An examination into the origins of microscopic gas emboli in blast

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Appendices

Abstract

Injuries from blast are found in a variety of clinical settings following exposure to an explosion. An explosion results in a blast wave, formed as it releases (and expands) the gas produced, into the immediate surrounding environment. While blast trauma is well documented in the literature, the origins of microscopic gas emboli resulting from blast are not. As such the management of gas emboli for blast victims is currently not based upon research evidence.

The major objective of this research was to outline and test an alternative theory to microscopic gas emboli development in blast other than the popular and untested translocation theory.

This research has shown a rapid decompression effect liberates a dissolved gas (carbon dioxide) from blood to gas bubble, this was supported by a lowered carbon dioxide content in active samples and aligned acid-base chemistry using a blood gas analyser. These findings justified a further experiment using an explosives experiment, again using blood samples and blood gas analysis. Although the blast experiment did not provide clear evidence in support of the autologous theory for microscopic gas emboli formation (due to the effects of the positive pressure phase), it justifies the continuation of the search for mechanisms of emboli development other than translocation because the bubbling in blood could not possibly have resulted from translocation via damaged pulmonary architecture.

Statement

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint award of this degree.

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