Stem cell emergence after HBO in volunteers


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Introduction:
Studies have identified a cell population called endothelial progenitor cells (EPCs), which can be isolated from circulating mononuclear cells, bone marrow, and cord blood. EPCs express a number of endothelial-specific cell-surface markers and exhibit numerous endothelial properties. The exposure to hyperbaric oxygen therapy (HBO) has been proved to mobilize stem/progenitor cells from the bone marrow. We investigated the emergence of EPCs characterized by great proliferative potential and vessel-forming activity in vivo in healthy volunteers.

Materials and Methods:
15 healthy volunteers were submitted daily to 20 HBO treatments (seven breathed only air, as pressure control), daily for 90 min at 2.4 ATA.
• Venous blood samples were drawn for lymphomonocytes isolated at the first treatment (before and after HBO); after 10th, after 20 th treatment and one month after the last treatment (wash out).
• Characterization (flow cytometry) and culture (endothelial medium) of EPCs was accomplished. EPCs, identified and enumerated via flow-cytometry as CD34, CD133 or VEGFR2 expressing cells.

Results:
We employed a specific culture method for EPCs, obtaining, between 5 and 22 days of culture, colonies of fVIII and CD31 positive endothelial cells. Our results show that CD34 remain constant at the basal level; CD34/CD133 increase in volunteers already after the first (p = 0.0126) and the tenth HBO treatment (p = 0.0316). CD34/CD133/VEGFR2 increase only after the first HBO treatment (p = 0.0327) in comparison with the group of volunteers who were breathing air.

Conclusions:
HBO may be mobilizing stem/progenitor cells even after one single exposure to HBO. This might represent a cell-based therapy for repair of damaged blood vessels.