Doug Whiteaker;
 - Outbreaks: crypto, legionella and pseudomonas, and other healthy swimming updates, by Michele Hlavsa RN MPH. ■



JOIN WITH INDUSTRY LEADERS FOR THE SPASA LEADERSHIP CONVENTION 2019

HILTON HOTEL ADELAIDE



FRIDAY 2 AUGUST 2019

EARLY BIRD PACKAGE \$995

SAVE \$165

SPASA Australia presents the 2019 Leadership Convention, with internationally acclaimed speakers set to inspire and motivate, and culminating in the celebration of the ever-popular National Awards of Excellence.



Valued at \$1,160, secure your booking and save! Limited to the first 100 registrants, this package entitles you to attend not only the Leadership Convention and National Awards of Excellence, you also gain access to the **exclusive Roof Top Networking event**, being held on Thursday 1 August.

VISIT SPASA.COM.AU TO REGISTER

