



VIBRATING BUBBLES, BRILLIANT IMAGES AND PALPABLE THERAPEUTICS

It all started in the late eighties of the last century. Real time 2D medical ultrasound imaging was established and color Doppler turned out to have excellent diagnostic utility in the larger vessels and cavities like the atria and ventricles of the heart. For visualising smaller vessels, however, there was a clear need for a contrast agent to rescue the Doppler signal. Microbubbles were the obvious candidates, since it was known that small bubbles reflect ultrasound strongly. Very quickly, several pharmaceutical and start-up companies introduced gas filled microbubbles for intravenous administration. Clinicians reported improved image clarity in organs like heart, liver, kidney, and brain. BUT, the fact that bubbles were echogenic, was also the *only* knowledge we had at that time. Nonlinearity was an unknown word in medical acoustics and we were ignorant about vibration modes of bubbles, jetting, diffusion of the gases, buckling, interaction with surrounding tissue, etc etc. . .

There was a clear need for understanding the fundamental physics of microbubbles, their use in other organs than the heart, their safety, and also their potential application for therapy. Thus, 1996 saw the start of the yearly European symposium on ultrasound contrast imaging, also referred to as the Rotterdam bubble meeting (www.echocontrast.nl).

The symposium has reached its 25th anniversary last January 2020. As always, it highlights new directions of research, early experiments and clinical applications by both established faculty and young investigators. The symposium is known for its strong interaction between different disciplines, including clinicians (cardiologists, radiologists, neurologists and others), physicists and engineers, biologists and chemists, from both

academic and industrial backgrounds, and it links to worldwide initiatives through the ICUS(.org) society.

For this anniversary the organising committee has invited established groups of researchers to contribute review articles covering different aspects of the past, present, and future directions in the field. In total 12 topics have been defined in four areas; 1. Bubble technology (theoretical modelling, state of the art contrast agents, new and emerging agents), 2. Clinical (liver, heart perfusion and flow, carotid), 3. Imaging (conventional, high frame rate, super-resolution, molecular imaging, machine learning) and 4. Therapy (fundamental principles and clinical applications). The reviews will be accompanied by [Special Collections](#) of key UMB research papers, designed to offer readers an overview of timely areas of research.

Nico de Jong

On behalf of the organizing committee
and scientific board:

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