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CLAIMS:

1. A method of modifying cognitive performance of a subject, the method comprising treating said subject by one or more treatment cycles, each treatment cycle comprises exposing said subject to hyperbaric conditions and oxygen rich environment, and carrying out at least one cognitive training task during said exposure.
2. The method of claim 1, comprising at least 2 treatment cycles.
3. The method of claim 1 or 2, comprising between 5 and 120 cycles.
4. The method of any one of claims 1 to 3, wherein treatment conditions are the same in each treatment cycle.
5. The method of any one of claims 1 to 3, wherein the treatment conditions differ from treatment cycle to treatment cycle.
6. The method of any one of claims 1 to 5, further comprising assessing cognitive performance of the subject before said exposure to obtain a first score.
7. The method of any one of claims 1 or 6, further comprising assessing cognitive performance of said subject after said exposure to obtain a second score.
8. The method of claim 7, further comprising comparing said first score and second score to obtain an evaluation score of the subject.
9. The method of claim 8, wherein said evaluation score for a given treatment cycle determines the treatment conditions in one or more subsequent treatment cycles.
10. The method of any one of claims 1 to 9, wherein said hyperbaric conditions comprise exposing the subject to a pressure of between about 1.1 absolute atmospheres (ATA) and about 3.2 ATA.
11. The method of any one of claims 1 to 10, wherein said oxygen rich environment comprises between about 22 vol% and about 100 vol% oxygen.
12. The method of any one of claims 1 to 11, wherein each treatment cycle is carried out for a period of time of between about 1 minute and 200 minutes.
13. The method of any one of claims 1 to 12, wherein each treatment cycle comprises a total time of exposure to said oxygen rich environment of between about 1 minute and about 240 minutes.
14. The method of any one of claims 1 to 13, wherein exposure to said oxygen rich environment is carried out intermittently.

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15. The method of claim 14, wherein exposure to said oxygen rich environment is carried out during defined time periods, with intervals of administration of lower oxygen levels in between said defined time periods.
16. The method of claim 15, wherein said intervals are of between about 10 seconds and about 30 minutes.
17. The method of any one of claims 1 to 16, further comprising a compression stage before said treatment cycle.
18. The method of claim 17, wherein said compression is carried out at a rate of between about 0.1 m/min and about 2 m/min.
19. The method of any one of claims 1 to 18, further comprising a decompression stage after said treatment cycle.
20. The method of claim 19, wherein said decompression is carried out at a rate of between about 0.1 m/min and about 2 m/min.
21. The method of any one of claims 1 to 20, wherein said at least one cognitive training task is one or more task selected from verbal memory task, nonverbal memory task, immediate memory task, delayed memory task, information processing speed task, attention task, executive function task, motoric task, visual perception task, multi-tasking assignment, visual spatial task, verbal task, navigational task, intelligence task, working memory task, task switching, response inhibition task, psychomotor speed task, verbal functions task (fluency/naming/vocabulary), response time, double decision, sustained attention, divided attention, selective attention, working memory, long term memory, reasoning, auditory processing, and combinations thereof.
22. The method of any one of claims 1 to 21, wherein said treatment cycle further comprises at least one physical training task carried out under said hyperbaric conditions and oxygen rich environment.
23. The method of any one of claims 1 to 22, wherein the subject has a history of brain injury.
24. The method of claim 23, wherein said brain injury is selected from stroke, traumatic brain injury (TBI), ischemia, hypoxia, damage due to metabolic disorder, damage due to toxic exposure, and infection.
25. The method of any one of claims 1 to 22, wherein the subject suffers from a neurodegenerative disease, dementia, or mild cognitive impairment.

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26. The method of any one of claims 1 to 22, wherein the subject suffers from aging-related cognitive functional decline.
27. The method of any one of claims 1 to 22, wherein the subject suffers from cerebral palsy.
28. The method of any one of claims 1 to 22, wherein the subject suffers from abnormal development.
29. The method of any one of claims 1 to 22, wherein the subject is a healthy subject.
30. A system for use in a method of any one of claims 1 to 29, the system comprising at least one hyperbaric chamber configured to enclose at least one subject and apply hyperbaric conditions thereonto,
 - at least one controllable oxygen administration unit permitting forming an oxygen rich environment within the chamber and/or configured to administer said oxygen rich environment to said subject, and
 - at least one means of cognitive training within the chamber configured to permit a subject to carry out said at least one cognitive training task.
31. The system of claim 30, further comprising at least one means of physical training within the chamber configured to permit the subject to carry out at least one physical training task.
32. The system of claim 30 or 31, further comprising at least one monitoring unit for monitoring at least one physical parameter of the subject.
33. The system of any one of claims 30 to 32, further comprising at least one controller for operating and controlling the system.
34. The system of any one of claims 30 to 33, wherein said chamber is configured to enclose two or more subjects.
35. The system of claim 34, wherein said at least one controllable oxygen administration unit is configured to administer a controllable oxygen rich environment to each of the subjects.
36. The system of claim 35, wherein said at least one controllable oxygen administration unit is configured to administer a different oxygen rich environment to each of the subjects.
37. The system of any one of claims 34 to 36, wherein said at least one means of cognitive training is configured for permitting each of the subjects to independently carry out at least one cognitive training task.

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38. The system of claim 37, wherein said wherein said at least one means of cognitive training is configured for permitting each of the subjects to carry out a different cognitive training task.

39. The system of any one of claims 30 to 38, wherein the chamber further comprises at least one compression sub-chamber, at least one training sub-chamber, and at least one decompression sub-chamber, the compression sub-chamber, training sub-chamber and decompression sub-chamber being linked to one another as to permit the subject to migrate therebetween.

40. The system of claim 39, wherein the at least one compression sub-chamber, at least one training sub-chamber, and at least one decompression sub-chamber are integral one with the other.