INDIVIDUALLY TAILORED SUPPLEMENT DISPENSING SYSTEM

BACKGROUND OF THE INVENTION

[0001] This invention relates to a system for formulating and mixing supplements with customized quantities of various nutrients designed to precisely affect aspects of a user's body chemistry during and after a workout. Supplements are commonly used by people who exercise. However, the supplements currently used are mostly one size fits all. These supplements are usually in the form a pre-mixed drink or a power that the user mixes with water. The supplements only address generalized deficiencies, but do not account for an individual's specific needs. Published Patent Application US 2016/0106137 describes a protein beverage and a process for making the protein beverage. The protein beverage is made using a predetermined formula that does not consider any individual characteristics of the consumer.

[0002] Wearable electronic devices have become popular with consumers in recent years, particularly devices for tracking health and fitness. Many of these devices are bracelet or watch-type devices that use sensors to measure things like the number of steps a user has taken, a user's heart rate, and the amount of sleep a user is getting. These devices do not actively do anything with the data collected except display it to the user. An example of such a device can be found in US patent US8734296.

[0003] Currently, the most customized drink dispensers are dispensers for dispensing soft drinks. Published Patent Application US 2016/0098883 describes a drink dispensing apparatus. The drink dispensing apparatus dispenses customized drinks by combining one or more drink recipes according to a user's input through a graphical user interface. The apparatus does not formulate recipes specifically for an individual user, but instead allows the user to select from a large variety of flavor combinations.

[0004] To the knowledge of the inventor, no system for formulating and dispensing supplements based on contemporaneously measured physiological parameters of a user currently exists.

BRIEF SUMMARY OF THE INVENTION

[0005] The present invention is a system for formulating, mixing, and dispensing additives for a customized supplement based on a variety of physiological parameters of a user which are contemporaneously measured with a sensor. The system includes a sensor that measures concentrations of various components in a user's sweat. The system also includes an electronic communication device that receives data representing the sweat component concentrations from the sensor.

[0006] The system also includes a server that receives the sweat component data from the electronic communication device. The central processing unit of the server calculates quantities of additives to use in a supplement by subtracting the concentration of each sweat component from a precalculated concentration target for each sweat component, and multiplying the results of the subtraction by precalculated values associated with each additive.

[0007] The system also includes a computer that receives the data representing quantities of the variety of additives that will be used in the supplement from the server.

The central processing unit of the computer references an actuator index containing information on the amount an actuator needs to be actuated to dispense different quantities of additives. The central processing unit of the computer produces actuation data based on the information in the actuator index.

[0008] The system also includes actuators that receive the actuation data from the computer causing the actuators to actuate. The actuation data represents the amount the actuators need to be actuated to dispense the quantities of additives calculated by the server above. The system also includes valves, wherein actuation of the actuators results in the valves opening. The system also includes storage containers, a bottom portion of each storage container is connected to a top end of one of the valves. The storage containers each contain a different additive for use in the supplements. When the actuators are actuated, the additives fall through the valves and the calculated quantity of additives are released into a container from which the additives can be consumed as a supplement.

[0009] Also provided is a system for keeping track of past supplements and the effect the supplements had on the user.

[0010] Also provided is a system for alerting a user when they should consume a supplement, and dispensing a customized supplement whenever the user desires a supplement.

[0011] Also provided is a system for monitoring additive intake and preventing a user from consuming an unhealthy amount of one or more additives.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Figure 1 illustrates an individually–tailored supplement dispensing system according to an embodiment of the present invention.

[0013] Figure 2 illustrates a supplement dispensing device according to an embodiment of the present invention.

[0014] Figure 3 is a table including information about the sweat components and the additives.

[0015] Figure 4 illustrates a home menu on the display of the electronic communication device according to an embodiment of the present invention.

[0016] Figure 5 illustrates a settings menu on the display of the electronic communication device according to an embodiment of the present invention.

[0017] Figure 6 illustrates a supplement additives menu on the display of the electronic communication device according to an embodiment of the present invention.

[0018] Figure 7 illustrates a display QR code menu on the display of the electronic communication device according to an embodiment of the present invention.

[0019] Figure 8 illustrates a supplement ready alert menu on the display of the electronic communication device according to an embodiment of the present invention.

[0020] Figure 9 illustrates a flowchart of an embodiment of a process for making a supplement in a supplement dispenser based on a list of quantities of additives selected through a computer readable program on an electronic communication device.

[0021] Figure 10 illustrates a flowchart of an embodiment of a process for calculating an average user specific sensitivity for water, sucrose, and a 4:1 ratio of NaCl to KCl (electrolyte mixture).

[0022] Figure 11 illustrates a flowchart of an embodiment of a process for calculating a quantity of electrolyte mix to add to a supplement based on a measured electrolyte concentration, a target electrolyte concentration, and a user's calculated electrolyte sensitivity.

[0023] Figure 12 illustrates a flowchart 1200 of an embodiment of a process for calculating a quantity of sucrose to add to a supplement based on a measured glucose concentration, a target glucose concentration, and the user's calculated sucrose sensitivity.

[0024] Figure 13 illustrates a flowchart of an embodiment of a process for calculating a quantity of water to add to a supplement based on a measured hydration level, a target hydration level, and the user's calculated water sensitivity.

[0025] Figure 14 illustrates a flowchart of an embodiment of a process for calculating the user's lean weight and blood volume.

[0026] Figure 15 illustrates a flowchart of an embodiment of a process for calculating a target value for lactate and pH based on an average of pre-exercise measurements.

[0027] Figure 16 illustrates a flowchart of an embodiment of a process for calculating a quantity of carnosine to add to a supplement based on a measured lactate concentration, a target lactate concentration, and the user's lean weight.

[0028] Figure 17 illustrates a flowchart of an embodiment of a process for calculating a quantity of sodium bicarbonate to add to a supplement based on a measured pH value, a target pH value, and the user's lean weight.

[0029] Figure 18 illustrates a flowchart of an embodiment of a process for dispensing a supplement based on a set of sweat component values measured in the user's sweat compared to a set of target sweat component values.

[0030] Figure 19 illustrates a flowchart of an embodiment of a process for dispensing supplements before, during, and after exercising with quantities of additives based on measured sweat component quantities.

[0031] Figure 20 illustrates a mobile supplement dispensing device according to an embodiment of the present invention.

[0032] Figure 21 illustrates a transcranial direct current stimulation headset according to an embodiment of the present invention.

[0033] Detailed description of the invention

[0034] Figure 1 (comprised of Figure 1A, Figure 1B, and Figure 1C) illustrates an individually–tailored supplement dispensing system 100 according to an embodiment of the present invention. Figure 1A illustrates the system as a whole, while Figure 1B and Figure 1C illustrate in greater detail components of the individually-tailored supplement dispensing system 100. The individually–tailored supplement dispensing system 100 includes a wearable sensor 110, an electronic communication device 120, a server 160, a supplement dispenser computer 190, and a supplement dispenser 195.

[0035] The wearable sensor 110 includes a data transmitter 111, a glucose sensor 112, a chloride sensor 113, a potassium sensor 114, a lactate sensor 115, a pH sensor 116, and a hydration sensor 117.

[0036] The electronic communication device 120 includes a device data transceiver 121, a device central processing unit (CPU) 122, a touch screen display (display) 125, a speaker 126, a device clock 127, a GPS receiver 128, and a device memory 130. As illustrated in Figure 1B, the device memory 130 of the mobile electronic communication device 120 includes an adjusted additive quantity data structure 140, and a current biometric data structure 150. The adjusted additive quantity data structure 140 includes a user adjusted additives data 141, an adjusted additives user ID data 142, and an adjusted additives time stamp data 143. The current biometric data structure 150 includes a hydration data 151, a chloride data 152, a potassium data 153, a glucose data 154, a lactose data 155, a pH data 156, a biometric user ID data 157, a biometric time stamp data 158, and a GPS data 159.

[0037] The server 160 includes a server data transceiver 161, a server CPU 162, a server clock 163 and a server memory 170. As illustrated in Figure 1C, the server memory 170 includes a water data 171, a sucrose data 172, an electrolyte mix data 173, a sodium bicarbonate data 174, a carnosine data 175, a flavor data 176, a caffeine data 177, a creatine data 178, a BCAA data 179, a beta-alanine data 180, a multivitamin data 181, a whey data 182, a glutamine data 183, an additive user ID data 184, and an additive time stamp data 185.

[0038] The supplement dispenser computer 190 includes a dispenser data transceiver 191, a dispenser CPU 192, a dispenser memory 193, and an optical scanner 194.

[0039] In the individually–tailored supplement dispensing system 100, the glucose sensor 112 of the wearable sensor 110, the chloride sensor 113 of the wearable sensor 110, the potassium sensor 114 of the wearable sensor 110, the lactate sensor 115 of the wearable sensor 110, the pH sensor 116 of the wearable sensor 110, and the hydration sensor 117 of the wearable sensor 110 are in electronic communication with the data transmitter 111 of the wearable sensor 110. The data transmitter 111 of the wearable sensor 110 is in data communication with the device data transceiver 121 of the electronic communication device 120. The device data transceiver 121 of the electronic communication device 120 is in electronic communication with the device CPU 122 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 is in electronic communication with the device memory 130 of the electronic communication device 120, the display 125 of the electronic communication device 120, the speaker 126 of the electronic communication device 120, the device clock 127 of the electronic communication device 120, and the GPS receiver

128 of the electronic communication device 120. The display 125 of the electronic communication device 120 is in data communication with the optical scanner 194 of the supplement dispenser computer 190. The device data transceiver 121 of the electronic communication device 120 is in data communication with the server data transceiver 161 of the server 160. The server data transceiver 161 of the server 160 is in electronic communication with the server CPU 162 of the server 160. The CPU 162 of the server 160 is in electronic communication with the server memory 170 of the server 160 and the server clock 163 of the server 160. The server data transceiver 161 of the server 160 is in data communication with the dispenser data transceiver 191 of the supplement dispenser computer 190. The dispenser data transceiver 191 of the supplement dispenser computer 190 is in electronic communication with the dispenser CPU 192 of the supplement dispenser computer 190. The dispenser CPU 192 of the supplement dispenser computer 190 is in electronic communication with the dispenser memory 193 of the supplement dispenser computer 190, and the optical scanner 194 of the supplement dispenser computer 190. The dispenser CPU 192 of the supplement dispenser computer 190 is in electronic communication with the supplement dispenser 220.

[0040] In operation, the glucose sensor 112 of the wearable sensor 110 measures the concentration of glucose in a user’s sweat as the glucose data 154. The glucose sensor 112 of the wearable sensor 110 electronically communicates the glucose data 154 to the transmitter 111 of the wearable sensor 110. The chloride sensor 113 of the wearable sensor 110 measures the concentration of chloride in the user’s sweat as the chloride data 152. The chloride sensor 113 of the wearable sensor 110 electronically communicates the chloride data 152 to the transmitter 111 of the wearable sensor 110.

The potassium sensor 114 of the wearable sensor 110 measures the concentration of potassium in the user's sweat as the potassium data 153. The potassium sensor 114 of the wearable sensor 110 electronically communicates the potassium data 153 to the transmitter 111 of the wearable sensor 110. The lactate sensor 115 of the wearable sensor 110 measures the concentration of lactate in the user's sweat as the lactate data 155. The lactate sensor 115 of the wearable sensor 110 electronically communicates the lactate data 155 to the transmitter 111 of the wearable sensor 110. The pH sensor 116 of the wearable sensor 110 measures the pH of the user's sweat as the pH data 156. The pH sensor 116 of the wearable sensor 110 electronically communicates the pH data 156 to the transmitter 111 of the wearable sensor 110. The hydration sensor 117 of the wearable sensor 110 measures the hydration level of the user's sweat as the hydration data 151. The hydration sensor 117 of the wearable sensor 110 electronically communicates the hydration data 151 to the transmitter 111 of the wearable sensor 110. The data transmitter 111 of the wearable sensor 110 then transmits the glucose data 154, the chloride data 152, the potassium data 153, the lactate data 155, the pH data 156, and the hydration data 151 to the device data transceiver 121 of the electronic communication device 120.

[0041] The device data transceiver 121 of the electronic communication device 120 then electronically communicates the glucose data 154, the chloride data 152, the potassium data 153, the lactate data 155, the pH data 156, and the hydration data 151 to the CPU 122 of the electronic communication device 120. The CPU 122 of the electronic communication device 120 stores the glucose data 154, the chloride data 152, the potassium data 153, the lactate data 155, the pH data 156, and the hydration data 151 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 stores a unique identifier of the user as the biometric user ID data 157 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 stores the date and time from the device clock 127 of the electronic communication device 120 as the biometric time stamp data 158 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 stores the GPS coordinates from the GPS receiver 128 as the GPS data 159 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 then electronically communicates the current biometric data structure 150 to the device data transceiver 121 of the electronic communication device 120. The device data transceiver 121 of the electronic communication device 120 then transmits the current biometric data structure 150 to the server data transceiver 161 of the server 160.

[0042] The server data transceiver 161 of the server 160 then electronically communicates the current biometric data structure 150 to the server CPU 162 of the server 160. The server CPU 162 of the server 160 stores the current biometric data structure 150 on the server memory 170 of the server 160. The server CPU 162 of the server 160 then operates on the current biometric data structure 150 to produce the electrolyte mix data 173 as further described below with regard to Figure 11, the sucrose data 172 as further described below with regard to Figure 12, the water data 171 as further described below with regard to Figure 13, the carnosine data 175 as further described below with regard to Figure 16, the sodium bicarbonate data 174 as further described below with regard to Figure 17, and the flavor data 176, the caffeine data 177, the creatine data 178, the BCAA data 179, the beta-alanine data 180, the multivitamin data 181, the whey data 182, and the glutamine data 183 as further described below with regard to Figure 18. The server CPU 162 of the server 160 stores the electrolyte mix data 173, the sucrose data 172, the water data 171, the carnosine data 175, the sodium bicarbonate data 174, the flavor data 176, the caffeine data 177, the creatine data 178, the BCAA data 179, the beta-alanine data 180, the multivitamin data 181, the whey data 182, and the glutamine data 183 in the additive quantity data structure 188 on the server memory 170 of the server 160. The server CPU 162 of the server 160 stores the unique identifier of the user as the additive user ID data 184 in the additive quantity data structure 188 on the server memory 170 of the server 160. The server CPU 162 of the server 160 stores the date and time from the server clock 163 as the additive time stamp data 185 in the additive quantity data structure 188 on the server memory 170 of the server 160. The server CPU 162 of the server 160 then electronically communicates the additive quantity data structure to the server data transceiver 161 of the server 160. The server data transceiver 161 of the server 160 then transmits the additive quantity data structure to the device data transceiver 121 of the electronic communication device 120.

[0043] The device data transceiver 121 of the electronic communication device 120 electronically communicates the additive quantity data structure 188 to the device CPU 122 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 stores the additive quantity data structure 188 on the memory

130 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 then stores a copy of the additive quantity data structure 188 as the user adjusted additives data 141 in the adjusted additive quantity data structure 140 on the memory 130 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 operates on the adjusted additive quantity data structure 140 to display a set of numerical values representing the quantity of additives to be added to a supplement on the display 125 of the electronic communication device 120. The display 125 of the electronic communication device 120 receives input that instructs the device CPU 122 of the electronic communication device 120 to alter and replace the adjusted additive quantity data structure 140 so the adjusted additive quantity data structure 140 represents additive quantities reflecting the input received by display 125 of the electronic communication device 120 as further described below in regards to Figure 6 and Figure 18. Next, the display 125 of the electronic communication device 120 receives input that instructs the device CPU 122 of the electronic communication device 120 to store data representing a unique identifier of the user as the adjusted additive user ID data 142 and data representing the date and time from the device clock 127 of the electronic communication device 120 as the adjusted additive time stamp data 143 in the adjusted additive quantity data structure 140 on the device memory 130 of the electronic communication device 120 as further described below with respect to Figure 6 and Figure 9. Next, the device CPU of the electronic communication device 120 produces and stores a QR code data that represents information for displaying a QR code that encodes the adjusted additive user ID data 142 and the adjusted additive time stamp data 143. The device CPU 122 of the electronic communication device 120 then electronically

communicates the adjusted additive quantity data structure 140 to the device data transceiver 121 of the electronic communication device 120. The device data transceiver 121 of the electronic communication device 120 then transmits the adjusted additive quantity data structure 140 to the server data transceiver 161 of the server 160.

[0044] The server data transceiver 161 of the server 160 electronically communicates the adjusted additive quantity data structure 140 to the server CPU 162 of the server 160. The server CPU 162 of the server 160 stores the adjusted additive quantity data structure 140 on the server memory 170 of the server 160. The device CPU 122 of the electronic communication device 120 processes the QR code data to display the QR code on the display 125 of the electronic communication device 120 as further described below with regard to Figure 9. The optical scanner 194 of the supplement dispenser computer 190 then scans the QR code displayed on the display 125 of the electronic communication device 120. The optical scanner 194 of the supplement dispenser computer 190 then electronically communicates an optical scanner data representing the scanned QR code to the dispenser CPU 192 of the supplement dispenser computer 190. The dispenser CPU 192 of the supplement dispenser computer 190 stores the optical scanner data on the dispenser memory 193 of the supplement dispenser computer 190. The dispenser CPU 192 of the supplement dispenser computer 190 processes the optical scanner data to produce an additive request data, wherein the additive request data represents a request for the adjusted additive quantity data structure 140 having the adjusted additive user ID data 142 and the adjusted additive time stamp data 143 that matches the adjusted additive user ID data 142 and the adjusted additive time stamp data 143 encoded in the QR code from the server memory 170 of the server 160 as further described below with respect to figure 9. The dispenser CPU 192 of the supplement dispenser computer 190 then electronically communicates the additive request data to the dispenser data transceiver 191 of the supplement dispenser computer 190. The dispenser data transceiver 191 of the supplement dispenser computer 190 then transmits the additive request data to the server data transceiver 161 of the server 160.

[0045] The server data transceiver 161 of the server 160 electronically communicates the additive request data to the server CPU 162 of the server 160. The server CPU 162 of the server 160 stores the additive request data to the server memory 170 of the server 160. The server CPU 162 of the server 160 then processes the additive request data and locates the adjusted additive data structure 140 on server memory 170 of the server 160 as further described below with regard to Figure 9. The server CPU 162 of the server 160 electronically communicates the adjusted additive quantity data structure 140 to the server data transceiver 161 of the server 160. The server data transceiver 161 of the server 160 transmits the adjusted additive quantity data structure to the dispenser data transceiver 191 of the supplement dispenser computer 190.

[0046] The dispenser data transceiver 191 of the supplement dispenser computer 190 electronically communicates the adjusted additive quantity data structure 140 to the dispenser CPU 192 of the supplement dispenser computer 190. The supplement dispenser CPU 192 of the supplement dispenser computer 190 processes the adjusted additive quantity data structure 140 to produce a current actuator data as further described below with regard to Figure 9. The current actuator data represents the amount the plurality of actuators 221 of the supplement dispenser 220 need to be actuated to dispense the quantities of each additive represented by the adjusted additive quantity data structure

140. The dispenser CPU 192 of the supplement dispenser computer 190 then electronically communicates the current actuator data to the supplement dispenser 220.

[0047] In one embodiment the additives added to the drink are an electrolyte mix, which is a 4:1 ratio of sodium chloride to potassium chloride, sucrose or any digestible sugar, carnosine, sodium bicarbonate or any pH buffer, water, creative, caffeine, BCAAs, beta-alanine, multivitamin, whey, and glutamine.

[0048] In one embodiment the water for the supplements is stored in one of the plurality of additive storage containers 223.

[0049] In one embodiment the water for the supplements is provided to the dispenser through a water line, one of the valves 222 is connected to the water line and one of the actuators 221 is connected to the valve 222.

[0050] In addition to or in replacement of the sensors on the wearable sensor 110, the wearable sensor 110 may include a magnesium sensor, calcium sensor, a urea sensor, and any other sensor for measuring the contents of the user's sweat.

[0051] In one embodiment, the electronic communication device 120 is a device selected from a group including but not limited to: a smart phone, a tablet computer, a smart watch, a video game counsel, a television, a laptop computer, a digital media player, and a desktop computer.

[0052] The electronic communication device 120 may alternatively be any device having a CPU, a memory, a display, a data transceiver, and a device for inputting data.

[0053] In one embodiment the CPU 122 of the electronic communication device 120 sends data representing an alarm sound to the speaker 126 of the electronic communication device 120 when a supplement is ready, causing the speaker to sound an alarm.

[0054] In another embodiment, the QR code representing an identifier of the adjusted additive data may alternatively be a set of data representing an identifier of the adjusted additive data. Instead of the optical scanner 194 of the supplement dispenser computer 190 reading the QR code, the device data transceiver 121 of the electronic communication device 120 would transmit the data representing an identifier of the adjusted additive data to the dispenser data transceiver 191 of the supplement dispenser computer 190.

[0055] In another embodiment, the QR code representing the ID tag may alternatively be a bar code, or any other form of encoding data that can be read by an optical scanner.

[0056] In another embodiment, the wearable sensor 110 measures the contents of a bodily fluid from the list blood, urine, and tears.

[0057] In one embodiment the wearable sensor 110 attaches directly to the skin similarly to a temporary tattoo.

[0058] In one embodiment the wearable sensor 110 is worn as a bracelet.

[0059] In one embodiment the wearable sensor is built into a piece of clothing, wherein the piece of clothing is chosen from a shirt, shoes, gloves, socks, a hat, a headband, underwear, pants, and shorts.

[0060] In one embodiment the wearable sensor 110 is any sensor that can take continuous sweat measurements from the user while the user exercises.

[0061] In one embodiment, the data transmitter 111 of the biosensor 110 is a data transceiver.

[0062] In one embodiment the number of actuators 221, valves 222, and additive storage containers 223 is selected from a range of 1-30.

[0063] Figure 2 illustrates a supplement dispensing device 200 according to an embodiment of the present invention. The supplement dispensing device 200 includes the supplement dispenser computer 190 and a supplement dispenser 220. The supplement dispenser computer 190 includes the dispenser data transceiver 191, the dispenser CPU 192, the dispenser memory 193, and the optical scanner 194. The supplement dispenser 220 includes a plurality of actuators 221, a plurality of valves 222, a plurality of additive storage containers 223, and a mixer/dispenser 224.

[0064] In the supplement dispensing device 200 the dispenser data transceiver 191 of the supplement dispenser computer 190, the dispenser memory 193 of the supplement dispenser computer 190, and the optical scanner 194 of the supplement dispenser computer 190 are in electronic communication with the dispenser CPU 192 of the supplement dispenser computer 190. The dispenser CPU 192 of the supplement dispenser computer 190 is in electronic communication with the plurality of actuators 221 of the supplement dispenser 220. The plurality of actuators 221 of the supplement dispenser 220 are in mechanical communication with the plurality of valves 222 of the supplement dispenser 220. Each of the plurality of valves 222 of the supplement dispenser 220 is connected at one end to a different one of the plurality of additive storage containers 223 of the supplement dispenser 220 and connected at the other end to the mixer/dispenser 224 of the supplement dispenser 220.

[0065] In operation the dispenser CPU 192 of the supplement dispenser computer 190 electronically communicates the current actuator data to the plurality of actuators 221 of the supplement dispenser 220 as described above with respect to Figure 1. The plurality of actuators 221 of the supplement dispenser 220 actuate the plurality of valves 222 of the supplement dispenser 220 to distribute the quantities of each additive represented by the adjusted additive quantity data structure 140 from the plurality of additive storage containers 223 of the supplement dispenser 220 to the mixer/dispenser 224 of the supplement dispenser 220. The mixer/dispenser 224 of the supplement dispenser 220 mixes the additives and dispenses the additives as a supplement.

[0066] In another embodiment, the plurality of valves 222 of the supplement dispenser 220 may also be any other mechanism that can be actuated to dispense specific quantities of additives.

[0067] Figure 3 is a table 300 including information about the sweat components and the additives. The first column includes the sweat components measured by the sensors on wearable sensor 110. The second column includes the target values for the sweat components. The target values represent the benchmarks for each sweat component that measured values of the same sweat component will be compared against to determine if the user has a deficiency with regard to that sweat component. Each sweat component is in the same row as its target. The third column includes the minimum increment that each sweat component can be adjusted by. Each sweat component is in the same row as its minimum increment. The fourth column includes the additives used to make supplement supplements. The additive and the sweat component it adjusts are in the same row. The fifth column includes the maximum amount of the additive from the same row in the fourth column that is used in a single supplement. The sixth column includes the maximum amount of the additive from the same line in the fourth column that is used in a 24 hour period. All of the information included in table 300 is stored on the server memory 170 of the server 160.

[0068] In one embodiment, the hydration target value in the table in Figure 3 is selected from a range of 10 osmolality/kg H_2O to 10,000 osmolality/kg H_2O.

[0069] In one embodiment the glucose target value is selected from a range of 0.1g/L to 20g/L.

[0070] In one embodiment the electrolyte target range is selected from a range of 0.1 millimoles/L to 50 millimoles/L.

[0071] In one embodiment the minimum adjustment increment for hydration is selected from a range of 1 osmolality/kg H_2O to 50 osmolality/kg H_2O.

[0072] In one embodiment the minimum adjustment increment for glucose is selected from a range of 0.01 g/L to 1 g/L.

[0073] In one embodiment the pH minimum adjustment increment is selected from a range of 0.1 to 2.0.

[0074] In one embodiment the minimum adjustment increment for electrolyte issescted from a range of 0.01 millimoles/L to 2 millimoles/L.

[0075] In one embodiment the per-drink maximum for all additives is selected from a range of 0.1g to 150g.

[0076] In one embodiment the 24-hour maximum for all additives is selected from a range of 0.1g to 300g.

[0077] Figure 4 illustrates a home menu 400 on the display 125 of the electronic communication device 120 according to an embodiment of the present invention. The home menu 400 includes a countdown to next supplement 410, a current bioparameter graph 420, a start workout button 430, an end workout button 440, a log in button 445, a settings button 450, and a supplement additives button 460.

[0078] In the supplement additive menu 400, the countdown to next supplement 410 displays a clock counting down to the next supplement. The current bioparameter graph 420 is a graphical representation of the most recent level of hydration, chloride, potassium glucose, lactate, and pH measured by the wearable sensor 110. The start workout button 430, when pushed, initiates the workout process as further described below with regard to figure 19. When the start workout button 430 is pushed, the device CPU 122 of the mobile electronic device 120 also stores data representing the date and time from the device clock 127 of the mobile electronic device 120 as start time data on the device memory 130 of the mobile electronic device 120. The start time data is transmitted to the server 160 and stored on the server memory 170 of the server 160. The end workout button 440, when pushed, initiates an end of workout process as further described below with regard to figure 19. When the end workout button 440 is pushed, the device CPU 122 of the mobile electronic device 120 also stores data representing the date and time from the device clock 127 of the mobile electronic device 120 as end time data on the device memory 130 of the mobile electronic device 120. The end time data is transmitted to the serve 160 and stored on the server memory 170 of the server 160. The log in button 445, when pushed, gives a user access to the user's account after credentials are entered. Also, when the log in button 445 is pushed, the electronic communication device starts to receive data from the wearable sensor 110. The settings button 450, when pushed, causes the graphical user interface to display a settings menu, the settings menu is illustrated in Figure 5. The supplement additives button 460, when pushed, causes the graphical user interface to display a supplement additives menu, the supplement additives menu is illustrated in Figure 6.

[0079] Figure 5 illustrates a settings menu 500 on the display 125 of the electronic communication device 120 according to an embodiment of the present invention. The settings menu 500 includes a user weight field 510, a user body fat percentage field 520, a user sex field 530, a time interval between supplements field 540, a home button 550, and a supplement additives button 560. The user weight field 510 includes a weight dropdown menu 512 and a weight units dropdown menu 514. The user body fat percentage field 520 includes a body fat percentage dropdown menu 521. The user sex field 530 includes a male check box 531 and a female check box 532. The time interval between supplements field 540 includes a time dropdown menu 543 and a time units dropdown menu 542.

[0080] In the settings menu 500 the weight dropdown menu 512, when pushed, displays a range of numbers representing weights to choose from, a number from the range of weights is selected by pushing it. The weight units dropdown menu 514, when pushed, displays a selection of units of weight to choose from, a unit of weight from the selection of units of weight is selected by pushing it. The body fat percentage dropdown menu 521, when pushed, displays a range of numbers representing body fat percentages to choose from, a number from the range of body fat percentages is selected by pushing it. The male check box 531, when pushed, selects the user's sex as male. The female check box 532, when pushed, selects the user's sex as female. The time interval dropdown menu 543, when pushed, displays a range of numbers representing amount of time to choose from, a number from the range of time amounts is selected by pushing it. The time units dropdown menu 542, when pushed, displays a selection of units of time to choose from, a unit of time from the selection of units of time is selected by pushing it. The home button 550, when pushed, causes the graphical user interface to display the home menu 400. The supplement additives button 560, when pushed, causes the graphical user interface to display the supplement additives menu, the supplement additives menu is illustrated in figure 6.

[0081] In one embodiment the weight dropdown menu 512 displays a range of 1 to 1000.

[0082] In one embodiment the weight units dropdown menu 514 are chosen from a selection of pounds and kilograms.

[0083] In one embodiment the body fat dropdown menu 521 contains a range from 0.1% to 70%.

[0084] In one embodiment the time dropdown menu 543 contains a range of 1 to 10000.

[0085] In one embodiment the time units dropdown box 542 are chosen from a selction of seconds, minutes, and hours.

[0086] Figure 6 illustrates a supplement additives menu 600 on the display 125 of the electronic communication device 120 according to an embodiment of the present invention. The supplement additives menu 600 includes a set of additives 610, a set of additive quantities 620, a set of additive adjustment dropdown menus 630, a reset button

640, a pass button 650, a display QR code button 670, a settings button 680, and a home button 690.

[0087] In the supplement additive menu 600, the set of additives 610 is a list of the additives represented by the additive quantity data structure 188 that the user has the option of adjusting. The set of additive quantities 620 first display the quantities of each additive represented by the additive quantity data structure 188. After the user makes adjustments, the set of additive quantities 620 then display the adjusted quantities chosen by the user, these adjusted quantities are represented by the user adjusted additives data 141. The set of additive adjustment dropdown menus 630 are a set of dropdown menus containing a range of quantities a user can choose from. When a value is selected from the range in the dropdown box, the value selected becomes the adjusted additive quantity that replaces the quantities represented by the additive quantity data structure 188 in the set of additive quantities 620. For the additive flavor, the additive adjustment dropdown menu contains a selection of flavors instead of a range of quantities. The reset button 640, when pressed, resets the set of additive quantities 620 back to those represented by the additive quantity data structure 188. The pass button 650, when pushed, causes the graphical user interface to display a supplement alert menu. The supplement alert menu is illustrated in Figure 8. The display QR code button 670, when pushed, displays a QR code and triggers the mobile app to send the adjusted additive quantity data structure 140 to the server 160 as further described below with regard to Figure 9. The settings button 680, when pushed, causes the graphical user interface to display the settings menu 500. The home button 690, when pushed, causes the graphical user interface to display the home menu 400.

[0088] In one embodiment the additive values can be adjusted to any value that does not result in exceeding the pre-drink and 24-hour maximums from Figure 3.

[0089] Figure 7 illustrates a display QR code menu 700 on the display 125 of the electronic communication device 120 according to an embodiment of the present invention. The display QR code menu 700 includes a QR code 710, a resume workout button 720, a settings button 730, a home button 740, and a supplement additives button 750.

[0090] In the display QR code menu 700, the QR code 710 is displayed on the display 125 of the electronic communication device 120 and is readable by the optical scanner 194 of the supplement dispenser computer 190. The resume workout button 720, when pushed, restarts the countdown to next supplement 410 clock of the home menu 400 to the time interval selected in the time interval between supplements field 540 of the settings menu 500. The settings button 730, when pushed, causes the graphical user interface to display the settings menu 500. The home button 740, when pushed, causes the graphical user interface to display the home menu 400. The supplement additives button 750, when pushed, causes the graphical user interface to display the supplement additives menu 600.

[0091] Figure 8 illustrates a supplement ready alert menu 800 on the display 125 of the electronic communication device 120 according to an embodiment of the present invention. The supplement ready alert menu 800 includes a supplement ready notification 810, a skip button 820, a settings button 830, a home button 840, and a supplement additives button 850.

[0092] In the supplement ready alert menu 800, the supplement ready notification 810 displays text indicating that the supplement is ready to be made. The skip button 820, when pushed, restarts the countdown to next supplement 410 clock of the home menu 400 to the time interval selected in the time interval between supplements field 540 of the settings menu 500. The settings button 830, when pushed, causes the graphical user interface to display the settings menu 500. The home button 840, when pushed, causes the graphical user interface to display the home menu 400. The supplement additives button 850, when pushed, causes the graphical user interface to display the supplement additives menu 600.

[0093] Figure 9 illustrates a flowchart 900 of an embodiment of a process for making a supplement in a supplement dispenser based on a list of quantities of additives selected through a computer readable program on an electronic communication device. First, at step 923, the display QR code button 670 of the supplement additives menu 600 is pushed. At step 924, the device CPU 122 of the electronic communication device 120 stores the adjusted additive quantities as the user adjusted additives data 141 in the adjusted additive quantities data structure 140 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 also stores data representing a unique identifier of the user as the adjusted additive user ID data 142 and data representing the date and time from the device clock 127 of the electronic communication device 120 as the adjusted additive time stamp data 143 in the adjusted additive quantity data structure 140 on the device memory 130 of the electronic communication device 120. At step 925, the device CPU 122 of the electronic communication device 120 electronically communicates the adjusted additive quantity data structure 140 to the device data transceiver 121 of the electronic communication device 120. The data transceiver 121 of the electronic communication device 120 transmits the adjusted additive quantity data structure 140 to the server data transceiver 161 of the server 160.

[0094] At step 926, the device CPU 122 of the electronic communication device 120 stores a QR code data that represents information for displaying a QR code that encodes the adjusted additive user ID data 142 and the adjusted additive time stamp data 143. The device CPU 122 of the electronic communication device 120 electronically communicates the QR code data to the display 125 of the electronic communication device 120, and the display 125 of the electronic communication device 120 displays the QR code 710 of the display QR code menu 700. At step 927, the optical scanner 191 of the supplement dispenser computer 190 reads the QR 710 code from the display 125 of the electronic communication device 120. At step 928, the optical scanner 194 of the supplement dispenser computer 190 electronically communicates an optical scanner data representing the scanned QR code to the dispenser CPU 192 of the supplement dispenser computer 190. The dispenser CPU 192 of the supplement dispenser computer 190 stores the optical scanner data on the dispenser memory 193 of the supplement dispenser computer 190. Next, at step 930, the dispenser CPU 192 of the supplement dispenser computer 190 processes the optical scanner data to produce an additive request data, wherein the additive request data represents a request for the adjusted additive quantity data structure 140 having the adjusted additive user ID data 142 and the adjusted additive time stamp data 143 that matches the adjusted additive user ID data 142 and the adjusted additive time stamp data 143 encoded in the QR code from the server memory 170 of the server 160. At step 931, the dispenser CPU 192 of the drink dispenser computer 190 stores the additive request data on the dispenser memory 193 of the drink dispenser computer 190. At step 932, the dispenser CPU 192 of the supplement dispenser computer 190 electronically communicates the additive request data to the dispenser data transceiver 191 of the supplement dispenser computer 190. The dispenser data transceiver 191 of the supplement dispenser computer 190 then transmits the additive request data to the server data transceiver 161 of the server 160.

[0095] At step 933, the server data transceiver 161 of the server 160 electronically communicates the additive request data to the server CPU 162 of the server 160. The server CPU 162 of the server 160 stores the additive request data to the server memory 170 of the server 160. At step 934, the server CPU 162 of the server 160 locates the adjusted additive data structure 140 on server memory 170 of the server 160 containing the adjusted additive user ID data 142 and the adjusted additive time stamp data 143 represented by the additive request data. At step 936, the server CPU 162 of the server 160 electronically communicates the adjusted additive quantity data structure 140 to the server data transceiver 161 of the server 160. The server data transceiver 161 of the server 160 transmits the adjusted additive quantity data structure to the dispenser data transceiver 191 of the supplement dispenser computer 190.

[0096] At step 937, the server CPU 162 of the server 160 stores the adjusted additive quantity data structure 140 as historic adjusted additive quantity data. Next, at step 938, the dispenser data transceiver 191 of the supplement dispenser computer 190 electronically communicates the adjusted additive quantity data structure 140 to the dispenser CPU 192 of the supplement dispenser computer 190. The dispenser CPU 192 of the supplement dispenser computer 190 then stores the additive quantity data structure 140 to the dispenser memory 193 of the supplement dispenser computer 190. At step 940, the supplement dispenser CPU 192 of the supplement dispenser computer 190 processes the adjusted additive quantity data structure 140 to produce a current actuator data by referencing a set of data called known actuator data representing the amount that the actuators 221 of the supplement dispenser 220 need to be actuated do dispense a minimum quantity of an additive. The dispenser CPU 192 of the supplement dispenser computer 190 divides the adjusted quantity of an additive by the minimum quantity from the known actuator data, the result is then multiplied with the actuation amount from the known actuator data. The current actuator data represents the amount the plurality of actuators 221 of the supplement dispenser 220 need to be actuated to dispense the quantities of each additive represented by the adjusted additive quantity data structure 140. At step 942, the dispenser CPU 192 of the supplement dispenser computer 190 stores the current actuator data on the dispenser memory 193 of the supplement dispenser computer 190. At step 944, the dispenser CPU 192 of the supplement dispenser computer 190 electronically communicates the current actuator data to the plurality of actuators 221 of the supplement dispenser 195. The plurality of actuators 221 of the supplement dispenser 220 actuate the plurality of valves 222 of the supplement dispenser 220 to distribute the quantities of each additive represented by the adjusted additive quantity data structure 140 from the plurality of additive storage containers 223 of the supplement dispenser 220 to the mixer/dispenser 224 of the supplement dispenser 220. At step 946, the mixer/dispenser 224 of the supplement dispenser 220 mixes the additives and dispenses the additives as a supplement.

Figure 10 illustrates a flowchart 1000 of an embodiment of a process for calculating an average user specific sensitivity for water, sucrose, and a 4:1 ratio of NaCl to KCl (electrolyte mixture). First, at step 1014, the hydration sensor 117 of the wearable sensor 110 measures a first hydration level of the user's sweat as baseline hydration data. The glucose sensor 112 of the wearable sensor 110 measures a first glucose concentration of the user's sweat as baseline glucose data. The chloride sensor 113 of the wearable sensor 110 and the potassium sensor 114 of the wearable sensor 110 measure a first electrolyte concentration of the user's sweat as baseline electrolyte data. At step 1016, the hydration sensor 117 of the wearable sensor 110 electronically communicates the baseline hydration data to the data transmitter 111 of the wearable sensor 110. The glucose sensor 112 of the wearable sensor 110 electronically communicates the baseline glucose data to the data transmitter 111 of the wearable sensor 110. The chloride sensor 113 of the wearable sensor 110 and the potassium sensor of the wearable sensor 110 electronically communicate the baseline electrolyte data to the data transmitter 111 of the wearable sensor 110. The data transmitter 111 of the wearable sensor 110 transmits the baseline hydration data, the baseline glucose data, and the baseline electrolyte data to the device data transceiver 121 of the electronic communication device 120. The device data transceiver 121 of the electronic communication device 120 electronically communicates the baseline hydration data, the baseline glucose data, and the baseline electrolyte data to the device CPU 122 of the electronic communication device 120, and the CPU 122 of the electronic communication device 120 stores the baseline hydration data, the baseline glucose data, and the baseline electrolyte data as a baseline sensitivity data structure on the memory 130 of the electronic communication device 120. At step 1017, the device data transceiver 121 of the electronic communication device 120 transmits the baseline sensitivity data structure to the server data transceiver 161 of the server 160. At step 1018, the server data transceiver 161 of the server 160 electronically communicates the baseline sensitivity data to the server CPU 162 of the server 160, and the CPU 162 of the server 160 stores the baseline sensitivity data on the memory 170 of the server 160. At step 1019 the supplement ready alert menu 800 is displayed on the display 125 of the electronic communication device 120. At step 1020 the supplement additives button 850 of the supplement ready alert menu 800 is pushed. At step 1021, the supplement additives menu 600 is displayed on the display 125 of the electronic communication device 120. At step 1022, the additive quantities are adjusted using the dropdown menus 630 of the supplement additives menu 600 as described above in regard to figure 6. At step 1023, flowchart 900 of Figure 9 is followed to dispense a supplement. At step 1024, the user consumes the supplement. At step 1025, the hydration sensor 117 of the wearable sensor 110 measures a second hydration level of the user's sweat as post-supplement hydration data. The glucose sensor 112 of the wearable sensor 110 measures a second glucose concentration of the user's sweat as post-supplement glucose data. The chloride sensor 113 of the wearable sensor 110 and the potassium sensor 114 of the wearable sensor 110 measure a second electrolyte concentration of the user's sweat as post-supplement electrolyte data. At step 1030, the hydration sensor 117 of the wearable sensor 110 electronically communicates the post-supplement hydration data to the data transmitter 111 of the wearable sensor 110. The glucose sensor 112 of the wearable sensor 110 electronically communicates the post-supplement glucose data to the data transmitter 111 of the wearable sensor 110. The chloride sensor 113 of the wearable sensor 110 and the potassium sensor 114 of the wearable sensor 110 electronically communicate the post-supplement electrolyte data to the data transmitter 111 of the wearable sensor 110. The data transmitter 111 of the wearable sensor 110 then transmits the post-supplement hydration data, the post-supplement glucose data, and the post-supplement electrolyte data to the device data transceiver 121 of the electronic communication device 120. At step 1032, the device data transceiver 121 of the electronic communication device 120 electronically communicates the post-supplement hydration data, the post-supplement glucose data, and the post-supplement electrolyte data to the device CPU 122 of the electronic communication device 120. The device CPU 122 of the electronic communication device 120 stores the post-supplement hydration data, the post-supplement glucose data, and the post-supplement electrolyte data in a post-supplement sensitivity data structure on the device memory 130 of the electronic communication device 120. At step 1035, the device CPU of the electronic communication device 120 electronically communicates the post-supplement sensitivity data structure to the device data transceiver 121 of the electronic communication device 120. The device data transceiver 121 of the electronic communication device 120 transmits the post-supplement sensitivity data structure to the server data transceiver 161 of the server 160. At step 1037, the server data transceiver 161 of the server 160 electronically communicates the post-supplement sensitivity data structure to the server CPU 162 of the server 160, and the server CPU 162 of the server 160 stores the post-supplement sensitivity data structure to the server memory 170 of the server 160. At step 1040, the server CPU 162 of the server 160 calculates the user's current water sensitivity as current water sensitivity data, the user's current sucrose sensitivity as current sucrose sensitivity data, and the user's current electrolyte mix sensitivity as current electrolyte sensitivity data. The current water sensitivity represents the amount of water that when consumed by the user will result in the hydration level of the user's sweat being the minimum adjustment increment for hydration level less than it was before the user consumed the water. The current sucrose sensitivity represents the amount of sucrose that when consumed by the user will result in the glucose concentration of the user's sweat being the minimum adjustment increment for glucose greater than it was before the user consumed the sucrose. The current electrolyte mix sensitivity represents the amount of electrolyte mix that when consumed by the user will result in the electrolyte concentration of the user's sweat being the minimum adjustment increment for electrolyte greater than it was before the user consumed the electrolyte mix. The minimum adjustment increments for hydration, glucose, and electrolyte can be found in table 300. The current water sensitivity is calculated as current water sensitivity data by multiplying the quantity of water in the supplement and the minimum adjustment increment for hydration level and dividing by the magnitude of difference between baseline hydration data and the post-supplement hydration data. The current sucrose sensitivity is calculated as current sucrose sensitivity data by multiplying the quantity of sucrose in the supplement and the minimum adjustment increment for glucose and dividing by the magnitude of difference between the baseline glucose data and the post-supplement glucose data. The current electrolyte mix sensitivity is calculated as current electrolyte mix sensitivity data by multiplying the quantity of electrolyte mix in the supplement and the minimum adjustment increment for electrolyte level and dividing by the magnitude of difference between the baseline electrolyte data and the post-supplement electrolyte data. At step 1042, the server CPU 162 of the server 160 stores the current water sensitivity data, the current sucrose sensitivity data, and the current electrolyte mix sensitivity data on the server memory 170 of the server 160. At step 1045, the server CPU 162 of the server 160 calculates an average water sensitivity as average water sensitivity data by averaging the current water sensitivity data with previously recorded water sensitivity data stored on the server memory 170 of the server 160 for the user. The server CPU 162 of the server 160 calculates an average sucrose sensitivity as average sucrose sensitivity data by averaging the current sucrose sensitivity data with previously recorded sucrose sensitivity data stored on the server memory 170 of the server 160 for the user. The server CPU 162 of the server 160 calculates an average electrolyte mix sensitivity as average electrolyte mix sensitivity data by averaging the current electrolyte mix sensitivity data with previously recorded electrolyte mix sensitivity data stored on the server memory 170 of the server 170 for the user. At step 1050, the server CPU 162 of the server 160 stores the average water sensitivity data, the average sucrose sensitivity data, and the average electrolyte mix sensitivity data on the server memory 170 of the server 160.

[0097] In another embodiment, instead of the user consuming the additive in the form of a supplement at step 520, the additive is introduced as food, in a pill, in a capsule, intravenously or by any other means of introducing the additive into the user's body.

[0098] In one embodiment, the supplement consumed by the user at step 520 is made by the user. The user inputs the quantities of additives that the user added to the supplement into the graphical user interface of the electronic communication device app on the device memory 130 of the electronic communication device 120.

[0099] In one embodiment, the supplement consumed by the user at step 520 is made by the same process as following the steps of flowchart 1500.

[00100] Figure 11 illustrates a flowchart 1100 of an embodiment of a process for calculating a quantity of electrolyte mix to add to a supplement based on a measured electrolyte concentration, a target electrolyte concentration, and a user's calculated electrolyte sensitivity. First, at step 1105, the server data transceiver 161 of the server 160 receives current electrolyte data comprising chloride data 152 and potassium data 153. Next, at step 1110, the server data transceiver 161 of the server 160 electronically communicates the current electrolyte concentration data to the server CPU 162 of the server 160. The server CPU 162 of the server 160 stores the current electrolyte data on the memory 170 of the server 160. Next, at step 1115, the server CPU 162 of the server 160 calculates the difference between the current electrolyte data and a target electrolyte data by subtracting the current electrolyte data from the target electrolyte data. The target electrolyte concentration can be found in table 300. If the result from step 1115 is less than the minimum adjustment increment for electrolyte, the flow chart moves to step 1120. The minimum adjustment increment for electrolytes is found in table 300. At step 1120, data representing an electrolyte mix quantity of 0.00 grams is stored as electrolyte mix data 173 in the additive quantity data structure 188 on the server memory 170 of the server 160. If the result from step 1115 is at least the minimum adjustment increment for electrolyte, the flow chart moves to step 1125. At step 1125, the server CPU 162 of the server 160 to calculates the quantity of electrolyte mix that will be added to the supplement by multiplying the average electrolyte mix sensitivity data stored on the server memory 170 of the server 160 at step 1050 of the flowchart 1000 and the magnitude of difference between the current electrolyte data and the target electrolyte data and dividing by the minimum adjustment increment for electrolyte. At step 1130, the server memory 170 of the server 160 stores the calculated electrolyte mix quantity as the electrolyte mix data 173 in the additive quantity data structure 188 on the server memory 170 of the server 160.

[00101] Figure 12 illustrates a flowchart 1200 of an embodiment of a process for calculating a quantity of sucrose to add to a supplement based on a measured glucose concentration, a target glucose concentration, and the user's calculated sucrose sensitivity. First, at step 1205, the server data transceiver 161 of the server 160 receives glucose data 154. Next, at step 1210, the server data transceiver 161 of the server 160 electronically communicates the glucose data 154 to the server CPU 162 of the server 160. The server CPU 162 of the server 160 stores the glucose data 154 on the memory 170 of the server 160. Next, at step 1215, the server CPU 162 of the server 160 calculates the difference between the glucose data 154 and the target glucose data by subtracting the glucose data 154 from the target glucose data. The target glucose concentration can be found in table 300. If the result from step 1215 is less than the minimum adjustment increment for glucose, the flow chart moves to step 1220. The minimum adjustment increment for glucose is found in table 300. At step 1220, data representing a sucrose quantity of 0.00 grams is stored as the sucrose data 172 in the additive quantity data structure 188 on the server memory 170 of the server 160. If the result from step 1215 is at least the minimum adjustment increment for glucose, the flow chart moves to step 1225. At step 1225, the server CPU 162 of the server 160 calculates the quantity of sucrose that will be added to the supplement by multiplying the average sucrose sensitivity data stored on the server memory 170 of the server 160 at step 1050 of the flowchart 1000 and the magnitude of difference between the glucose data 154 and the target glucose data and dividing by the minimum adjustment increment for glucose. At step 1230, the server CPU 162 of the server 160 stores the calculated sucrose quantity as the sucrose data 172 on the server memory 170 of the server 160.

[00102] Figure 13 illustrates a flowchart 1300 of an embodiment of a process for calculating a quantity of water to add to a supplement based on a measured hydration level, a target hydration level, and the user's calculated water sensitivity. First, at step 1305, the server data transceiver 161 of the server 160 receives the hydration data 151. Next, at step 1310, the server data transceiver 161 of the server 160 electronically communicates the hydration data 151 to the server CPU 162 of the server 160, the server CPU 162 of the server 160 stores the hydration data 151 on memory 170 of the server 160. Next, at step 1315, the server CPU 162 of the server 160 calculates the difference between the hydration data 151 and the target hydration data by subtracting the target hydration data from the hydration data 151. The target hydration level can be found in table 300. The male target is used if the male check box 531 is selected in the settings menu 500, the female target is used if the female check box 532 is selected in the settings menu 500 as describe above with regard to figure 500. If the result from step 1315 is less than the minimum adjustment increment for glucose, the flow chart moves to step 1320. The minimum adjustment increment for glucose is found in table 300. At step 1320, a set of data representing a water quantity of 0.00 grams is stored as the water data 171 in the additive quantity data structure 188 on the server memory 170 of the server 160. If the result from step 1315 is at least the minimum adjustment increment for hydration, the flow chart moves to step 1325. At step 1325, the server CPU 162 of the server 160 calculates the quantity of water that will be added to the supplement by multiplying the average water sensitivity data stored on the server memory 170 of the server 160 at step 1050 of the flowchart 1000 and the magnitude of difference between the hydration data 151 and the target hydration data and dividing by the minimum adjustment increment for hydration. At step 1330, the server CPU of the server 160 stores the calculated quantity of water as the water data 171 in the additive quantity data structure on the memory 170 of the server 160.

[00103] In one embodiment, the amount of water being calculated in flowchart 1000 is in addition to a quantity of water that is added to every supplement. The quantity of water added to every supplement may include from 10mL to 2000mL.

[00104] Figure 14 illustrates a flowchart 1400 of an embodiment of a process for calculating the user's lean weight and blood volume. First, at step 1410 the settings menu 500 is displayed on the display 124 of the electronic communication device 120. At step 1415, the user's total weight is entered in the weight dropdown menu 512 in the settings menu 500 and the weight units are selected from the weight units dropdown menu 514 in the settings menu 500 as described above with regard to Figure 5. At step 1416, the user's body fat percentage is selected from the body fat percentage dropdown menu 521 in the settings menu 500 as described above with regard to Figure 5. At step 1417, the user's sex is chosen by selecting the male check box 531 if the user is male or by selecting the female check box 532 of the user is female as described above with regard to Figure 5. Next, at step 1420, the device CPU of the electronic communication device 120 stores the user's body weight as body weight data, the user's body fat percentage as body fat data, and the user's sex as sex data on the device memory 130 of the electronic communication device 120. Next, at step 1430, the device CPU 122 of the electronic communication device 120 electronically communicates the body weight data to the device transceiver 121 of the electronic communication device 120. The device data transceiver 121 of the electronic communication device 120 then transmits the body weight data, the body fat data, and the sex data to the server data transceiver 161 of the server 160.

[00105] Next, at step 1440, the server data transceiver 161 of the server 160 electronically communicates the body weight data, the body fat data, and the sex data to the server CPU 162 of the server 160, and the server CPU 162 of the server 160 stores the body weight data, the body fat data, and the sex data on the server memory 170 of the server 160. Next, at step 1450, the server CPU 162 of the server 160 calculates a lean weight data by first calculating a body fat mass data by multiplying the body weight data and the body fat data, then subtracting the body fat mass data from the body weight data. At step 1460, the server CPU 162 of the server 160 stores the lean weight data on the server memory 170 of the server 160. At step 1470, the server CPU 162 of the server 160 calculates the user's blood volume as blood volume data by multiplying the body weight data by 0.6. At step 1480, the server CPU 162 of the server 160 stores the blood volume data on the memory 170 of the server 160.

[00106] In another embodiment, the user at step 1415 enters the user's lean weight, directly.

[00107] In one embodiment, the body fat percentage is estimated by the user.

[00108] In one embodiment, the body fat percentage is measured using calipers, a fluid displacement tank, electrical current, or any other method for measuring body fat content.

[00109] Figure 15 illustrates a flowchart 1500 of an embodiment of a process for calculating a target value for lactate and pH based on an average of pre-exercise measurements. First, at step 1502, the lactate sensor 115 of the wearable sensor 110 measures the concentration of lactate in a user's sweat as lactate data 155 and the pH sensor 116 of the wearable sensor 110 measure the pH value of a user's sweat as pH data 156. At step 1504, the lactate sensor 115 of the wearable sensor 110 electronically communicates the lactate data 155 to the data transmitter 111 of the wearable sensor 110. The pH sensor 116 of the wearable sensor 110 electronically communicates the pH data 156 to the data transmitter 111 of the wearable sensor 110. The data transmitter of the wearable sensor 110 transmits the lactate data 155 and the pH data 156 to the device data transceiver 121 of the electronic communication device 120. At step 1506, the device data transceiver 121 of the electronic communication device 120 electronically communicates the lactate data 155 and the pH data 156 to the device CPU 122 of the of the electronic communication device 120, and the device CPU 122 of the electronic communication device 120 stores the lactate data 155 and pH data 156 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic mobile device 120 stores the date and time from the device clock 127 of the electronic mobile device 120 as biometric timestamp data 158 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic mobile device 120 stores data representing a unique identifier of the user as biometric user ID data 157 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic mobile device 120 stores the GPS coordinates from the GPS receiver 128 of the electronic mobile device 120 as GPS data 159 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. At step 1510, the device CPU of the electronic communication device 120 electronically communicates the current biometric data structure 150 to the device data transceiver 121 of the electronic communication device 120. The device data transceiver 121 of the electronic communication device 120 transmits the current biometric data structure 150 to the server data transceiver 161 of the server 160.

[00110] At step 1520, the server data transceiver 161 of the server 160 electronically communicates the current biometric data structure 150 to the server CPU 162 of the server 160. The server CPU 162 of the server 160 stores the current biometric data structure 150 on the memory 170 of the server 160. At step 1523, the server CPU 162 of the server 160 determines if the current biometric data structure 150 represents pre-exercise measurements. If the biometric time stamp data 157 represents a time that is more than 3 hours later than the most recent end time data and earlier than the start time data directly following the most recent end time data, the current biometric data structure represents pre-exercise measurements and the flowchart proceeds to step 1530, if not the flowchart proceeds to step 1526. At step 1526, the flow chart ends without a new target being calculated. The start time data represents the time that the start workout button 430 in the home menu 400 was pushed as described above with regard to Figure 4. The end time data represents the time that the end workout button 440 was pushed as described above with regard to Figure 4. At step 1540, the server CPU 162 of the server 160 calculates an updated pH target data by averaging the pH data 156 with all data comprising the pH target data. The pH target data is an average of all pre-exercise pH data. The server CPU 162 of the server 160 calculates an updated lactate target data by averaging the lactate data 155 with all data comprising the lactate target data. The lactate target data is an average of all pre-exercise lactate data. At step 1550, the server memory 170 of the server 160 stores the updated pH target data as the pH target data and the updated lactate target data as the lactate target data.

[00111] Figure 16 illustrates a flowchart 1600 of an embodiment of a process for calculating a quantity of carnosine to add to a supplement based on a measured lactate concentration, a target lactate concentration, and the user's lean weight. First, at step 1610 the server data transceiver 161 of server 160 receives the lactate data 155. Next, at step 1620, the server data transceiver 161 of the server 160 electronically communicates the lactate concentration to the server CPU 162 of the server 160, and the server CPU of the server 160 stores the lactate data 155 on the memory 170 of the server 160. At step 1623, the server CPU 162 of the server 160 retrieves the lactate target data stored on the server memory 170 of the server 160 from step 1550 of the flowchart 1500. At step 1525, the server CPU 162 of the server 160 calculates the difference between the lactate data 155 and the lactate target data by subtracting the target lactate data from the lactate data 155. If the measured lactate concentration is not at least 0.1 mmol greater than the target lactate concentration, the flowchart moves to step 1627. Next, at step 1627, data representing a quantity of 0.00 grams is stored as the carnosine data 175 in the additive quantity data structure 188 on the server memory 170 of the server 160. If the measured lactate concentration is at least 0.1 mmol greater than the target lactate concentration, the flowchart moves to step 1630. Next, at step 1630, the server CPU 162 of the server 160 retrieves the user's lean weight data stored on the server memory 170 of the server 160 from step 1460 of the flowchart 1400. Next, at step 1635, the quantity of carnosine for the supplement is calculated. 0.02 grams of carnosine are added to the supplement per kg of lean weight for each 0.1 mmol/L difference between the measured lactate concentration and the target lactate concentration. The server CPU 162 of the server 160 calculates the quantity of carnosine to add to a supplement as carnosine data 175 by multiplying 0.2 and the lean weight data and the magnitude of difference between the target lactate data and the lactate data 155. At step 1640, the server CPU 162 of the server 160 stores the calculated carnosine value as carnosine data 175 in the additive quantity data structure 188 on the memory 170 of the server 160.

[00112] Figure 17 illustrates a flowchart 1700 of an embodiment of a process for calculating a quantity of sodium bicarbonate to add to a supplement based on a measured pH value, a target pH value, and the user's lean weight. First, at step 1710 the server data transceiver 161 of server 160 receives the pH data 156. Next, at step 1720, the server data transceiver 161 of the server 160 electronically communicates the pH data 156 to the server CPU 162 of the server 160, the server CPU 162 of the server 160 stores the pH data 156 on the memory 170 of the server 160. At step 1723, the server CPU 162 of the server 160 retrieves the pH target data stored on the server memory 170 of the server 160 from step 1550 of the flowchart 1500. At step 1725, the server CPU 162 of the server 160 calculates the difference between the pH data 156 and the pH target data by subtracting the pH target data from the pH data 156. If the pH data 156 is not at least 0.5 greater than the target pH data, the flowchart moves to step 1727. Next, at step 1727, a set of data representing a sodium bicarbonate quantity of 0.00 grams is stored as sodium bicarbonate data 174 in the additive quantity data structure 188 on the server memory 170 of the server 160. If the pH data 156 is at least 0.5 greater than the target pH data, the flowchart moves to step 1730. Next, at step 1730, the server CPU 162 of the server 160 retrieves the lean weight data stored on the server memory 170 of the server 160 from step 1460 of the flowchart 1400. Next, at step 1735, the quantity of sodium bicarbonate for the supplement is calculated. 0.01 grams of sodium bicarbonate are added to the supplement per kg of lean weight for each 0.5 in variation between the pH data 156 and the target pH data. The server CPU 162 of the server 160 calculates the quantity of sodium bicarbonate to add to a supplement by multiplying 0.1 and the lean weight data and the magnitude of difference between the target pH data and the pH data 156. At step 1740, the server CPU 162 of the server 160 stores the calculated sodium bicarbonate value as the sodium bicarbonate data 174 in the additive quantity data structure 188 on the memory 170 of the server 160.

[00113] Figure 18 illustrates a flowchart 1800 of an embodiment of a process for dispensing a supplement based on a set of sweat component values measured in the user's sweat compared to a set of target sweat component values. First, at step 1805, the glucose sensor 112 of the wearable sensor 110 measures the concentration of glucose in the user's sweat as glucose data 154, the chloride sensor 113 of the wearable sensor 110 measures the concentration of chloride in the user's sweat as chloride data 152, the potassium sensor 114 of the wearable sensor 110 measures the concentration of potassium in the user's sweat as potassium data 153, the lactate sensor 115 of the wearable sensor 110 measures the concentration of lactate in the user's sweat as lactate data 155, the pH sensor 116 of the wearable sensor 110 measures the pH of the user's sweat as pH data 156, and the hydration sensor 117 of the wearable sensor 110 measures the hydration level of the user's sweat as hydration data 151. Next, at step 1810, the glucose sensor 112 of the wearable sensor 110 electronically communicates the glucose data 154 to the transmitter 111 of the wearable sensor 110, the chloride sensor 113 of the wearable sensor 110 electronically communicates the chloride data 152 to the transmitter 111 of the wearable sensor 110, the potassium sensor 114 of the wearable sensor 110 electronically communicates the potassium data 153 to the transmitter 111 of the wearable sensor 110, the lactate sensor 115 of the wearable sensor 110 electronically communicates lactate data 155 to the transmitter 111 of the wearable sensor 110, the pH sensor 116 of the wearable sensor 110 electronically communicates the pH data 156 to the transmitter 111 of the wearable sensor 110, and the hydration sensor 117 of the wearable sensor 110 electronically communicates the hydration data 151 to the transmitter 111 of the wearable sensor 110. Next, at step 1815, the transmitter 111 of the wearable sensor 110 transmits the glucose data 154, the chloride data 152, the potassium data 153, the lactate data 155, the pH data 156, and the hydration data 151 to the device transceiver 121 of the electronic communication device 120.

[00114] Next at step 1820, the device data transceiver 121 of the electronic communication device 120 electronically communicates the glucose data 154, the chloride data 152, the potassium data 153, the lactate data 155, the pH data 156, and the hydration data 151 to the device CPU 122 of the electronic communication device 120, the CPU then stores the glucose data 154, the chloride data 152, the potassium data 153, the lactate data 155, the pH data 156, and the hydration data 151 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic mobile device 120 stores the date and time from the device clock 127 of the electronic mobile device 120 as biometric timestamp data 158 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic mobile device 120 stores data representing a unique identifier of the user as biometric user ID data 157 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. The device CPU 122 of the electronic mobile device 120 stores the GPS coordinates from the GPS receiver 128 of the electronic mobile device 120 as GPS data 159 in the current biometric data structure 150 on the device memory 130 of the electronic communication device 120. Next, at step 1825, the current biometric data structure 150 is electronically communicated to the device data transceiver 121 of the electronic communication device 120. The device data transceiver 121 of the electronic communication device 120 transmits the current biometric data structure 150 to the server data transceiver 161 of the server 160. Next, at step 1830, the quantity of an electrolyte mix to be used in a supplement is calculated following the flowchart 1100, the quantity of sucrose to be used in a supplement is calculated following the flowchart 1200, the quantity of water to be used in a supplement is calculated following the flowchart 1300, the quantity of carnosine to be used in a supplement is calculated following the flowchart 1600, and the quantity of sodium bicarbonate to be used in a supplement is calculated following the flowchart 1700. Next, at step 1835, the server CPU 162 of the server 160 stores the time and date from the server clock 163 of the server 160 as additive time stamp data 185 in the additive quantity data structure on the server memory 170 on server 160. The server CPU of the server 160 then stores data representing a unique identifier of the user as additive user ID data in the additive quantity data structure 188 on the memory 170 of the server 160. At step 1836, the server CPU 162 of the server 160 electronically communicates the additive quantity data structure 188 to the server data transceiver 161 of the server 160. The server data transceiver 161 of the server 160 transmits the additive quantity data structure 188 to the device data transceiver 121 of the electronic communication device 120.

[00115] Next, at step 1837, the device data transceiver 121 of the electronic communication device 120 electronically communicates the additive quantity data structure 188 to the device CPU 122 of the electronic communication device 120, the device CPU 122 of the electronic communication device 120 then stores the additive quantity data structure 188 on the device memory 130 of the electronic communication device 120. Next, at step 1839, if the calculated additives are for a pre-workout supplement, the flowchart proceeds to step 1841, if the calculated additives are not for a pre-workout supplement, the flowchart proceeds to step 1843. At step 1841, the device CPU 122 of the electronic communication device 120 operates on the additive quantity data structure to display a set of numerical values representing the quantities of additives represented by the additive data as well as quantities of caffeine, creatine, BCAAs, and beta-alanine in the supplement additives menu 600 on the display 124 of the electronic communication device 120. The quantities of caffeine, creatine, BCAAs, and beta-alanine are based on the user's lean weight. An embodiment of the supplement additives menu 600 is illustrated in figure 4. Next, at step 1843, if the calculated additives are for a post-workout supplement, the flowchart proceeds to step 1845, if the calculated additives are not for a post-workout supplement, the flowchart proceeds to step 1847. At step 1845, the device CPU 122 of the electronic communication device 120 operates on the additive data to display a set of numerical values representing the quantities of additives represented by the additive quantity data structure as well as quantities of multivitamin mix, whey protein, creatine, and glutamine in the supplement additives menu 600 on the display 124 of the electronic communication device 120. The quantities of multivitamin mix, whey protein, creatine, and glutamine are based on the user's lean weight. Next, at step 1847, if the calculated additives are for an intra-workout supplement, the flowchart proceeds to step 1849, if the calculated additives are not for an intra-workout supplement, the flowchart proceeds to step 1850. At step 1849, the device CPU 122 of the electronic communication device 120 operates on the additive quantity data structure to display a set of numerical values representing the quantities of additives represented by the additive quantity data structure in the supplement additives menu 600 on the display 124 of the electronic communication device 120. Next, at step 1850, the user makes any desired adjustments to the calculated additive quantities using the supplement additives menu 600 as discussed above with regard to figure 600. Next, at step 1855, flowchart 900 of Figure 9 is followed to dispense a supplement.

[00116] In one embodiment the caffeine, creatine, BCAAs and beta-alanine, glutamine, and whey protein can have quantities selected from a range of 0 to the per-drink maximum for each additive, so long as the 24-hour maximum is not exceeded.

[00117] In one embodiment, any additive from table 300 can be added or subtracted from the pre-exercise supplement, the intra-exercise supplement, and the post-exercise supplement.

[00118] In one embodiment, the mobile app on device memory 130 of electronic communication device 120 will not allow an additive to be distributed in excess of the per-drink max listed in table 300 in any single supplement.

[00119] In one embodiment, the mobile app on device memory 130 of electronic communication device 120 will not allow an additive to be distributed in excess of the 24-hour max listed in table 300 in any single 24 hour period.

[00120] In one embodiment, for every sweat component measurement occurring in the same exercise session and after a supplement has been consumed, data representing the sweat component measurement will be stored on the server memory 170 of the server 160 to be used as a data point for sensitivity averages.

[00121] In one embodiment, any pH and lactate values measured before exercising are stored and used for calculating pH and lactate targets.

[00122] In one embodiment the additive adjustments made at step 1550 can be made by someone other than the user, such as a trainer, a nutritionist, or anyone else the user allows to make the adjustments.

[00123] In one embodiment, the QR code displayed at step 1570 encodes the data representing the adjusted ingredients, eliminating communication with the server after step 1535.

[00124] In one embodiment the BCAAs is made up of 3:1:2 ration of leucine, valine, and isoleucine. The current disclosure is not limited to this ratio or composition.

[00125] In one embodiment, the pre-exercise supplement displayed at step 1541 comprises 2mg per kilogram of lean weight of caffeine, 25mg per kilogram of lean weight of creatine, 40mg per kilogram of lean weight of BCAAs, and 30mg per kilogram of lean weight of beta-alanine. These default quantities can be adjusted and the user can make ad hoc adjustments.

[00126] In one embodiment, the post-exercise supplement displayed at step 1545 comprises 20mg per kilogram of lean weight of multivitamin, 100mg per kilogram of lean weight of whey protein, 25mg per kilogram of lean weight of creatine, and 50mg per kilogram of lean weight of glutamine. These default quantities can be adjusted and the user can make ad hoc adjustments. These default quantities can be adjusted and the user can make ad hoc adjustments.

[00127] In one embodiment, the multivitamin is an off the shelf vitamin mix.

[00128] In one embodiment the user may choose from a variety of flavors for their supplement.

[00129] In one embodiment, each supplement dispenser 220 will have one choice of flavor, and each gym will have multiple supplement dispensers 120. The mobile app will use the GPS data to determine which gym the user is in and give the user the option to pick which supplement dispenser 220 to use based on the flavor in each supplement dispenser 220.

[00130] In one embodiment, additives for the supplement can be based on the type of exercise. For example, different additives are offered for cardio exercises and strength exercises.

[00131] Figure 19 illustrates a flowchart 1900 of an embodiment of a process for dispensing supplements before, during, and after exercising with quantities of additives based on measured sweat component quantities. First, at step 1905, the user puts on the wearable sensor. Next, at step 1910, the home menu 400 is displayed on the display 125 of the electronic communication device 120. Next, at step 1915, if the user has an account, then the user will sign into the user's account by pushing the log in button 445 in the home menu 400, and the flowchart will proceed to step 1940. If the user does not have an account, then the user will register one and the flowchart will proceed to step 1925. At step 1925, once the user is registered, the display 125 of the electronic communication device displays the settings menu 500 and the steps of flowchart 1400 are followed to determine and store the user's sex and calculate and store the user's lean weight and blood volume. Next, at step 1930, the steps of flowchart 1000 are followed to calculate and store the user's water sensitivity as water sensitivity data, the user's electrolyte mix sensitivity as electrolyte mix sensitivity data, and the user's sucrose sensitivity as sucrose sensitivity data. Next, at step 1935, the steps of flowchart 1500 are followed to calculate and store a target pH value as target pH data and a target lactate concentration as target lactate data. Next, at step 1940, the start workout button 430 in the home menu 400 is pushed. At step 1942, the steps of flowchart 1800 are followed to dispense the pre-exercise supplement. Next, at step 1945, the user consumes the supplement. Next, at step 1950, the resume workout button 720 in the display QR code menu 700 is pushed. Next, at step 1955, the device CPU 122 of the electronic communication device 120 uses the device clock 127 of the electronic communication device 120 to start the countdown to next supplement 410 in the home menu 400 for the amount of time selected in the time interval field 540 in the settings menu 500, at the end of which the steps of flowchart 1800 are followed. Next, at step 1960, if when the countdown to next supplement 410 from step 1955 has expired the user has not pushed the end workout button 440 in the home menu 400, the flowchart will proceed to step 1965. At step 1965, the steps of flowchart 1800 are followed to dispense an intra-exercise supplement. Next, at step 1970, the user consumes the supplement. Next, at step 1975, the resume workout button 720 is pushed. Next, the flow chart proceeds back to step 1955. If before the countdown to next supplement 410 from step 1955 has expired the user has pushed the end workout button 440 in the home menu 400, the flowchart will proceed to step 1980. At step 1980, the steps of flowchart 1800 are followed to dispense a post-exercise supplement. At step 1985, the user consumes the post-exercise supplement.

[00132] In one embodiment the server CPU 162 of the server 160 uses the adjusted additive time stamps in the archived adjusted additive quantities data structures to calculate the amount of additives that have been consumed in the last 24 hours. The server will add up all additives that have gone into drinks in the last 24 hours, and will alert the user through the electronic mobile device 120 if the user is attempting to adjust an additive above the 24 hour maximum. The server CPU will also not calculate additive quantities that will result in the 24 hour maximum being exceeded.

[00133] In one embodiment, the user performs a standardized calibration workout when they first use the system. Supplements are provided to the user during the calibration and the response of the sweat components to the additives is recorded. This information is used to adjust additive levels in the future.

[00134] In one embodiment, large data sets are collected when a large amount of users participate in the same exercises. This data is used to refine target calculations, sensitivity calculations, and additive calculations. Exercises that are most productive biologically are identified.

[00135] Figure 20 illustrates a mobile supplement dispensing device 2000 according to an embodiment of the present invention. The mobile supplement dispensing device 2000 includes the supplement dispenser computer 2010, a supplement dispenser 2020, and a vehicle 2030. The supplement dispenser computer 2010 includes the dispenser data transceiver 2011, the dispenser CPU 2012, the dispenser memory 2013, and the optical scanner 2014. The supplement dispenser 2020 includes a plurality of actuators 2021, a plurality of valves 2022, a plurality of additive storage containers 2023, and a mixer/dispenser 2024. The vehicle 2030 includes a motor 2031, a plurality of wheels 2032, a power supply 2033, a camera 2034, and a GPS receiver 2035.

[00136] In the mobile supplement dispensing device 2000 the dispenser data transceiver 2011 of the supplement dispenser computer 2010, the robot memory 2013 of the supplement dispenser computer 2010, and the optical scanner 2014 of the supplement dispenser computer 2010 are in electronic communication with the dispenser CPU 2012 of the supplement dispenser computer 2010. The dispenser CPU 2012 of the supplement dispenser computer 2010 is in electronic communication with the plurality of actuators

2021 of the supplement dispenser 2020. The plurality of actuators 2021 of the supplement dispenser 2020 are in mechanical communication with the plurality of valves 2022 of the supplement dispenser 2020. Each of the plurality of valves 2022 of the supplement dispenser 2020 is connected at one end to a different one of the plurality of additive storage containers 2023 of the supplement dispenser 2020 and connected at the other end to the mixer/dispenser 2024 of the supplement dispenser 2020. The robot CPU 2012 of the mobile supplement dispenser computer 2010 is in electronic communication with the motor 2031, the robot GPS receiver 2035, the camera 2034, and the power supply 2033 of the automobile 2030. The wheels 2032 of the automobile are in mechanical communication with the motor 2031 of the automobile 2030.

[00137] In operation the dispenser CPU 192 of the supplement dispenser computer 190 electronically communicates the current actuator data to the plurality of actuators 221 of the supplement dispenser 220 as described above with respect to Figure 1. The plurality of actuators 221 of the supplement dispenser 220 actuate the plurality of valves 222 of the supplement dispenser 220 to distribute the quantities of each additive represented by the adjusted additive quantity data structure 140 from the plurality of additive storage containers 223 of the supplement dispenser 220 to the mixer/dispenser 224 of the supplement dispenser 220. The mixer/dispenser 224 of the supplement dispenser 220 mixes the additives and dispenses the additives as a supplement. The power supply 2033 of the automobile 2030 is in electronic communication with the motor 2031 and the robot supplement computer 2010.

[00138] The camera 2034 and the robot GPS receiver 2035 provide navigation data to the CPU 2012 of the rob supplement computer 2010. The robot CPU 2012 electronically communicates data representing directions to the motor 2031 of the automobile 2030. The motor is capable of steering the automobile in any direction by engaging different wheels. The power supply 2033 of the automobile 2030 supplies electricity to the motor 2031 of the automobile 2030 and to the robot supplement dispenser computer 2010. The robot supplement dispenser computer 2010 provides electricity to the supplement dispenser 2020.

[00139] In one embodiment the plurality of wheels is replaced by a track system.

[00140] In one embodiment the number of wheels is selected from a range of 2 to 6.

[00141] In one embodiment the user carries a tracking device that the automobile 2030 follows.

[00142] While particular elements, embodiments, and applications of the present invention have been shown and described, it is understood that the invention is not limited thereto because modifications may be made by those skilled in the art, particularly in light of the foregoing teaching. It is therefore contemplated by the appended claims to cover such modifications and incorporate those features which come within the spirit and scope of the invention.

CLAIMS

1. A system for dispensing additives for a supplement based on measurements from a sensor, said system including:

a sensor, wherein said sensor measures a concentration of a substance in sweat as concentration data;

an electronic communication device, said electronic communication device including a central processing unit, a memory, a data transceiver, and a display, wherein said electronic communication device is in data communication with said sensor, wherein said data transceiver of said electronic communication device receives said concentration data from said sensor;

a server, said server including a central processing unit, a memory and a data transceiver, wherein said server is in data communication with said electronic communication device, wherein said data transceiver of said server receives said concentration data from said electronic communication device, wherein said central processing unit of said server calculates a quantity of an additive to use in a supplement as additive quantity data by subtracting said concentration represented by said concentration data from a precalculated concentration target value stored as target concentration data on said memory of said server and multiplying a result of said subtraction by a first precalculated number associated with said additive stored on said memory of said server as additive constant data;

a computer in electronic communication with an actuator, said computer including a central processing unit, a memory, and a data transceiver, wherein said computer is in data communication with said server, wherein said data transceiver of said computer receives said additive quantity data from said server, wherein said central processing unit of said computer references an actuation index on said memory of said computer to produce an actuation signal representing the amount said actuator needs to be actuated to dispense said quantity of additive represented by said additive quantity data, wherein said actuator receives said actuation signal from said computer causing said actuator to actuate;

a valve, wherein said valve is in mechanical communication with said actuator, wherein actuation of said actuator results in said valve opening; and

a storage container, wherein a bottom portion of said storage container is connected to a top end of said valve, wherein said storage container contains said additive for said supplement, wherein said quantity of said additive represented by said additive quantity data falls through said valve into a drinking container upon actuation of said actuator.

2. The system of claim 1 wherein said electronic communication device is a smart phone.

3. The system of claim 1 wherein said electronic communication device is a tablet.

4. The system of claim 1 wherein said electronic communication device is a personal computer.

5. The system of claim 1 wherein said substance being measured is selected from a list including: lactate, chloride, potassium, glucose, hydronium ion, and total solutes.

6. The system of claim 1 wherein said additive is chosen from a list including: water, sucrose, electrolyte mix, sodium bicarbonate, carnosine, caffeine, creatine, BCAA, beta-alanine, multivitamin, and glutamine.

7. The system of claim 1 wherein said sensor is a transdermal sensor.

8. A method of dispensing a supplement with an additive quantity based on a measurement from a sensor, said method including:

measuring a concentration of a substance in a sweat sample as concentration data, wherein said concentration is measured with a sensor;

transmitting said concentration data from said sensor to an electronic communication device, wherein said electronic communication device includes a central processing unit, a memory, and a data transceiver;

transmitting said concentration data from said electronic communication device to a server, wherein said server includes a central processing unit, a memory, and a data transceiver;

calculating an additive quantity data representing a quantity of an additive to be used in the supplement by subtracting said substance concentration represented by said concentration data and a precalculated concentration target stored as target concentration data on said memory of said server and multiplying a result of said subtraction by a first precalculated number associated with said additive stored as additive constant data on said memory of said server;

transmitting said additive quantity data to a computer, wherein said computer includes a central processing unit, a memory, and a data transceiver;

referencing, with said computer's central processing unit, an actuation index on said memory of said computer to produce an actuation signal representing the amount said actuator needs to be actuated to dispense said quantity of additive represented by said additive quantity data;

electronically communicating said actuator signal to an actuator, wherein said actuator is connected to a valve, wherein a top end of said valve is connected to a bottom end of a storage container, wherein said storage container contains said additive; and

actuating said actuator according to said actuator signal; wherein actuation of said actuators results in said valve opening, wherein opening said valve releases said quantity of said additive represented by said additive quantity data from said storage container into a container from which said additive can be consumed.

9. The method of claim 8 wherein said electronic communication device is a smart phone.

10. The method of claim 8 wherein said electronic communication device is a tablet.

11. The method of claim 8 wherein said electronic communication device is a personal computer.

12. The method of claim 8 wherein said substance measured by said sensor is selected from a list including: lactate, chloride, potassium, lactate, glucose, hydronium ion, and total solutes.

13. The method of claim 8 wherein said additive is chosen from a list including: water, sucrose, electrolyte mix, sodium bicarbonate, carnosine, caffeine, creatine, BCAA, beta-alanine, multivitamin, and glutamine.

13. The method of claim 8 wherein said sensor is a transdermal sensor.

ABSTRACT

A system is provided which dispenses additives for supplements based on measurements from a sensor. A sensor measures a first set of data representing the quantity of a substance in a user's sweat. The first set of data is transmitted to a server that calculates a second set of data representing a quantity of an ingredient to use in a supplement based on the first set of data. The second set of data is transmitted to a computer that is in electronic communication with a drink dispenser. The computer calculates a third set of data representing an actuator signal based on the second set of data. The computer electronically communicates the actuator signal to an actuator in the drink dispenser. The actuator signal actuates the actuator, releasing an additive from a storage container and into a dispensing unit, and the additive is dispensed.

Figure 1A

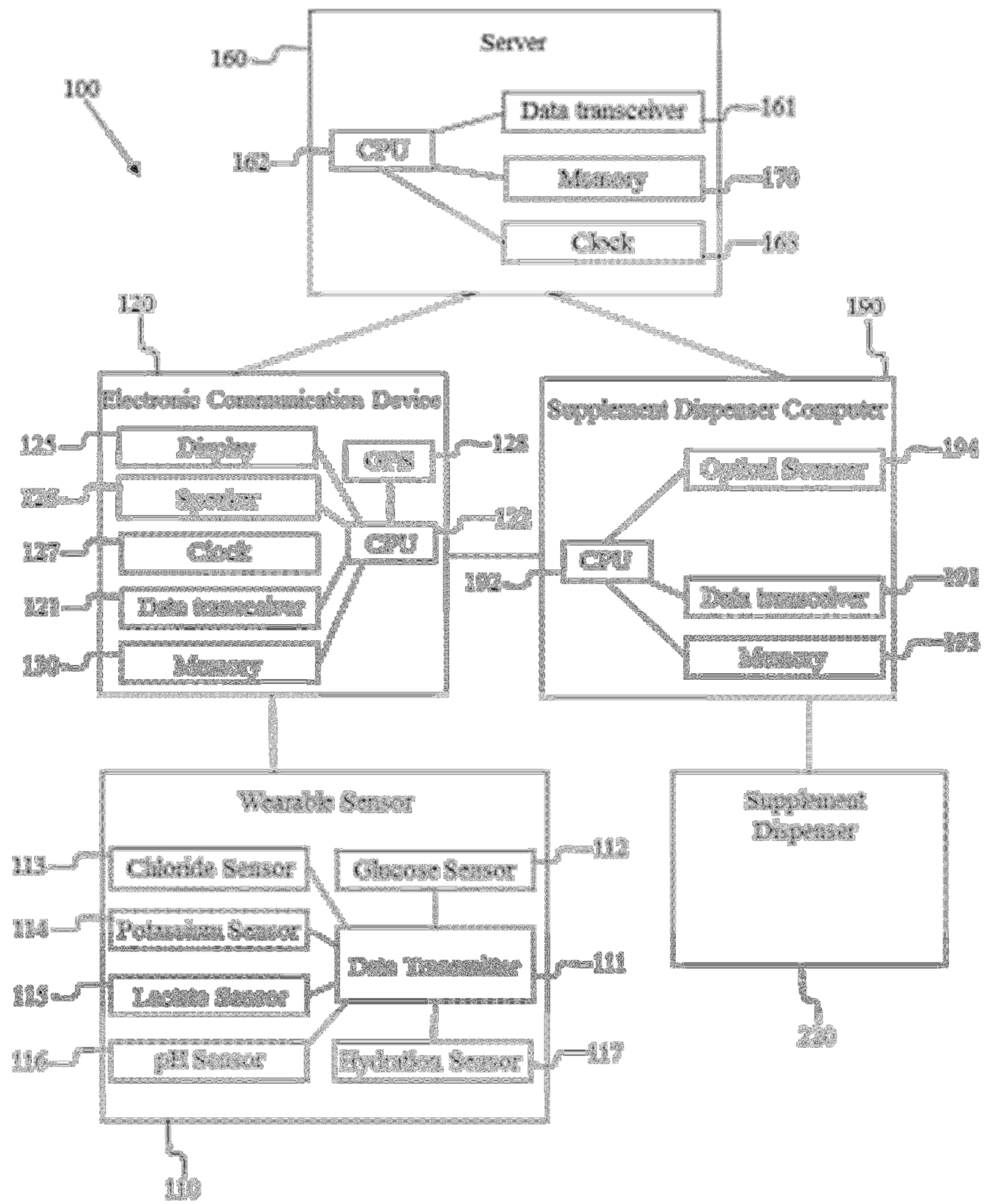
100
160
Server
Data transceiver
161
CPU
162
Memory
170
Clock
163
120
190
Electronic Communication Device
125
Display
Speaker
127
Clock
121
Data transceiver
Memory
GPS
128
CPU
122
Supplement Dispenser Computer
Optical Sensor
194
CPU
192
Data transceiver
Memory
Wearable Sensor
113
Chloride Sensor
Glucose Sensor
112
114
Potassium Sensor
Data Transmitter
111
115
Lactate Sensor
116
pH Sensor
Hydration Sensor
117
110
Supplement Dispenser
220

Figure 1B

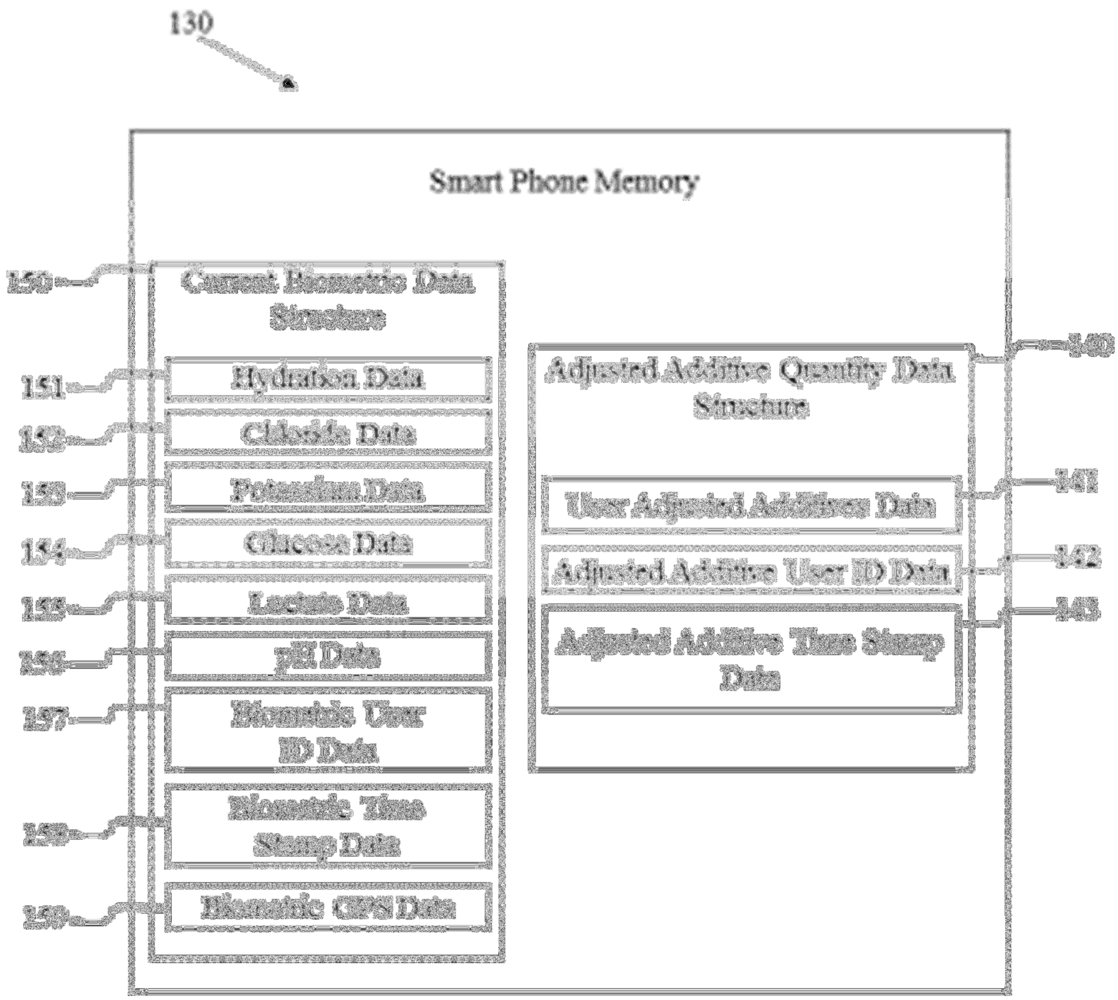
130
Smart Phone Memory
150
Current Biometric Data Structure
151
Hydration Data
152
Chloride Data
153
Potassium Data
154
Glucose Data
155
Lactate Data
156
pH Data
157
Biometric User ID Data
158
Biometric Time Stamp Data
159
Biometric GPS Data
140
Adjusted Additive Quantity Data Structure
141
User Adjusted Additives Data
142
Adjusted Additive User ID Data
143
Adjusted Additive Time Stamp Data

Figure 1C

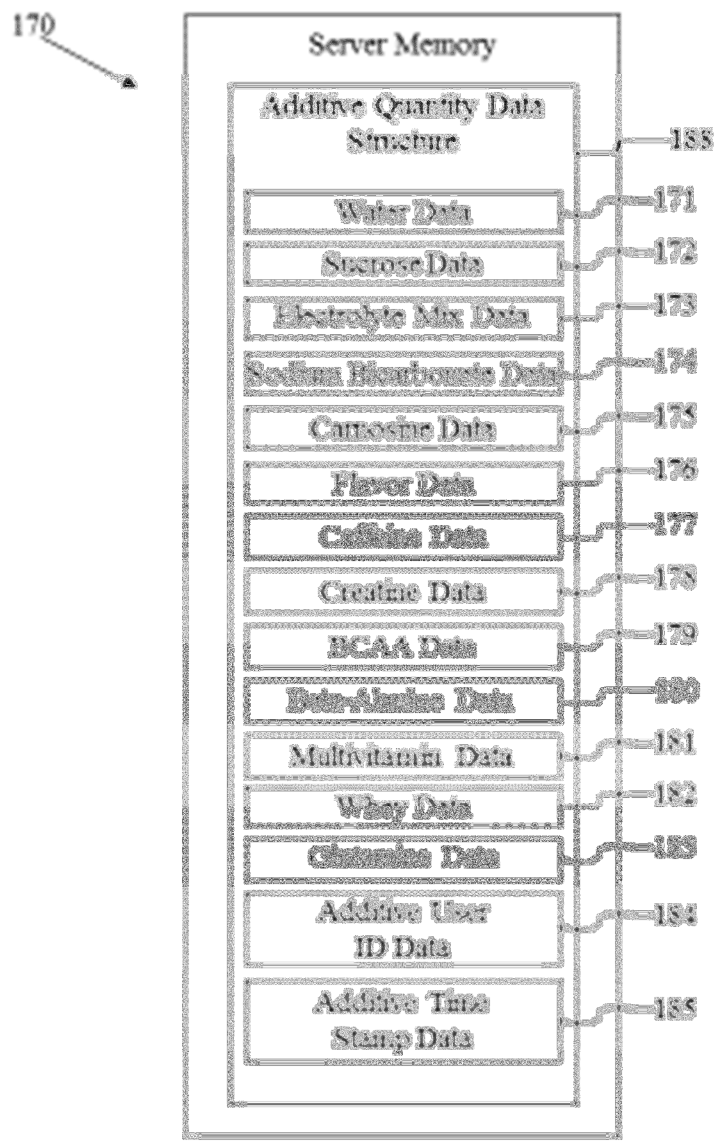
170
Server Memory
Additive Quantity Data Structure
155
Water Data
171
Sucrose Data
172
Electrolyte Mix Data
173
Sodium Bicarbonate Data
174
Carnosine Data
175
Flavor Data
176
Caffeine Data
177
Creatine Data
178
BCAA Data
179
Beta-Alanine Data
180
Multivitamin Data
181
Whey Data
182
Glutamine Data
183
Additive User ID Data
184
Additive Time Stamp Data
185

Figure 2

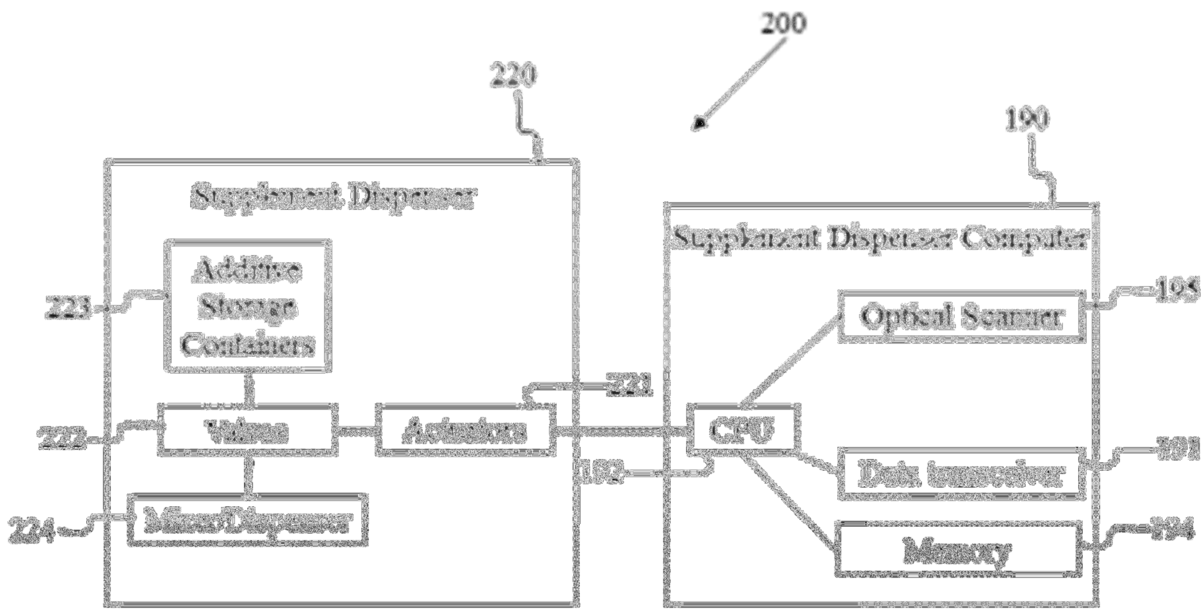
200
220
190
Supplement Dispenser
Supplement Dispenser Computer
223
Additive Storage Containers
Optical Scanner
195
221
222
Valves
Actuators
CPU
192
Data transceiver
224
Mixer/Dispenser
Memory
194

Figure 3

Bioparameter and additive information					
Bioparameters	**Target**	**Minimum Adjustment Increment**	**Additives**	**Per-drink max**	**24-hour max**
Hydration (Female)	800 Osmolality/kg H_20	10 Osmolality/kg H_20	Water	None	None
Hydration (Male)	900 Osmolality/kg H_20	10 Osmolality/kg H_20	Water	None	None
Glucose	1.8 g/L	0.1 g/L	Sucrose	None	None
Lactate	Determined from average of pre-workout biosensor measurements	0.1 millimoles/L	Carnosine	20g	50g
pH	Determined from average of pre-workout biosensor measurements	0.5	Sodium Bicarbonate	10g	20g
Electrolyte	5.0 millimoles/L	0.1 millimoles/L	Electrolyte Mix	5g	20g
NA	NA		Flavor	None	None
NA	NA		Caffeine	1g	2g
NA	NA		Creatine	20g	30g
NA	NA		BCAA	20g	30g
NA	NA		Beta-Alanine	10g	30g
NA	NA		Multivitamin	None	None
NA	NA		Whey	50g	100g
NA	NA		Glutamine	20g	50g

Figure 4

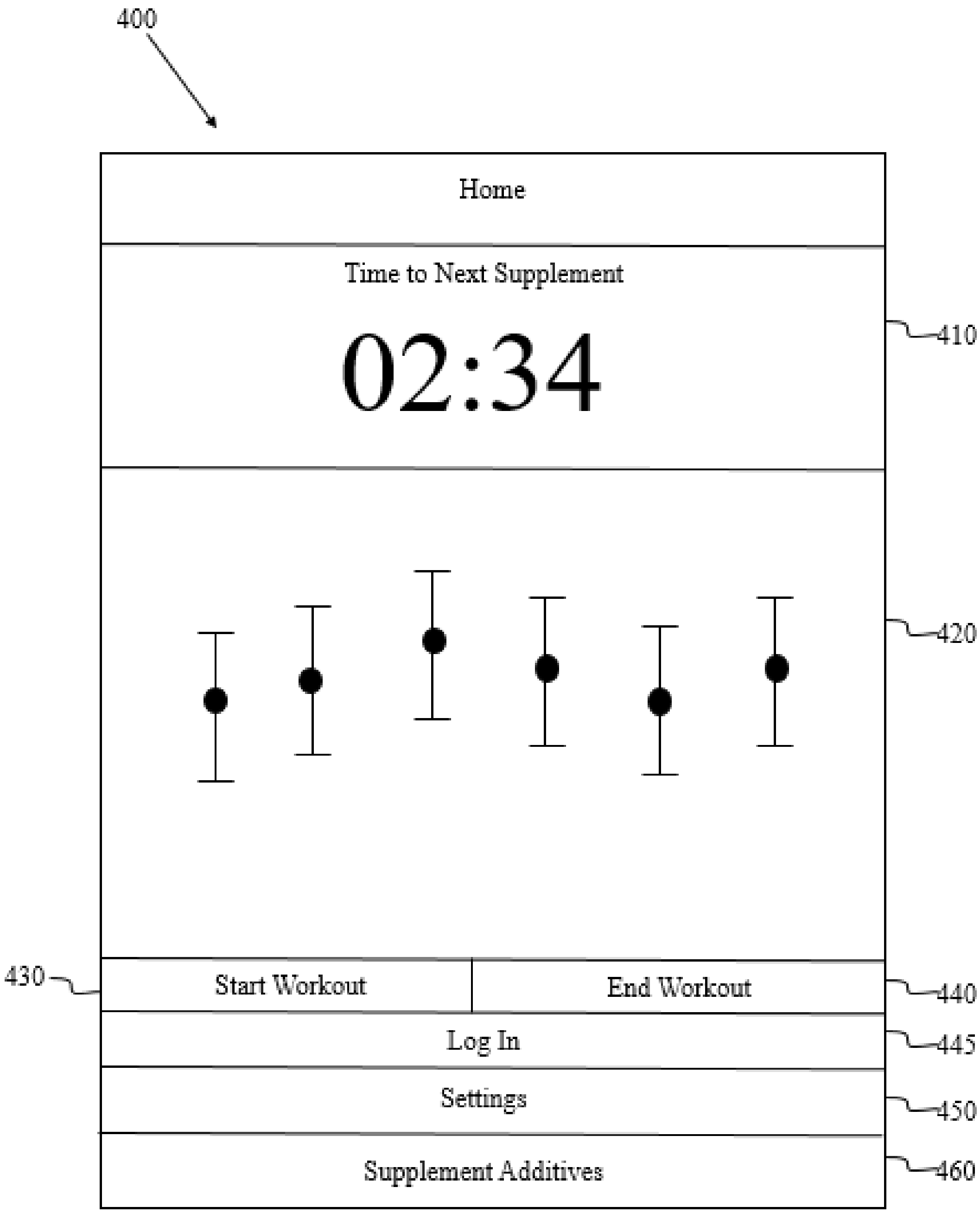
400
Home
Time to Next Supplement
02:34
410
420
430
Start Workout
End Workout
440
Log In
445
Settings
450
Supplement Additives
460

Figure 5

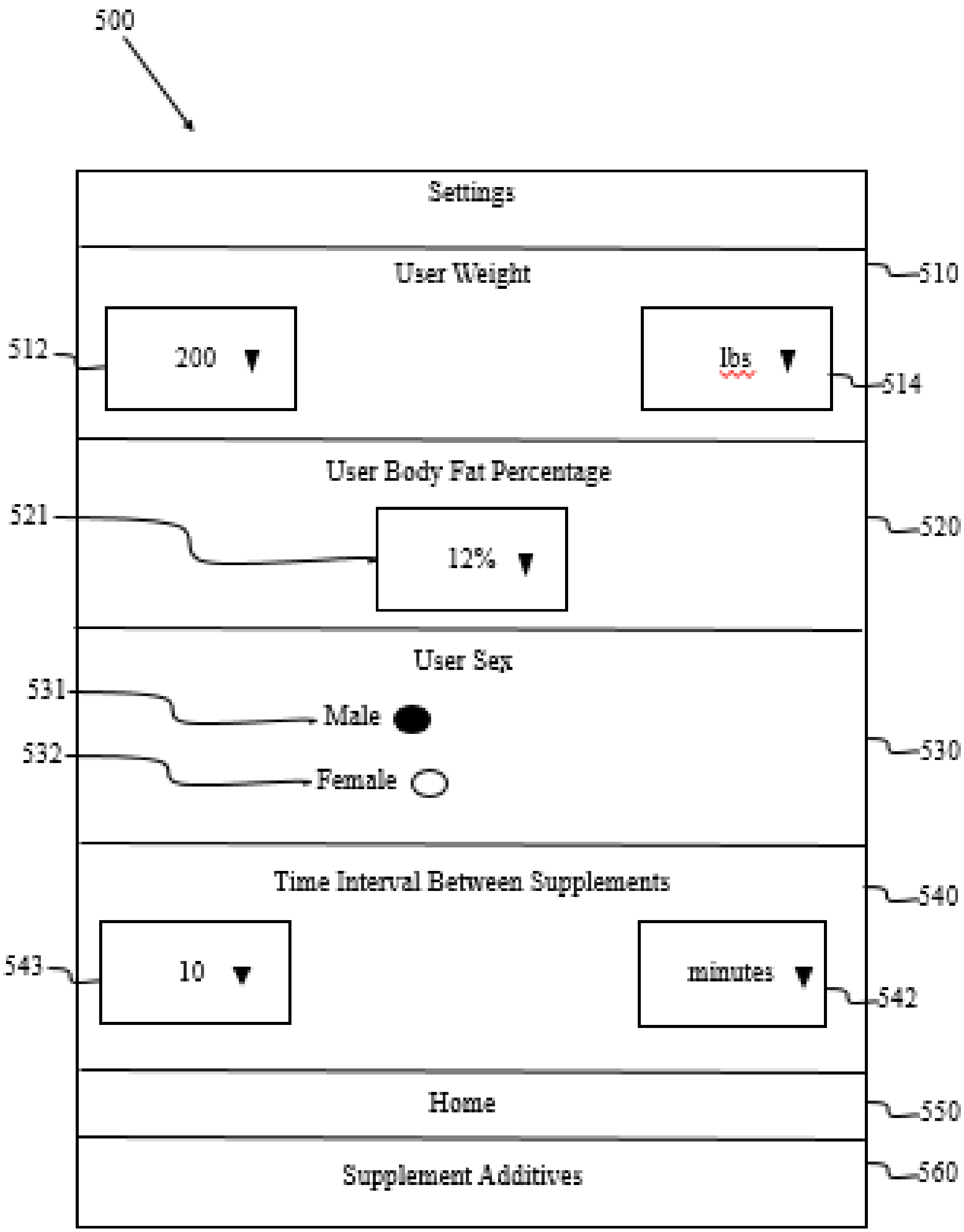
500
Settings
User Weight
510
512
200
lbs
514
User Body Fat Percentage
521
12%
520
User Sex
531
Male
532
Female
530
Time Interval Between Supplements
540
543
10
minutes
542
Home
550
Supplement Additives
560

Figure 6

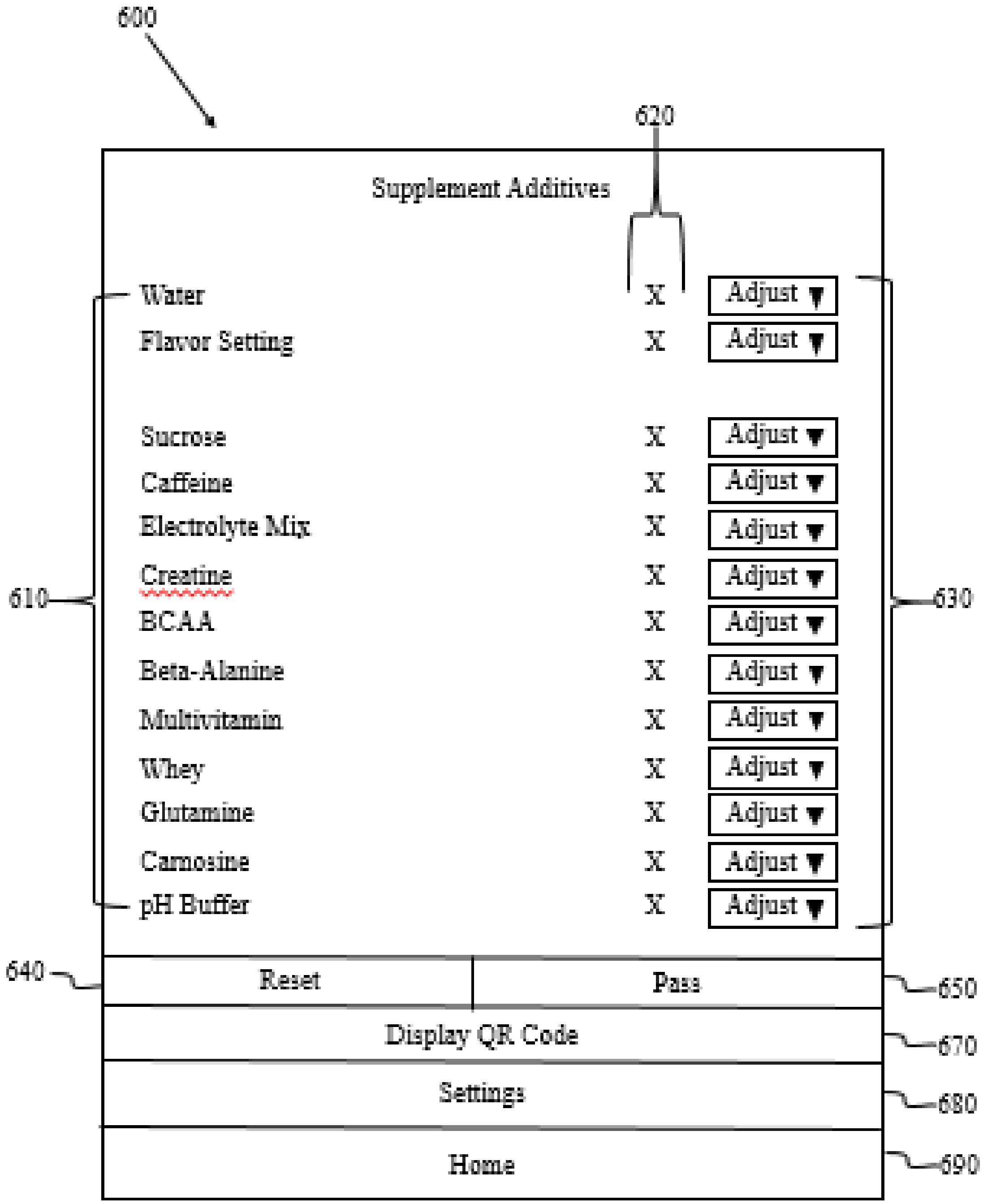
600
620
Supplement Additives
Water X Adjust
Flavor Setting X Adjust
Sucrose X Adjust
Caffeine X Adjust
Electrolyte Mix X Adjust
Creatine X Adjust
BCAA X Adjust
Beta-Alanine X Adjust
Multivitamin X Adjust
Whey X Adjust
Glutamine X Adjust
Carnosine X Adjust
pH Buffer X Adjust
610
630
640
Reset
Pass
650
Display QR Code
670
Settings
680
Home
690

Figure 7

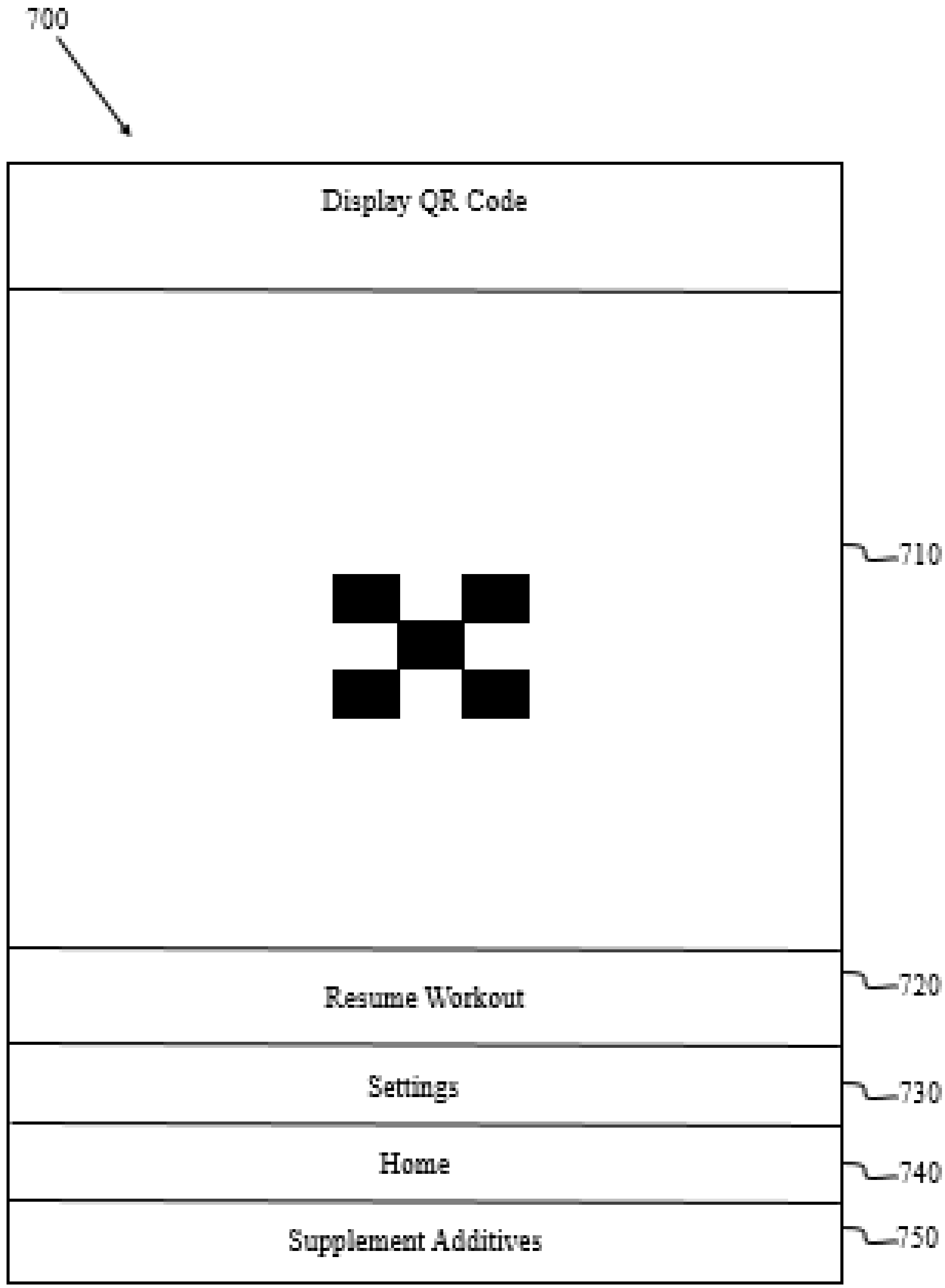
700
Display QR Code
710
Resume Workout
720
Settings
730
Home
740
Supplement Additives
750

Figure 8

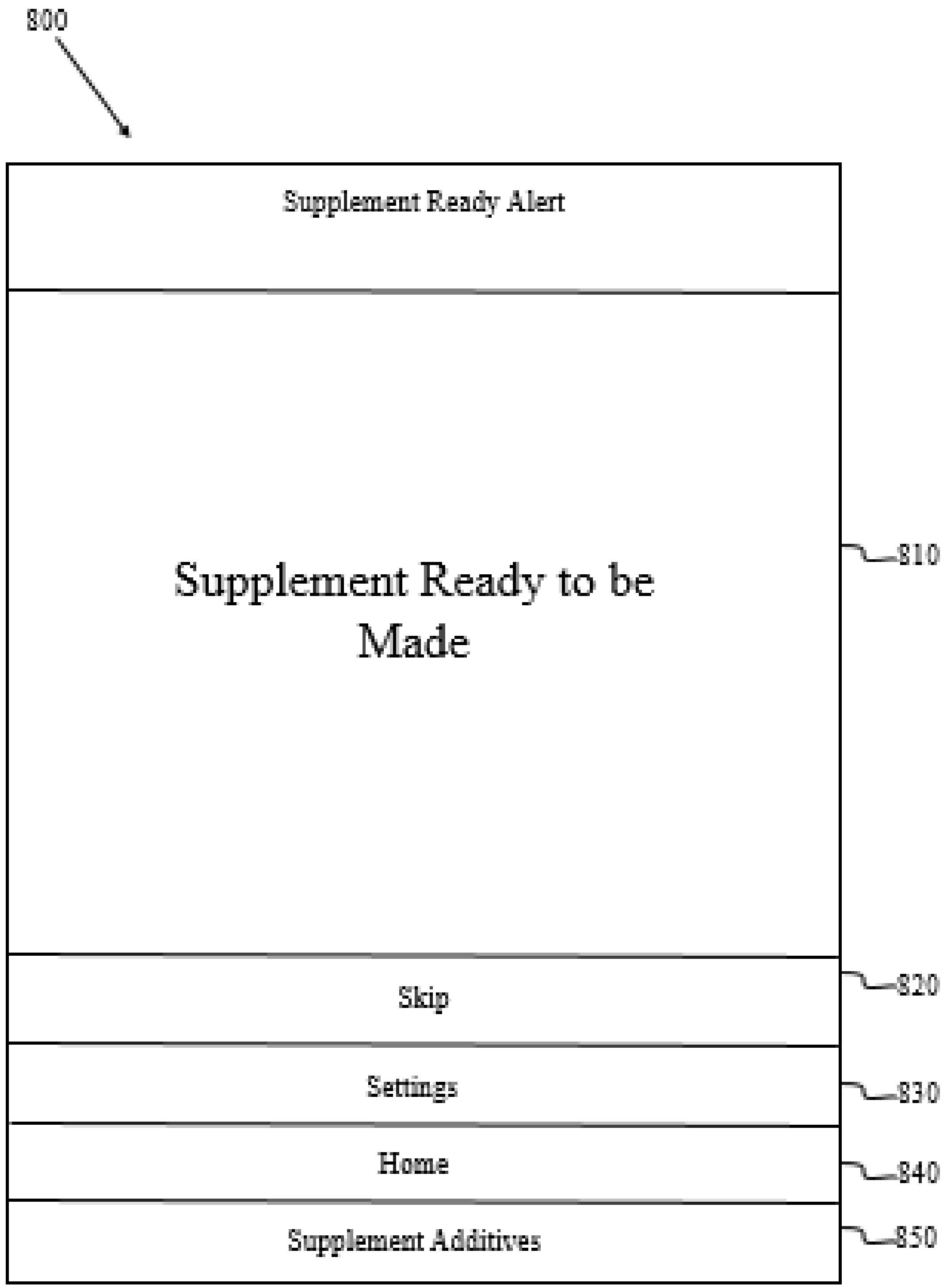
800
Supplement Ready Alert
Supplement Ready to be Made
Skip
Settings
Home
Supplement Additives
810
820
830
840
850

Figure 9A

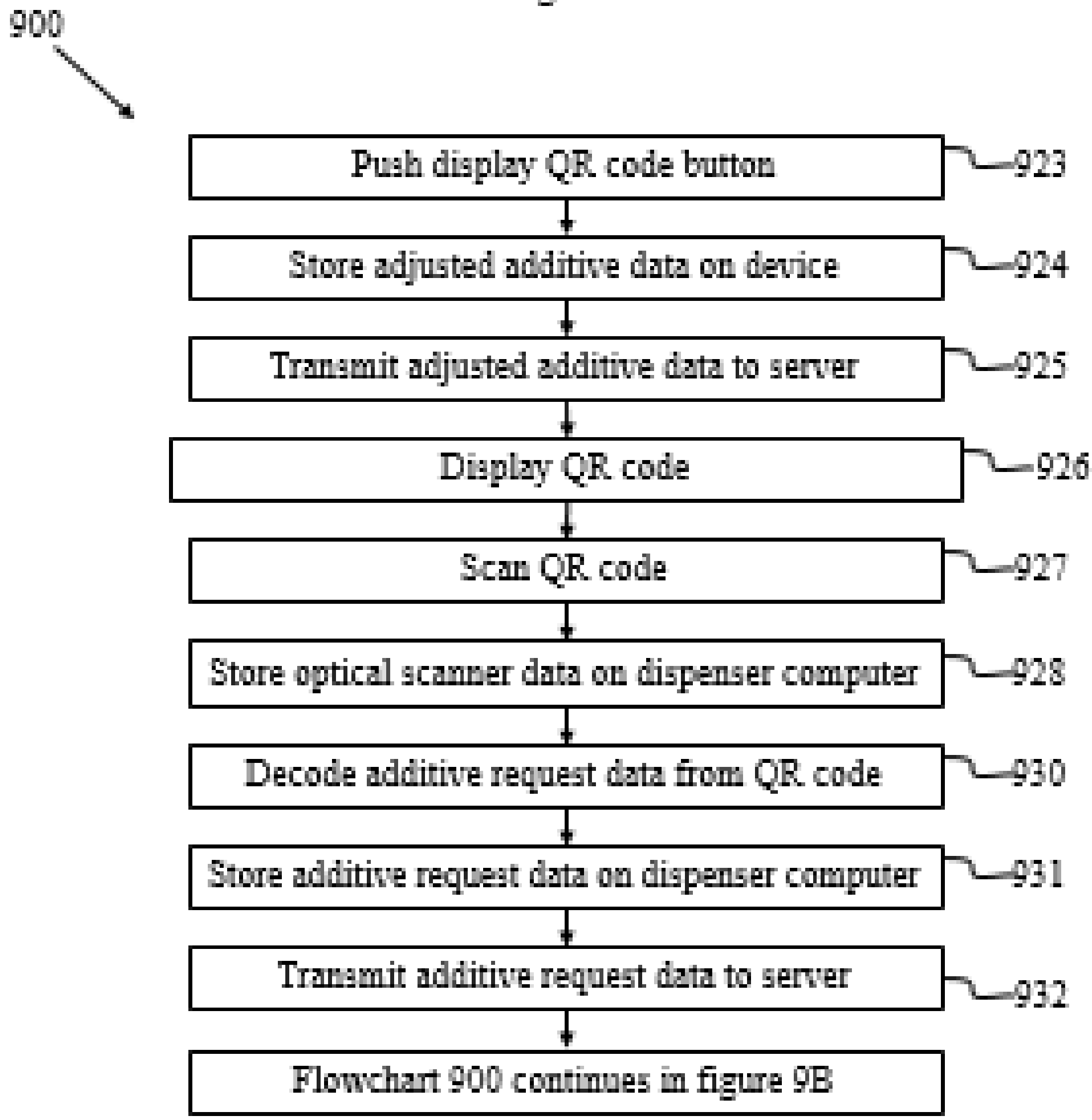
900
Push display QR code button
923
Store adjusted additive data on device
924
Transmit adjusted additive data to server
925
Display QR code
926
Scan QR code
927
Store optical scanner data on dispenser computer
928
Decode additive request data from QR code
930
Store additive request data on dispenser computer
931
Transmit additive request data to server
932
Flowchart 900 continues in figure 9B

Figure 9B

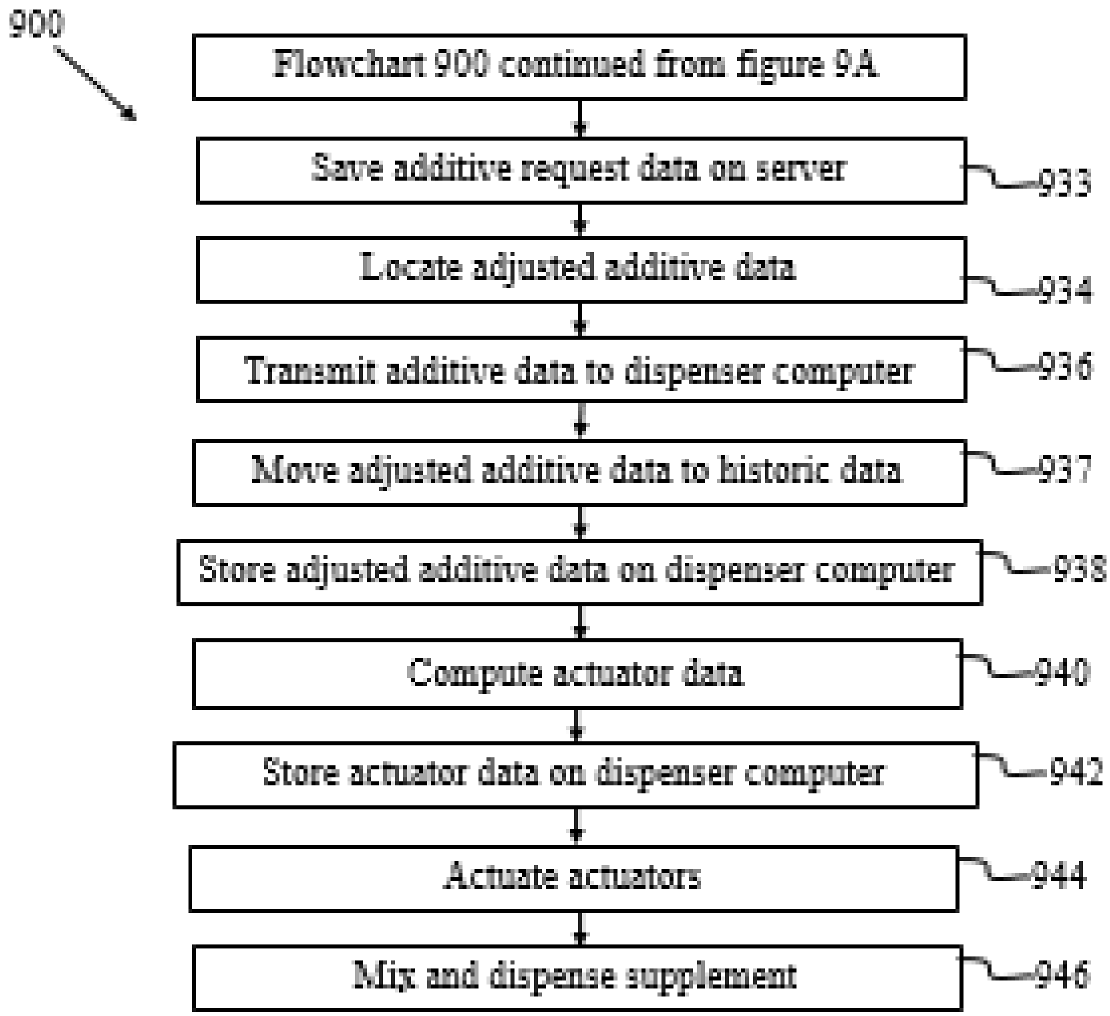
900
Flowchart 900 continued from figure 9A
Save additive request data on server
933
Locate adjusted additive data
934
Transmit additive data to dispenser computer
936
Move adjusted additive data to historic data
937
Store adjusted additive data on dispenser computer
938
Compute actuator data
940
Store actuator data on dispenser computer
942
Actuate actuators
944
Mix and dispense supplement
946

Figure 10A

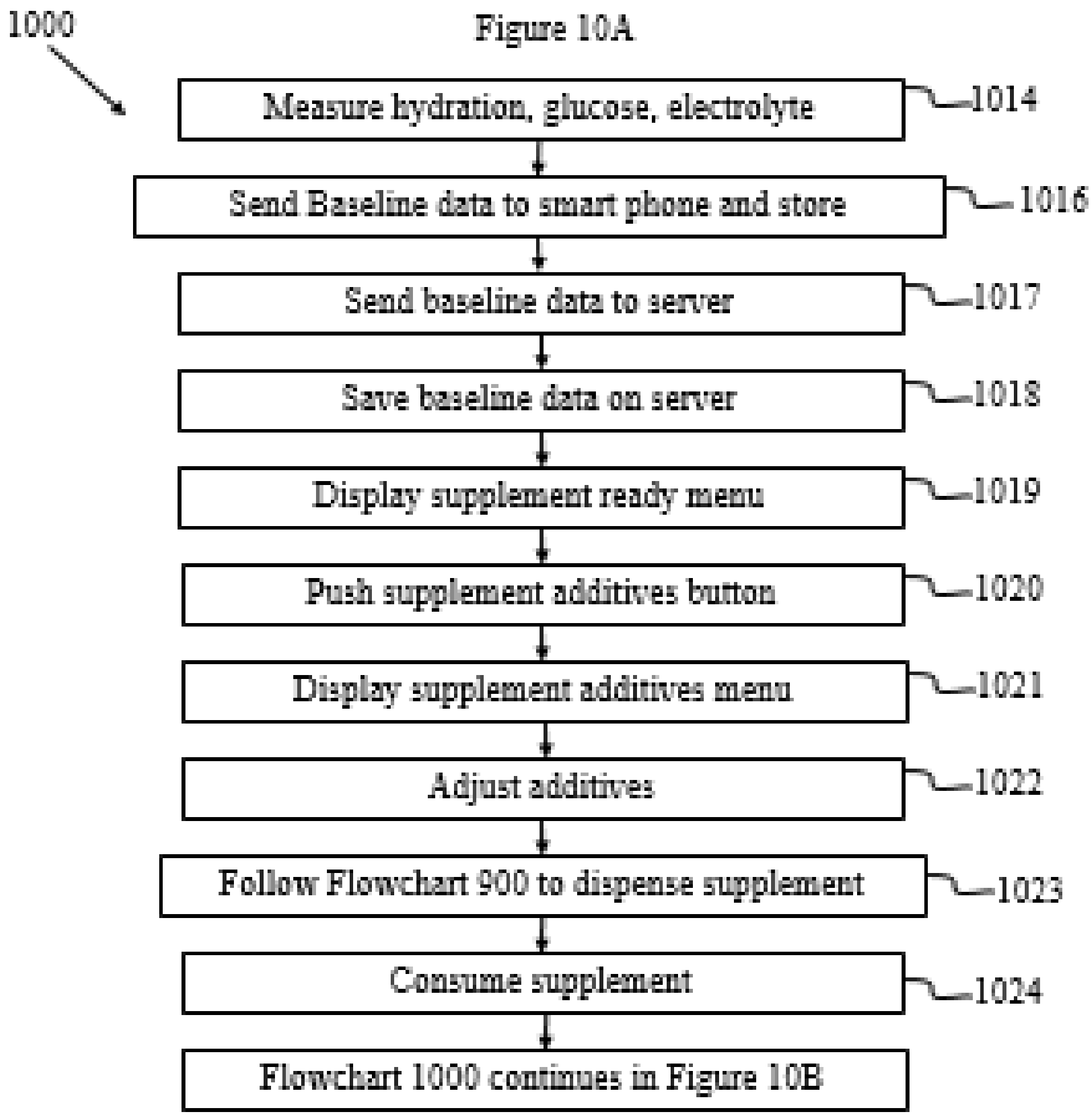
1000
Measure hydration, glucose, electrolyte
1014
Send Baseline data to smart phone and store
1016
Send baseline data to server
1017
Save baseline data on server
1018
Display supplement ready menu
1019
Push supplement additives button
1020
Display supplement additives menu
1021
Adjust additives
1022
Follow Flowchart 900 to dispense supplement
1023
Consume supplement
1024
Flowchart 1000 continues in Figure 10B

Figure 10B

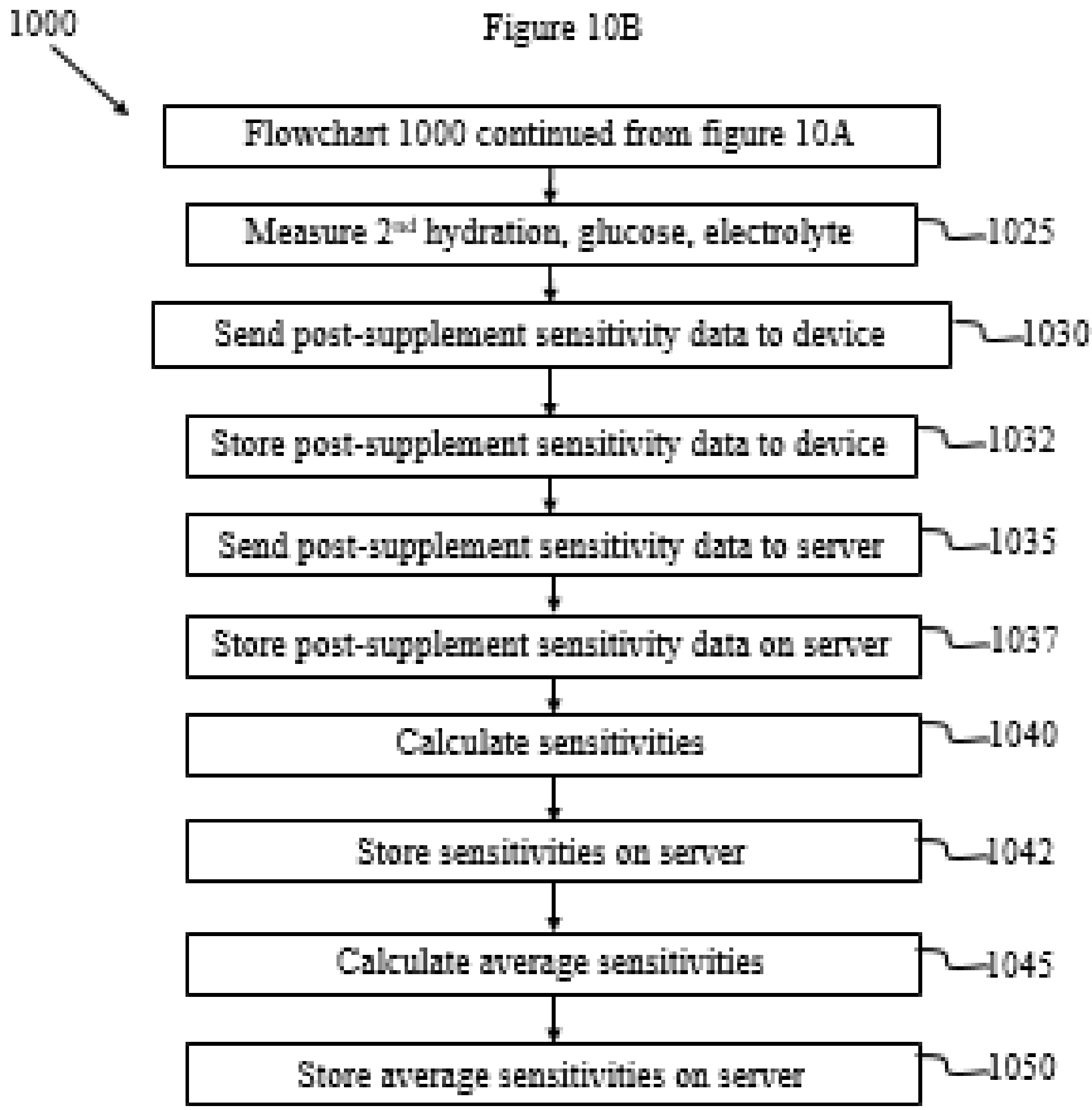
1000
Flowchart 1000 continued from figure 10A
Measure 2nd hydration, glucose, electrolyte
1025
Send post-supplement sensitivity data to device
1030
Store post-supplement sensitivity data to device
1032
Send post-supplement sensitivity data to server
1035
Store post-supplement sensitivity data on server
1037
Calculate sensitivities
1040
Store sensitivities on server
1042
Calculate average sensitivities
1045
Store average sensitivities on server
1050

Figure 11

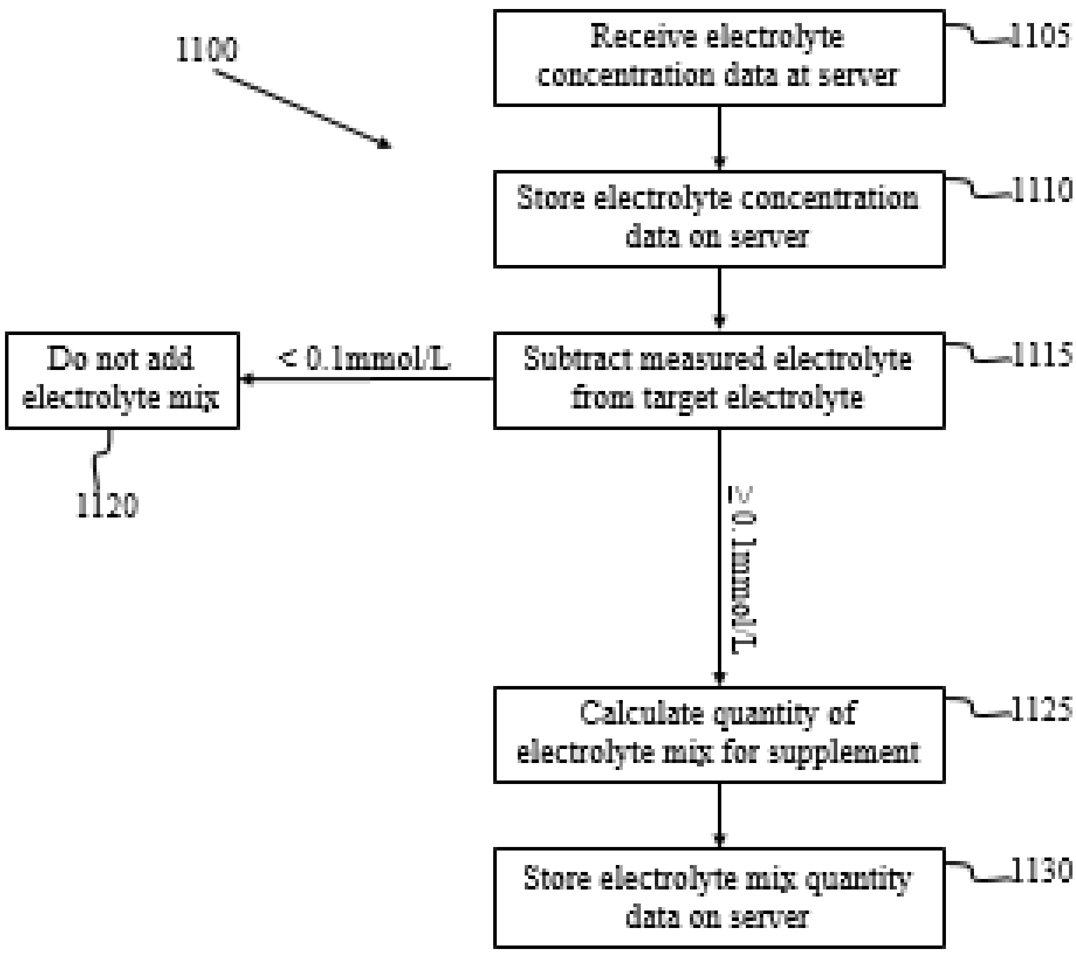
1100
Receive electrolyte concentration data at server
1105
Store electrolyte concentration data on server
1110
Subtract measured electrolyte from target electrolyte
1115
< 0.1mmol/L
Do not add electrolyte mix
1120
≥ 0.1mmol/L
Calculate quantity of electrolyte mix for supplement
1125
Store electrolyte mix quantity data on server
1130

Figure 12

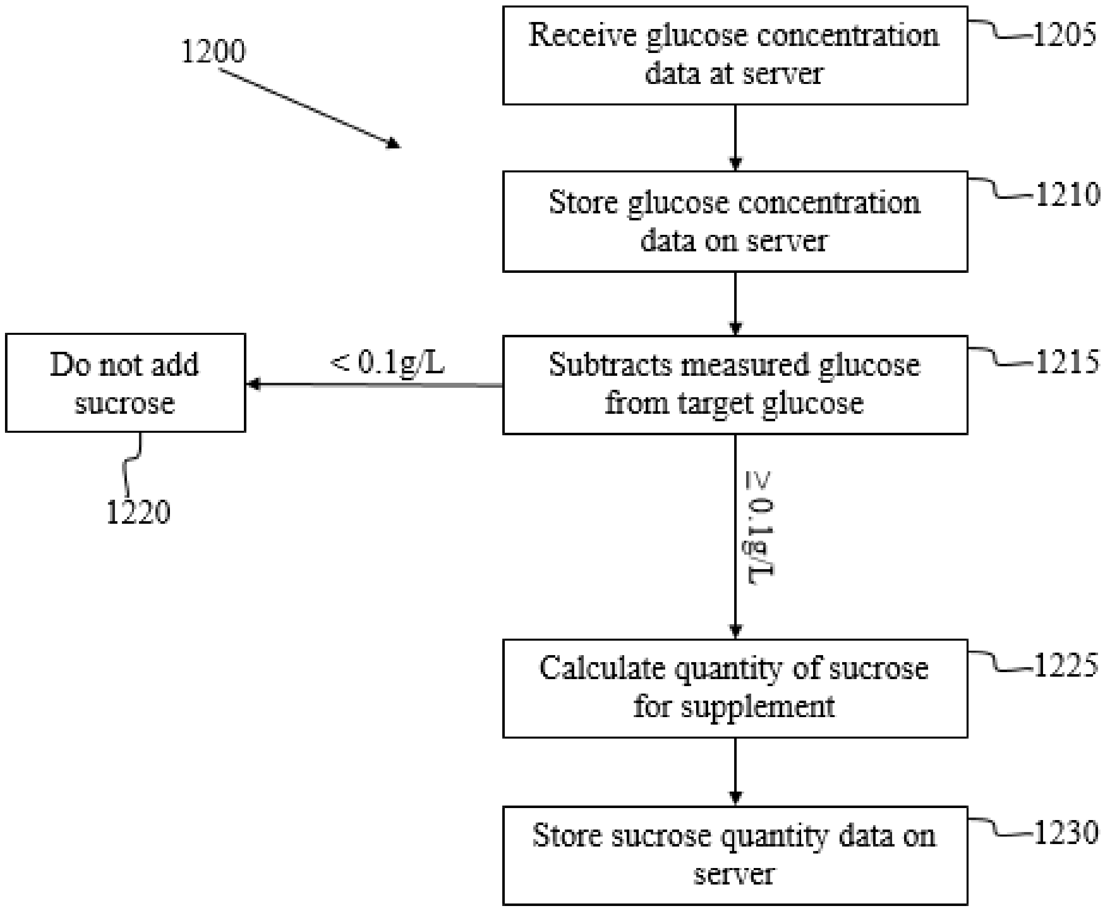
1200
Receive glucose concentration data at server
1205
Store glucose concentration data on server
1210
Do not add sucrose
< 0.1g/L
Subtracts measured glucose from target glucose
1215
1220
≥ 0.1g/L
Calculate quantity of sucrose for supplement
1225
Store sucrose quantity data on server
1230

Figure 13

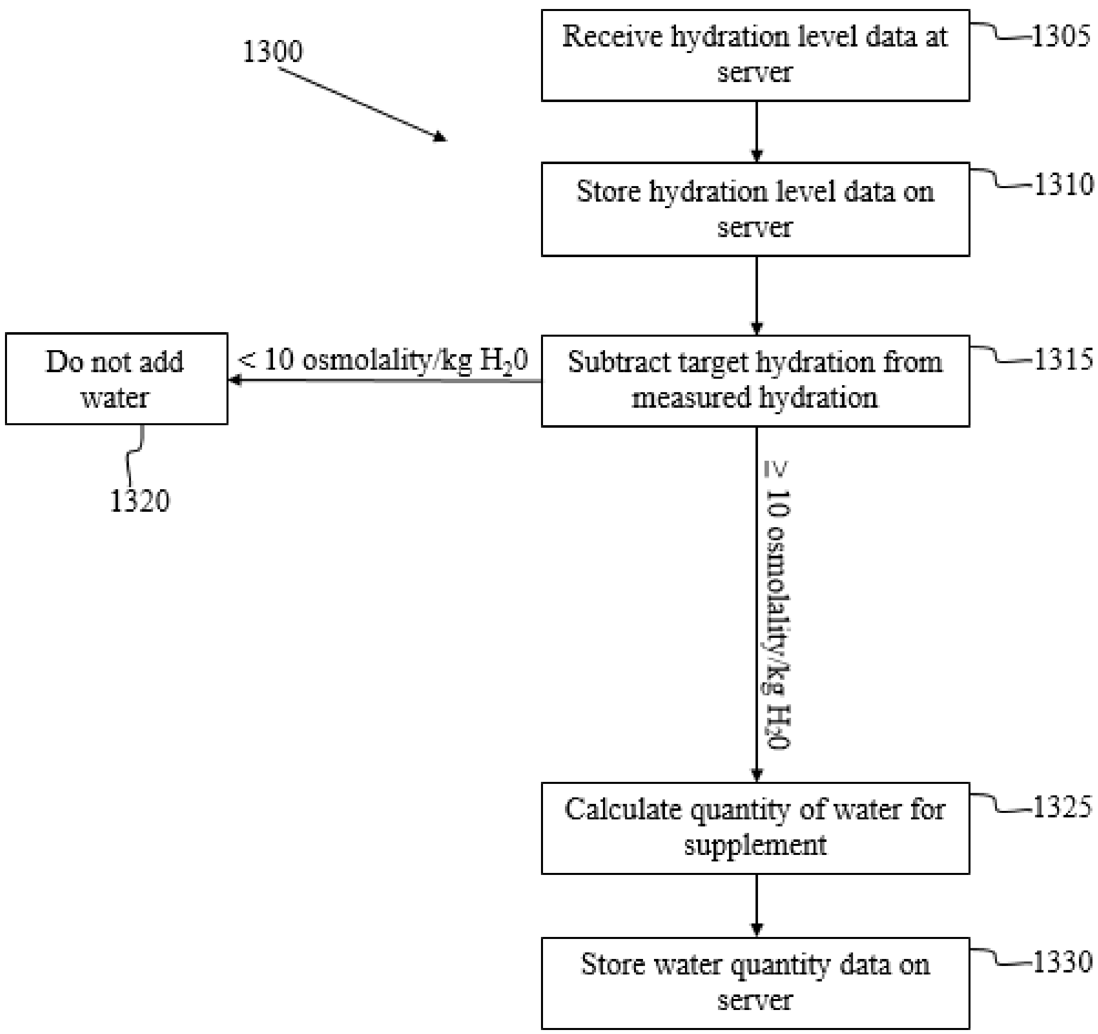
1300
Receive hydration level data at server
1305
Store hydration level data on server
1310
Subtract target hydration from measured hydration
1315
< 10 osmolality/kg H20
Do not add water
1320
≥ 10 osmolality/kg H20
Calculate quantity of water for supplement
1325
Store water quantity data on server
1330

Figure 14

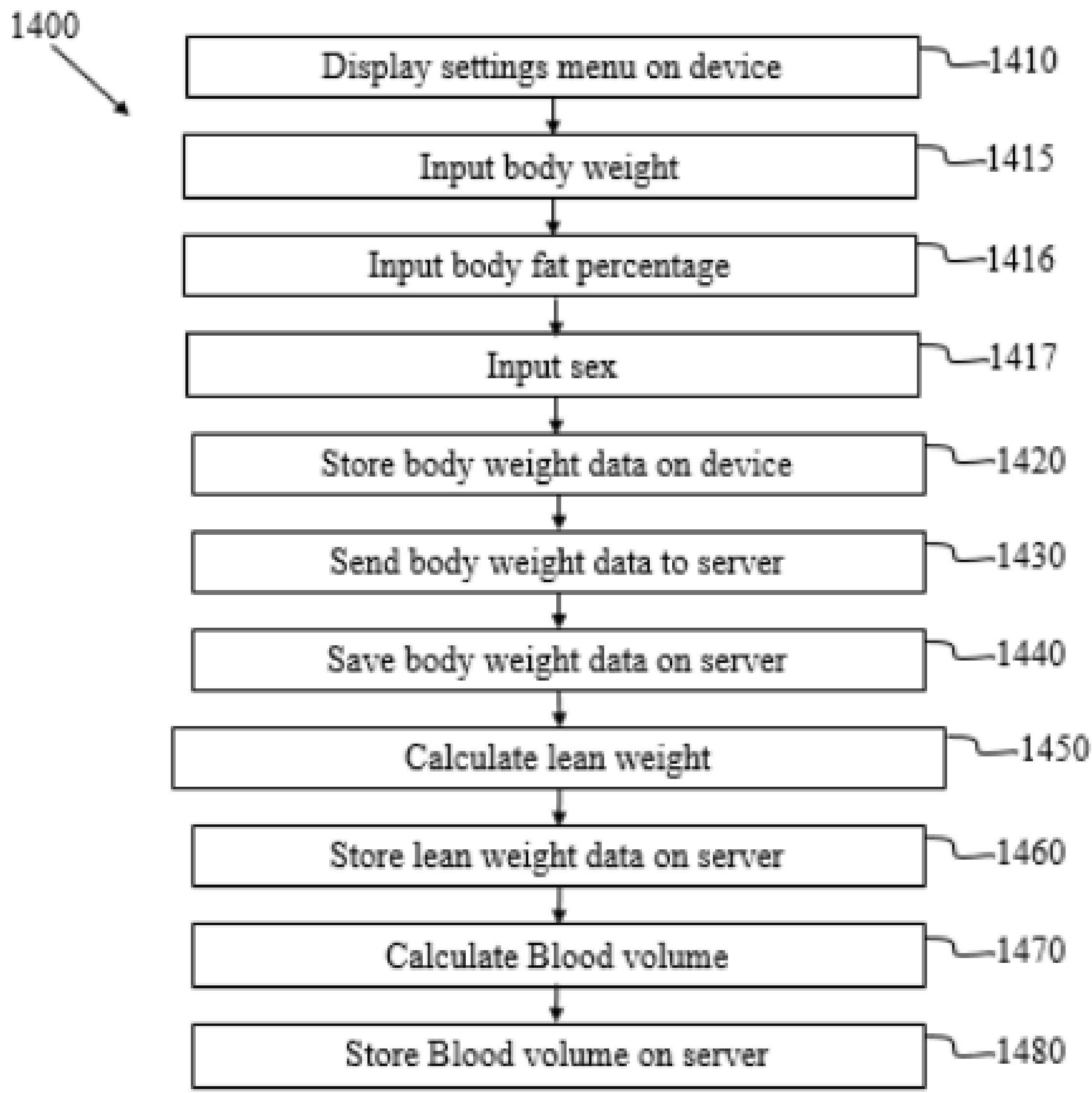
1400
Display settings menu on device
1410
Input body weight
1415
Input body fat percentage
1416
Input sex
1417
Store body weight data on device
1420
Send body weight data to server
1430
Save body weight data on server
1440
Calculate lean weight
1450
Store lean weight data on server
1460
Calculate Blood volume
1470
Store Blood volume on server
1480

Figure 15

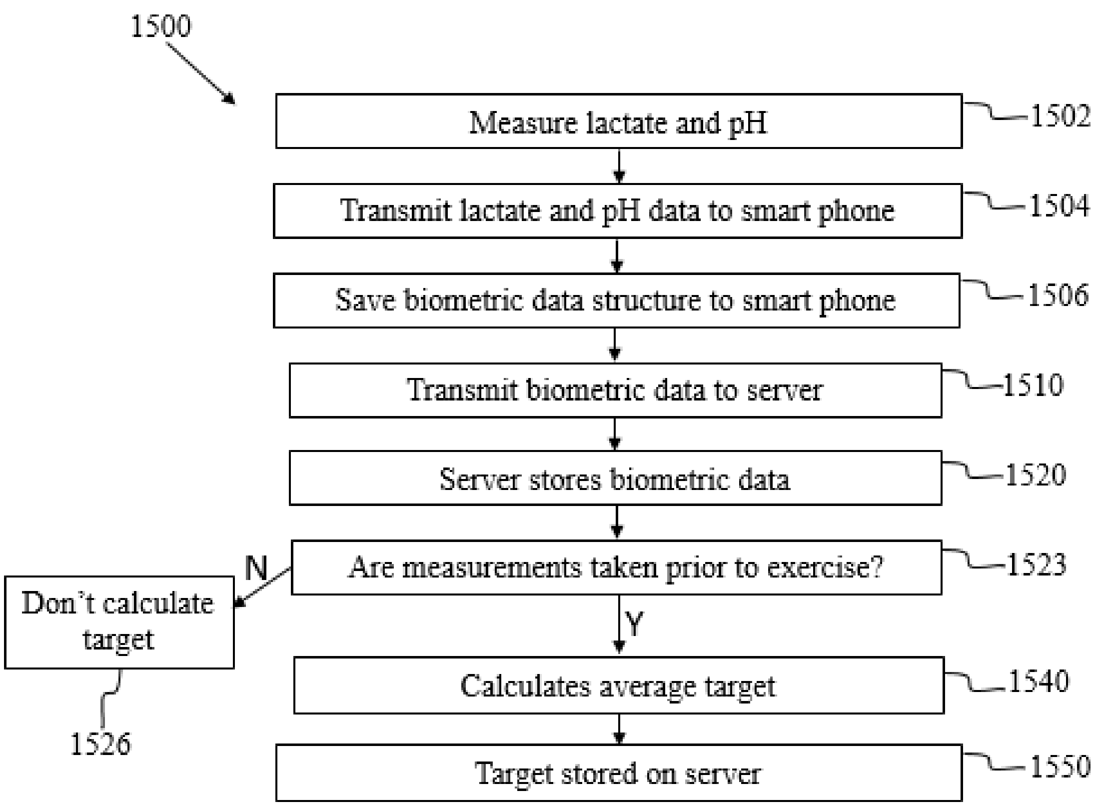
1500
Measure lactate and pH
1502
Transmit lactate and pH data to smart phone
1504
Save biometric data structure to smart phone
1506
Transmit biometric data to server
1510
Server stores biometric data
1520
Are measurements taken prior to exercise?
1523
N
Don't calculate target
1526
Y
Calculates average target
1540
Target stored on server
1550

Figure 16

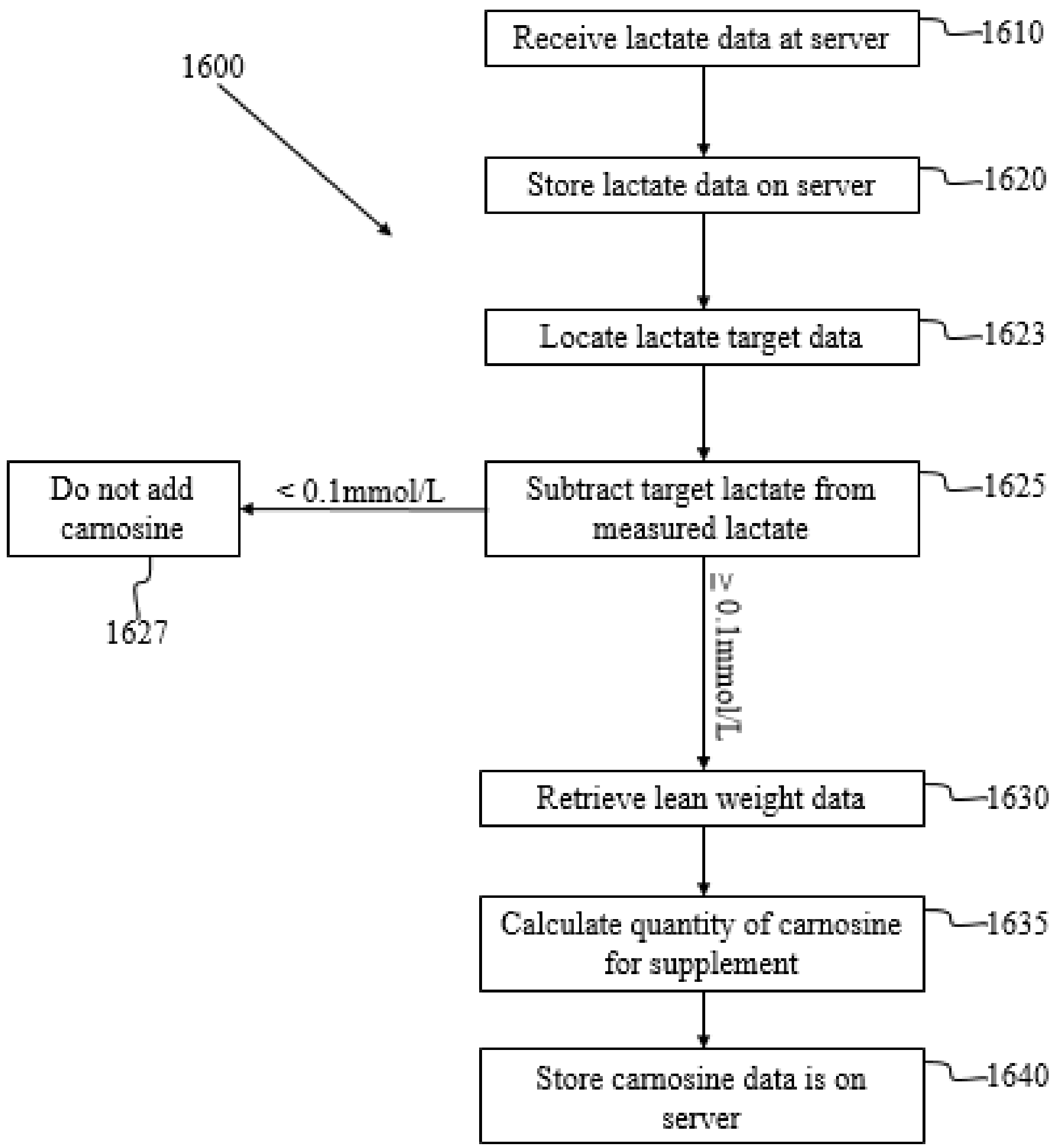
1600
Receive lactate data at server
1610
Store lactate data on server
1620
Locate lactate target data
1623
Subtract target lactate from measured lactate
1625
< 0.1mmol/L
Do not add carnosine
1627
≥ 0.1mmol/L
Retrieve lean weight data
1630
Calculate quantity of carnosine for supplement
1635
Store carnosine data is on server
1640

Figure 17

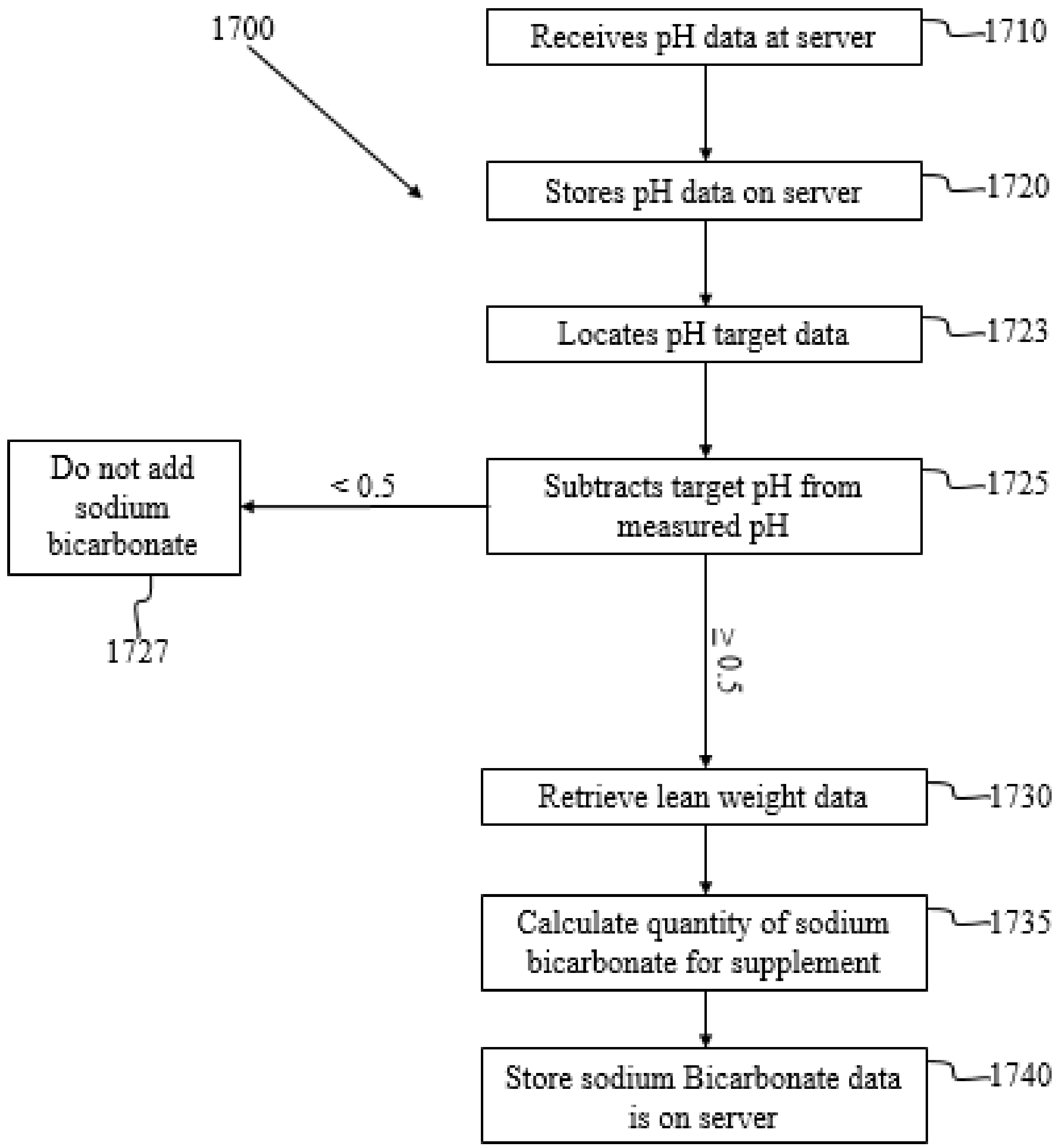
1700
Receives pH data at server
1710
Stores pH data on server
1720
Locates pH target data
1723
Subtracts target pH from measured pH
1725
< 0.5
Do not add sodium bicarbonate
1727
≥ 0.5
Retrieve lean weight data
1730
Calculate quantity of sodium bicarbonate for supplement
1735
Store sodium Bicarbonate data is on server
1740

Figure 18

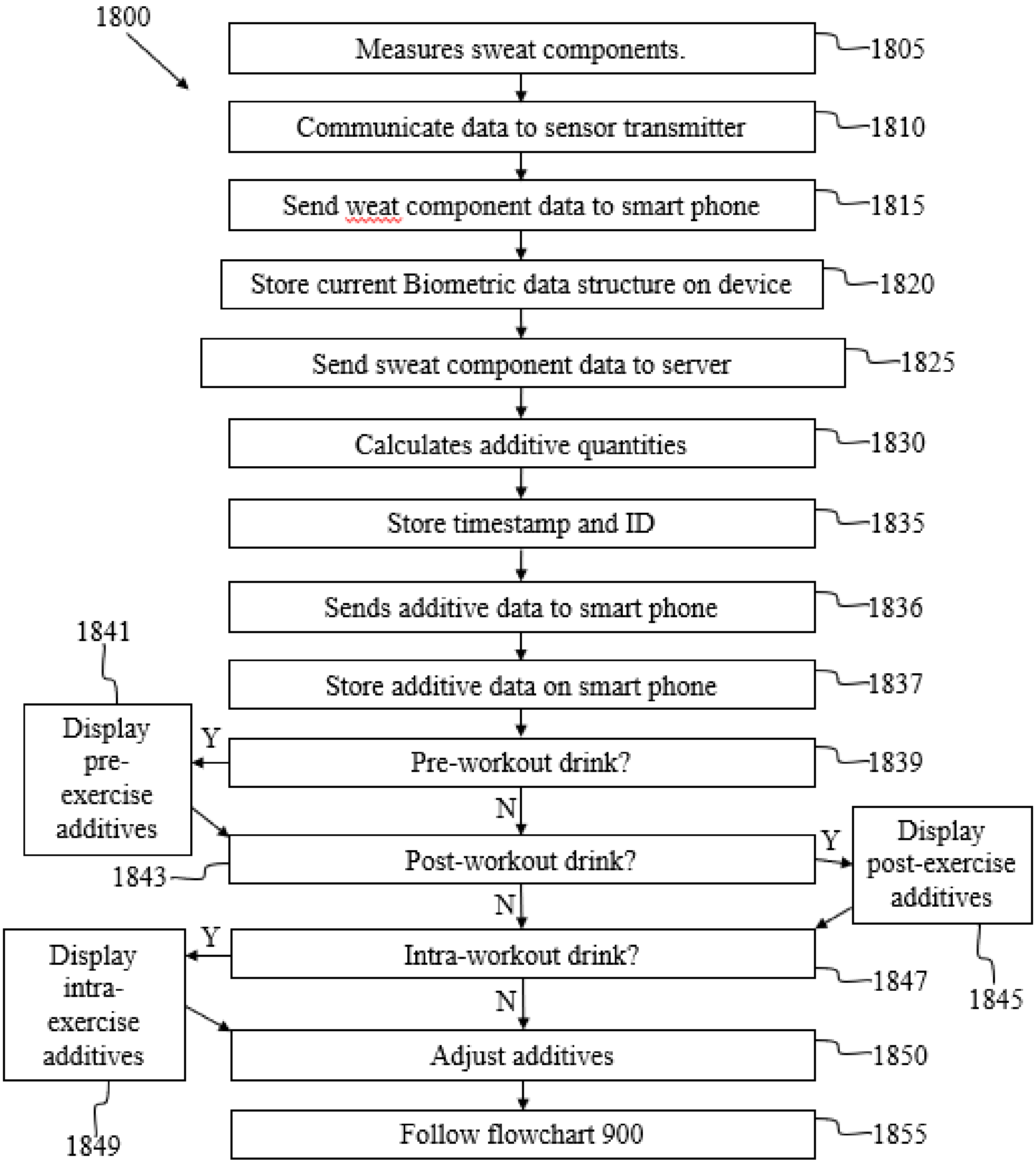
1800
Measures sweat components.
1805
Communicate data to sensor transmitter
1810
Send weat component data to smart phone
1815
Store current Biometric data structure on device
1820
Send sweat component data to server
1825
Calculates additive quantities
1830
Store timestamp and ID
1835
Sends additive data to smart phone
1836
Store additive data on smart phone
1837
1841
Display pre-exercise additives
Y
Pre-workout drink?
1839
N
Post-workout drink?
1843
Y
Display post-exercise additives
1845
N
Y
Intra-workout drink?
1847
Display intra-exercise additives
N
Adjust additives
1850
Follow flowchart 900
1855
1849

Figure 19

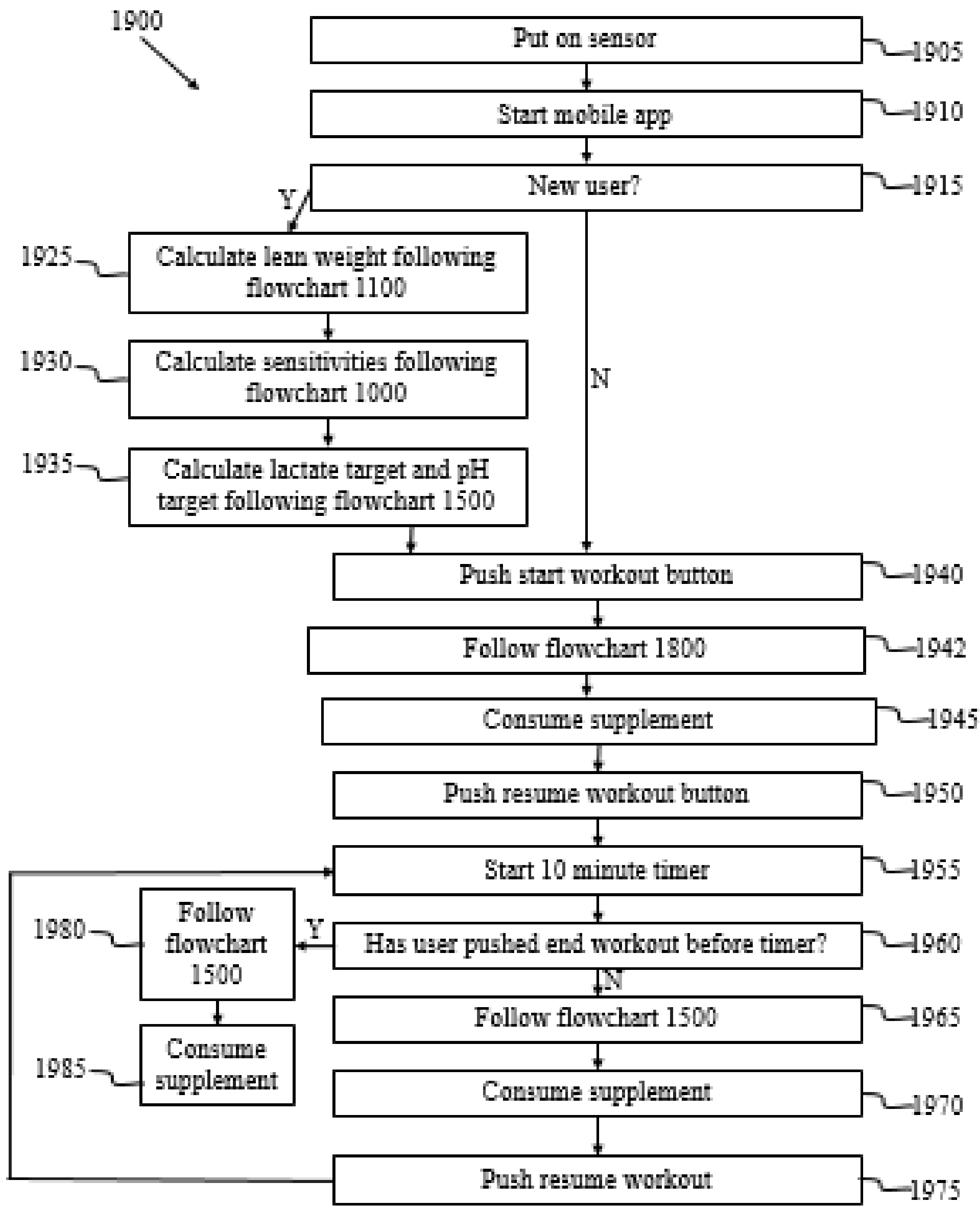
1900
Put on sensor
1905
Start mobile app
1910
New user?
1915
Y
N
1925
Calculate lean weight following flowchart 1100
1930
Calculate sensitivities following flowchart 1000
1935
Calculate lactate target and pH target following flowchart 1500
Push start workout button
1940
Follow flowchart 1800
1942
Consume supplement
1945
Push resume workout button
1950
Start 10 minute timer
1955
1980
Follow flowchart 1500
Y
Has user pushed end workout before timer?
1960
N
Follow flowchart 1500
1965
1985
Consume supplement
Consume supplement
1970
Push resume workout
1975

Figure 20

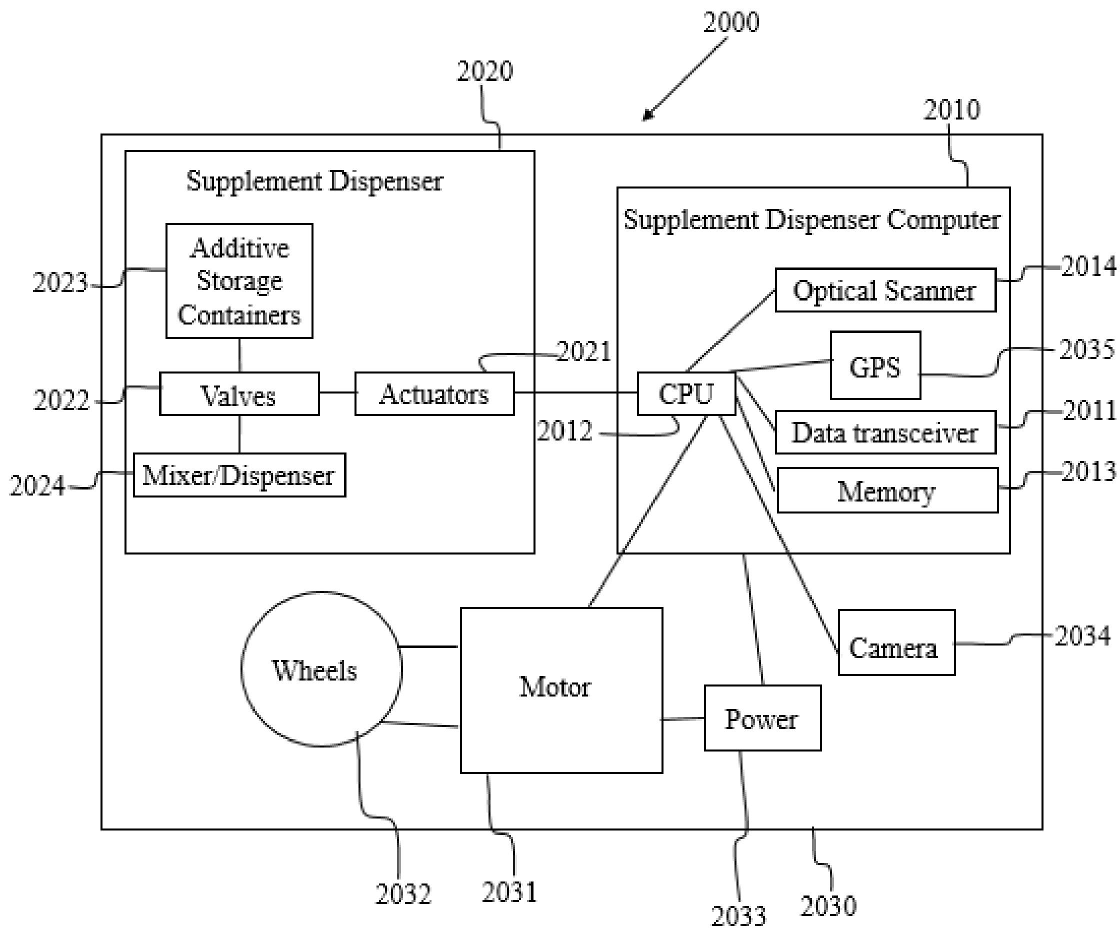
2000
2020
2010
Supplement Dispenser
Additive Storage Containers
2023
Valves
2022
Actuators
2021
Mixer/Dispenser
2024
Supplement Dispenser Computer
Optical Scanner
2014
GPS
2035
CPU
2012
Data transceiver
2011
Memory
2013
Wheels
Motor
Power
Camera
2034
2032
2031
2033
2030

Figure 21