

Hyperbaric Oxygen Therapy (HBOT) Prevents Autoimmune Diabetes Onset in NOD Mice

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Background: Hyperbaric Oxygen Therapy (HBOT) has been attributed numerous properties, including immunomodulation and tissue repair. Aim of our study was to assess the effects of HBOT on autoimmune diabetes development in Non-Obese Diabetic (NOD) mice.

Methods: Female NOD mice were monitored for glycosuriae (positive glycosuria confirmed with nonfasting glycemia > 350 mg/dl) to detect diabetes onset. Experimental groups included: (1) Four-weeks old mice treated daily with 60 min HBOT (2.0 atm) and untreated controls; (2) Ten-weeks old mice treated daily with either HBOT or hyperbaric ambient air (Air) starting 1 week before a single intraperitoneal injection of cyclophosphamide (CyP; 200 mg/kg) to induce accelerated autoimmune diabetes.

Results: Spontaneous diabetes onset occurred in 85% of control mice (n = 20; median: 20.5 weeks, range 16-26 weeks). HBOT significantly reduced diabetes occurrence to 45% (n = 20; range 19-29 weeks; p = 0.002 log-rank test). In another set of experiments, 80% of the mice in the control group receiving CyP without hyperbaric treatment developed diabetes (n = 20; median: 15 days, range 11-21 days). A similar pattern was observed in the Air-group, with 80% diabetes incidence (n = 10; median: 14 days, range 11-14 days). HBOT significantly reduced diabetes occurrence to 40% (n = 20; range 11-14 days; p = 0.02 vs control and p = 0.04 vs Air).

Conclusions: Our data indicates that HBOT can significantly reduce autoimmune diabetes incidence in NOD mice, both spontaneous and CyP-induced onset. Both the safety profile and its non-invasiveness (with virtually absent side effects) make HBOT a suitable candidate to further exploration of its possible clinical applications, including in diabetes prevention trials as a single strategy or in combination with other treatments.