CLAIMS

1. An intelligent adaptor for a pressure threshold breathing training device, the adaptor comprising:

a first end configured to attach to a mouthpiece of a pressure threshold breathing training device;

a second end configured to be received into a mouth of a user, such that a seal is created in use around the second end of the adaptor;

the first and second ends being connected by a passageway, the passageway beingconfigured to provide a sealed chamber, in use, between at least the user's lungs and the mouthpiece of the pressure threshold breathing training device, such that if a measured pressure within the passageway of the adaptor crosses a threshold value, the resistance valve located within the pressure threshold breathing training device moves from a first to a second configuration to allow the user to breathe freely through the device in the second configuration;

the adaptor further comprising a control system comprising:

a pressure sensor configured to measure a user generated pressure within the passageway at pre-defined increments of time during a training session; and,

a transceiver configured to receive pressure measurement data from the pressure sensor, and transmit the data to a computing device for analysis.

2. An adaptor as claimed in claim 1, wherein the pre-defined increments of time are chosen such that the pressure sensor can adequately detect when a user begins an inhalation, ends an inhalation, begins an exhalation, and ends an exhalation using the pressure threshold breathing training device.

3. An adaptor as claimed in claim 1 or claim 2, wherein the passageway at the first end is configured to at least partially receive a selectively removeable plug, such that in use, the plug substantially occludes the passageway of the adaptor at the first end, thereby at least minimising air flow between the user's lungs and the plug, and enabling the user to generate pressure within the passageway under isometric conditions.

4. A system for monitoring the breathing performance of a user, the system comprising:

- a pressure threshold breathing training device; the pressure threshold training device comprising a mouthpiece and a resistance valve, and arranged such that the resistance valve moves from a first to a second configuration if the user generated air pressure within the device crosses a threshold value to allow the user to breathe freely through the device in the second configuration;
- an intelligent adaptor according to any one of claims 1 to 3; and,

- a computing device for analysis of data received from the intelligent adaptor;

wherein the intelligent adaptor is mounted onto the mouthpiece of the pressure threshold breathing training device, and provides a passageway configured to provide a sealed chamber in use between at least the user's lungs and the mouthpiece of the pressure threshold breathing training device.

5. A system as claimed in claim 4, wherein the computing device comprises a software application, the software application being configured to:

- receive input from a user relating to a target resistance level; thereby determining the threshold value which must be crossed during a training session to move the valve from the first to the second configurations;

- receive pressure measurement data from the pressure sensor; and,

- determine at least one breathing performance indicator of the user based at least on a comparison of the target resistance level with the pressure measurement data from the pressure

sensor, preferably wherein the at least one breathing performance indicator of the user is additionally based on one or more of:

- the number of times the pressure measurement data from the pressure sensor fell within or were greater than the target resistance level for more than a pre-defined amount of time (successful attempts);

- the number of times the actual pressure measurement data fell within or were greater than the target resistance level for less than a pre-defined amount of time (unsuccessful attempts);

- the number of times the actual pressure measurement data was less than the target resistance level (unsuccessful attempts);

- the amount of time taken to reach the threshold pressure required to move the valve from the first to the second configurations;

- the inhalation or exhalation time of the previous successful attempt;

- the maximum air pressure generated, and/or the average air pressure generated over the training session;

- the inhalation time of the previous inhalation and/or the average inhalation time over the training session;

- the exhalation time of the previous exhalation and/or the average exhalation time;

- the average resistance level achieved during the training session;

- the total measurement time, which defines the length of a training session; and,

- the average pressure time product (PTP) achieved and/or the total pressure time product (PTP) achieved during the training session.

6. The system as claimed in claim 5, wherein an attempt is recorded as successful if the user 1) generates an air pressure falling within or above their target resistance level, and 2) remains within or above their target resistance level for a minimum amount of time.

7. The system as claimed in claim 5 or claim 6, wherein the software application is further configured to display the pressure measurement data in real-time during a training session; and wherein the software application is additionally configured to update and display in real-time the at least one breathing performance indicator of the user as a training session progresses.

8. The system as claimed in any one of claims 5 to 7, wherein the software application is configured to determine at least two breathing performance indicators; and wherein two or more of the at least two breathing performance indicators are combined to form at least one breathing performance indicator which is more user-friendly; and wherein the software application is additionally configured to update and display the at least one user-friendly breathing performance indicator of the user in real-time during a training session.

9. The system as claimed in any one of claims 5 to 8, wherein the software application is configured to analyse the pressure measurement data and/or the at least one breathing performance indicator and provide the user with one or more automated suggestions on how to improve their usage of the device and optimise their training.

10. The system as claimed in any one of claims 4 to 9, wherein a resistance load provided by the valve is adjustable to increase or decrease the threshold value at which the valve moves from the first to the second configuration thereby providing an adjustable threshold value.

11. The system as claimed in any one of claims 4 to 10, wherein a resistance load provided by the resistance valve is variable incrementally up to a maximum resistance load, such that each increment spans a range of resistance loads, thereby defining a series of progressively increasing resistance levels, preferably

wherein each resistance level comprises a threshold value which must be crossed to move the valve from the first to the second configuration to allow the user to breathe freely through the device in the second configuration; and wherein the pre-defined increments of time are sufficient to allow the pressure sensor to adequately detect when a user moves into and out of a resistance level.

12. A method of monitoring the breathing performance of a user using the system according to any one of claims 4 to 11, the method comprising:

- inputting a target resistance level into the computing device;

- placing the second end of the intelligent adaptor into a user's mouth, such that a seal is created around the second end of the adaptor;

- generating a pressure within the passageway between the user and the resistance valve;

- measuring the air pressure within the passageway at pre-defined increments of time;

- transmitting the air pressure measurements to the computing device;

- determining at least one breathing performance indicator of the user based at least on a comparison of the target resistance level with the air pressure measurements; and

- displaying the air pressure measurements and/or the at least one breathing performance indicator, on one or more display screens of the computing device for viewing by the user, preferably further comprising analysing the pressure measurement data and/or the at least one breathing performance indicator, and providing the user with one or more automated suggestions on how to improve their usage of the pressure threshold breathing training device and optimise their training.

13. A computer system for monitoring the breathing performance of a user, the computer system including at least one processor for executing program instructions configured to:

- receive input from a user relating to a target resistance level;

- receive air pressure measurements from the intelligent adaptor according to any one of claims 1 to 3;

- determine at least one breathing performance indicator of the user based at least on a comparison of the target resistance level with the air pressure measurements;

- display the pressure measurement data and/or the at least one breathing performance indicator on one or more display screens of a display device for viewing by the user, preferably wherein the at least one processor is additionally configured to analyse the pressure measurement data and/or the at least one breathing performance indicator, and provide the user with one or more automated suggestions on how to improve their usage of the device and optimise their training.

14. A system for determining a user's isometric respiratory muscle strength, the system comprising:

- a computing device, an intelligent adaptor having a first end and a second end connected by a passageway, and a selectively removable plug at least partially located within the first end to substantially occlude the passageway of the intelligent adaptor; wherein the second end is configured to be received into a mouth of a user, such that in use, a substantially sealed chamber is created between at least the user's lungs and the plug, thereby enabling the user to generate a pressure within the passageway upon activation of their respiratory muscles under isometric conditions; and wherein,

- the intelligent adaptor further comprises a control system, the control system comprising:

    - a pressure sensor configured to measure the pressure generated within the passageway at pre-defined increments of time during activation of the user's respiratory muscles under isometric conditions; and,

    - a transceiver configured to receive pressure measurement data from the pressure sensor, and transmit the data to the computing device for analysis, preferably

wherein the computing device comprises a software application, the software application being configured to:

- receive pressure measurement data from the pressure sensor;

- identify a maximum respiratory pressure based on the received pressure measurement data; and,

- determine at least one resistance level for the user based, at least in part, on a comparison of the maximum respiratory pressure identified, or a percentage thereof, with resistance loads associated with a resistance valve located within a chosen pressure threshold breathing training device, more preferably wherein the at least one resistance level and optionally an associated training plan is additionally determined based on user input regarding at least their previous and current lung health, including activity levels and smoking habits, any previous breathing training sessions, and future goals.

15. A method according to claim 12, further comprising:

at least partially locating a selectively removable plug within the first end of the intelligent adaptor to substantially occlude the passageway of the adaptor such that in use, a substantially sealed chamber is created between at least the user’s lungs and the plug, thereby enabling the user to generate a pressure within the passageway upon activation of their respiratory muscles under isometric conditions to enable performance of an isometric respiratory muscle strength test, preferably wherein at least one resistance level and optionally an associated training plan is additionally determined based on user input regarding at least their previous and current lung health, including activity levels and smoking habits, any previous breathing training sessions, and future goals.