# The world as it might (possibly) be

## Correlation of wavelength and amplitude of visual peripheral stimuli with decompression sickness in 'teckies': a triple-blinded, power-analysed study

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**Introduction**

Research on decompression models is shifting away from traditional physical and statistical approaches towards those that include physiological parameters, such as 'Copernicus' and the 'digital diver'.[1] Endothelial function, genetic disposition and heart rate, for example, are all currently being investigated.[2–6] Although visual stimuli have been used to assess narcosis and oxygen toxicity, any correlation of this parameter with decompression sickness (DCS) occurrence has not been investigated.[7] The present paper reviews DCS occurrence in 'teckies' and investigates any correlation with peripheral visual stimuli in the diver.

**Methods**

A questionnaire was sent to 251,214 technical divers of both sexes, with a minimum of 1,000 hours of diving logged. The questionnaire examined the type of optical adjustment systems used by each diver and asked if they had ever been diagnosed with DCS.

Peripheral visual stimuli are dominated by the reflectance spectrum of the diver's optical adjustment system. An optical densitometer was used to measure reflectance in all of the optical adjustment systems that are available on the market. The reflected light was analyzed with a spectrometer in a range between 450 and 780 nm. The results were logged, then compared with the responses given in the questionnaires.

**Results**

Response and return of the questionnaire was 100%. Of all divers polled, 99.99% used an optical adjustment system with a reflectance at the lowest end of the scale. The typical reflectance spectrum of an optical adjustment system was below 10%. The reflectance spectra are even, with no differing wavelengths bar one small peak at the upper end of the scale. This indicates that most optical systems used were black (Figure 1). Twenty-five divers (0.01%) used an optical system that registered at the higher end of the reflectance spectrum. This equated to a pink colour (Figure 2; sorry B&W only). Twenty-four of these respondents were female (age range 18–22 years), the other was an older Scandanavian male known to the authors.

In total, 3,768 teckies had been diagnosed or treated for DCI; 1.5% of the polled population, in keeping with previous studies of DCS in a similar group.[8] All divers with DCI used a black optical adjustment system ($P < 0.0001$).

**Discussion**

There was a very strong correlation between DCS occurrence and a low level of optical reflectance, i.e., the mask was black. Of the small population that wore optical systems with spectral reflectance at the higher end of the scale, no cases of DCS were observed; therefore, it can be said with some confidence that brightly coloured optical systems, especially pink ones, are protective for DCS.

One particular case was investigated. This female diver (known to many in the baromedical diving community) was wearing a mask with a typical low optical reflectance but also a strikingly coloured wetsuit with multiple spectral spikes at the wavelengths corresponding to bright blue, green, orange and pink. In a typical diving position, the diver is looking forward and peripheral stimuli coming from the suit are outside the field of vision. Therefore, we conclude that the colour of the suit has no protective effect against DCS.

**Conclusion**

Being a teckie diver is risky; DCS can occur despite the use of modern decompression strategies that are considered 'safe'; decompression is still not completely understood. This investigation shows clearly that the color of the optical adjustment system, or 'diving mask', may increase the risk of DCS. In other words, using a brighter, more colourful (preferably pink) mask for technical diving is likely to reduce the risk of DCS. This might also explain why many tropical fish are so brightly coloured. Therefore, the authors have

**Figure 1** **Figure 2**

contacted Santa Claus asking him to bring bright, colourful diving masks for teckies the world over.

We wish you "*Merry Christmas and a successful, safe and healthy 2016!*"

**References**


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**Conflict of interest**

Any resemblance of the authors to real persons is purely coincidental. All the references are genuine and well worth reading!

**Key words**
General interest

# Erratum

In the paper:
Smart DR, Van den Broek C, Nishi R, Cooper PD, Eastman D. Field validation of Tasmania's aquaculture industry bounce-diving schedules using Doppler analysis of decompression stress. *Diving and Hyperbaric Medicine*. 2014 September:44(3):124-136.
numbering in the reference list starts at 3, whereas it should start from number 1. The numbering sequence in the text is correct.

## Back articles from DHM

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***Elizabeth Elliott***: The assessment and management of inner ear barotrauma in divers and recommendations for returning to diving. *Diving Hyperb Med*. 2014;44:208-22.

***Marco Gelsomino:*** Development and testing of a pleural vacuum relief device to allow normalised pressurisation rates and minimal staff input when pleural drain units are used in the hyperbaric environment.

***Iestyn Lewis:*** Performance of the Baxter Infusor LV10 under hyperbaric conditions. *Diving Hyperb Med*. 2014;45:37-41.

***Csongor Oltvolgyi:*** Subatmospheric decompression illness: a review of aetiology, clinical presentation, and treatment.

***Alexander Pullen:*** A survey of illicit drug use amongst Western Australian recreational divers.

***Michael Reid:*** Decompressing rescue personnel during Australian submarine rescue operations.

***Susannah Sherlock:*** Hyperbaric oxygen therapy in the treatment of sudden sensorineural hearing loss: a retrospective analysis of outcomes and narrative review of alternative therapies.