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Hyperbaric hyperoxia suppresses growth of Staphylococcus aureus, including methicillin-resistant strains.

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PURPOSE: We investigated the effects of increased oxygen tension on the in vitro growth of Staphylococcus aureus (MRSA), methicillin-sensitive Staphylococcus aureus (MSSA), and Escherichia coli (E. coli). METHODS: The effects of oxygen tension [normobaric normoxia (21% O(2) at 1 atm), normobaric hyperoxia (100% O(2) at 1 atm), hyperbaric normoxia (21% O(2) at 2 atm), and hyperbaric hyperoxia (100% O(2) at 2 atm) on the in vitro growth of MRSA, MSSA, and E. coli were investigated by population analysis. RESULTS: Compared with normobaric normoxia, a 90-min exposure to hyperbaric hyperoxia significantly inhibited growth of both MRSA (by 25.0 +/- 3.0%, mean +/- SEM; P < 0.01) and MSSA (by 24.0 +/- 3.3%; P < 0.01). Normobaric hyperoxia and hyperbaric normoxia were without effect. In contrast, the growth of E. coli was not affected by any of the above treatments. CONCLUSION: Our results indicate that the bacterium S. aureus, including resistant strains, is susceptible to oxygen stress. The observation that relatively brief (90-min) treatment with hyperbaric hyperoxia is sufficient to produce significant growth inhibition suggests that hyperbaric hyperoxia may be useful in the treatment of serious staphylococcal infections.

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