Reply to comment by Peter T Wilmhurst and Christopher Edge

We would like to express our appreciation to Dr Wilmshurst and Dr Edge for their interest in our article[1] and raising conversation about divers' fluid balance.

We agree that there is no convincing evidence that the amount of diuresis experienced by divers increases the risk of DCS. Also, there is no convincing evidence that dehydration is a risk factor for DCS. Yet, there are a lot of anecdotal reports of divers suffering from dehydration. It is quite common that divers experience severe thirst after longer dives. After one liter of fluid intake after longer dives, divers still report being thirsty, but are not at that point 'gasping' for fluids anymore. It might still take hours until these divers feel the need to urinate despite the large amount of fluid intake.

Outside of extremes, clinical signs and symptoms of dehydration in adults are subtle and assessment is difficult. No single diagnostic test exists to accurately determine volume status.[2,3] Early symptoms (mild dehydration, 1–3% loss of body weight) may include increased thirst, dry mouth, weakness, and decreased urine output,[3] symptoms divers tend to have after longer dives.

To address the criticism of "*there was no consistency of dive durations between subjects*" we would like to address that the dive protocols were designed to be as identical as possible: the instruction was to use the same depth, the same route, the same diluent gases, the same pO_2 setpoints and the same ascent algorithm. However, in real life circumstances it is impossible to achieve a precisely identical dive profile for all dives. A strict scientific approach from laboratory-like environments as in the Navy Experimental Diving Unit (NEDU), or in the deep pools in Belgium or Italy provide a superior setting for addressing specific scientific questions, whereas our research group had the goal to study divers in a 'real-life' situation, although it creates challenges to control confounding factors.

We were careful to protect the divers' privacy as the number of divers performing at this level in Finland is very limited. Therefore, we decided to present the results as shown in the article. After careful consideration and assurance that this goal would not be jeopardised, we decided to now add more detailed data, which is now shown in Table 1. Here we demonstrate each diver's dive (depth and time) and weight loss. The weight is shown as a pre and post dive difference rather than absolute values, again to protect diver anonymity. This also addresses the criticism raised to use InBody 720 composition analyser, as both measurements are done with the same equipment and therefore even if there were inaccuracies in absolute values, it would not skew the values that show the change in weight. The InBody 720 composition

Table 1
The individual divers' maximum diving depth and time, and difference in weight before and after dive measured after voiding bladder and in underwear only

Diver #	Depth (mfw)	Dive time (min)	Δ weight (kg)	Depth (mfw)	Dive time (min)	Δ weight (kg)
1	47	70	-2.0	102	180	-1.8
2	46	59	-1.1	103	180	-2.1
3	45	63	-1.9	102	176	-1.7
4	46	70	-1.0	103	171	-1.2
5	45	68	-1.2	102	170	-0.8
6	45	62	-0.6	100	170	-1.1
7	45	74	-1.0	104	155	-2.2
8	44	72	-1.0	103	155	-1.1
9	46	64	-1.1	105	148	-1.5

analyser was used in our study as we were also interested in divers' body composition, like fat-%, although these data were not reported in this study.

Although we are not able to determine the exact minute schedule of measuring weight before and after dives, the process was as following: The diver voided the bladder, he / she was weighed in underwear, he / she went to don the undergarment, drysuit, and mounted the preset CCR unit, did the safety checks and prebreathing, and started to dive. During the dive the divers were able to use a *P*-valve allowing them to urinate. Immediately after undonning their equipment, they voided the bladder, and were weighed wearing the same underwear before the first VGE measurement.

One of the limitations in our study was that we did not ask the divers to have a food and drink diary before the test dives. For safety reasons, we did not want to restrict or guide their eating or drinking before a challenging dive to 100 mfw. All divers were very skilled and experienced and had developed their own habits on how to prepare for the dives as challenging as this. The researchers chose not to interfere with their protocol.

Dr Wilmshurst and Dr Edge state they have repeated the calculation of the regression coefficient for VGE grade versus weight change. We were actually calculating correlation coefficient, not regression coefficient. According to our professional statistician, also involved in this study, Spearman's method looks for a monotonic correlation, whereas the linear regression specifically looks for a linear effect. Our dataset most likely is simply too small for linear regression analyses, as the recommended minimum is around 25. Our professional statistician chose the best option to present the data.[4]

From the confidence interval, it can be seen that although there was correlation in our data, it is practically negligible, in other words, the result is very weak. Considering that the number of participants was small, we stated in the article that caution is needed when interpreting causal relationships and our study did not offer new evidence supporting the notion that dehydration simply measured by weight loss, increases decompression stress in divers. Our study produced a null result, which is rarely reported in diving medicine research.

The authors thank for this opportunity to clarify these issues and share some additional data with the *Diving and Hyperbaric Medicine* journal readers.

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