DAN Europe at the Conflans Aquatic Centre

Conflans, 2 March 2012: Our journey in the exploration of bubbles continues…

Every time we set off on a new adventure, we wonder what discoveries we will make and how many new friends we'll meet. This time our friends are Christian Furet and Christophe Riou, who await us smiling in front of the Centre Aquatique de Conflans to sign the official agreement of collaboration with DAN Europe, thus starting a new phase of research. Christian, an expert diver and motorcycle enthusiast runs the pool, whilst Christophe runs the aquatic centre. Active since 2001, the centre welcomes nearly 20 thousand divers a year, attracted by a pool 20 metres deep, the only one near Paris.

A 10-metre long banner hangs from the balcony facing over the pool, welcoming divers before their immersions. It says "Building Diving Safety Together". A slogan suitable for DAN Research, because without the help of precious facilities like this and the enthusiastic participation of divers all this wouldn't be possible. Even Pierre Yves Cousteau, who collaborates with DAN Europe DSL (Diving Safety Laboratory), has accepted our invitation and is ready to follow us into the water. Pierre-Yves is an expert diver despite his young age, and has thousands of dives in his logbook.

So we get to the 2nd day of tests. A new machine, a high quality ultrasound scanner, will support us on our journey to learn more about post-dive bubbles. The bubbles will be classified according to a version of the Spencer scale (echocardio), suitably adapted by DAN Europe to make it comprehensible to divers.

BUBBLE GRADE

0	No bubble	Green
LBG (Low Bubble Grade)	Low bubble grade	Yellow
HBG (High Bubble Grade)	Many bubbles	Red
HBG+ (High Bubble Grade Plus)	Too many bubbles to count	Violet

The initial briefing includes the explanation of the dive protocols and tests to be carried out. There are four dives in two days, with the same duration and depth, but differentiated (see tables 1 and 2) according to the physical effort made during the dive. The divers make "square dives" that are recorded with modern underwater computers.

TABLE 1 – GROUP A DIVES

DIVE	DEPTH	DURATION	PHYSICAL EXERCISE	
			YES	NO
1st day	20 metres	30 minutes	X	
1st day	20 metres	30 minutes	X	
2nd day	20 metres	30 minutes	X	
2nd day	20 metres	30 minutes	X	

TABLE 2 – GROUP B DIVES

DIVE	DEPTH	DURATION	PHYSICAL EXERCISE	
			YES	NO
1st day	20 metres	30 minutes		X
1st day	20 metres	30 minutes		X
2nd day	20 metres	30 minutes		X
2nd day	20 metres	30 minutes		X

The physical effort planned during the dives of Group A (see table 3) consists in taking the flippers off on the bottom and running from one side of the pool to the other. The effort made during this movement corresponds to level 3 on the DAN Europe DSL scale.

TABLE 3 – EFFORT GRADE (DAN Europe DSL Scale)

0 No effort	
1 Light effort	Diving in currents or photography
2 Moderate effort	Diving with some trim difficulties and flipping to maintain trim
3 Severe effort	Diving against a moderate current
4 Extenuating effort	Diving against a strong current or buddy emergency

During the tests carried out in March 2011 (cf. Alert Diver 3_2011) we had found a low production of bubbles, probably due to some typical variables associated with diving in pools (and therefore, also in a Trench): warm water and little exercise.

Another factor to be considered is that **divers think of deep pool merely as “pools”, forgetting the adjective “deep”** and even behaving like yo-yos, usually avoided whilst at sea.

DIVE PROFILE

			Depth	Dive time	Extra deep stop	Safety stop
			20m	30 min	3 min at 10m	5 min at 5m

In the image of the **profile recorded during the tests**, the diving profile is highlighted.

To carry out post-dive tests a laboratory was set up right by the pool: this means that some measurements, such as **thermal photography** to highlight variations in post-dive body temperature were taken in the “zero moment”, i.e. immediate after the dive and ultrasound scans. The thermal photos were taken in specific body areas: the face, chest, feet, hands, shoulders and back, following to a precise protocol.

THERMAL PHOTOGRAPHY

Post-dive ultrasound scans confirm a first result: Group B (divers not doing the exercise) produced few bubbles, with values of between 0 and Low Bubble Grade; on the contrary, the divers in Group A who did the substantial effort exercise (cf. Table 3), registered a high presence of bubbles (High Bubble Grade). This result, even though it needs confirmation from a new round of tests with a dedicated protocol, makes us reflect once more on the adequacy and wisdom of a an old adage: don't make any efforts during a dive.

If we think of how far we have come and how far we still have to go, we can understand even more the **importance of participated research, of which DAN Europe was the pioneer.** Today we can say we have a vast and tested experience in the training of research technicians, and can define 95% of the data collected in the field as being of "excellent quality".

Another interesting moment at Conflans was the scientific study carried out on free divers, aimed at measuring endothelial reactivity after apnoea diving. The study is about to be published and we will be able to provide you with more details in the next issue of the magazine.

A special thanks goes to all those who participated, making this new and fascinating adventure possible!

This event was held in collaboration with the PHYPODE Project.

Advancing knowledge on the physiopathology of decompression, highlighting the risk factors for the formation of intravascular bubbles: it's the objective of PHYPODE, a European Union-funded project under the Marie Curie Initial Training Networks initiative.

PHYPODE unites academic and industrial partners, international nonprofit associations and hyperbaric medical centres on an international scale.