

a greater pressure than that immediately surrounding the body, negative, is where the entire air of respiration is maintained at a less pressure than that surrounding the body—the exact reverse of the former; while alternative differentiation is a combination of the two—in inspiration, the air entering the lungs being of the greater pressure; while in expiration it is of the less.

The pneumatic cabinet is intended to produce these differentiations. It is an air tight box of sufficient size to allow an adult to be comfortably seated within it. The front is of glass, and so arranged as to be instantly opened if required. The cabinet is provided with a bellows arrangement, to rarify or condense the air within, and a tube by which the patient can breathe external air, medicated or otherwise as required.

To give the patient the benefit of positive pneumatic differentiation, he is placed within the cabinet, and the air within rarified, while he is allowed to breathe through the tube the outside air of natural density. As a consequence, the lighter pressure of the atmosphere round the body is more than balanced by the natural air within the lungs; the air-cells become fuller; the lungs expand to an unusual extent; and the circumference of the chest is increased. These are the results during inspiration. On the other hand expiration loses to some extent its ordinary passive quality. More exertion than usual is required to expel the air; while at the end an unusual amount of residual air is left within the lungs. That this residual air is larger in quantity than during ordinary respiration, is proved by restoring the rarified air in the cabinet to its normal density, as the occupant completes his expiration; when he is able to expel a still further amount; something that it was impossible for him to accomplish before the equilibrium was restored.

The effect of this process on respiration is, that the lungs will be more fully distended during inspiration than in the normal state; and less completely contracted during expiration; while extensive or long continued positive differentiation would undoubtedly produce emphysema.

On producing negative differentiation, the results would in a large measure be of an opposite character. The pneumatic cabinet, occupied by the patient would be filled with compressed instead of rarified air; and breathing the outside atmosphere

of normal density, the increased pressure upon the walls of the chest would render inspiration more difficult; while under the same conditions, expiration would be more complete—the residual air being reduced to a minimum. As a result of this procedure, the lungs might become more contracted; while at the same time, the inspiratory muscles would be strengthened by the unusual effort.

Alternate differentiation would be attended by a combination of both of the above results. By special arrangement in the cabinet, inspiration would become more complete, and expiration more exhaustive, the lungs as a consequence being more thoroughly and fully ventilated.

Leaving the air passages, let us for a moment consider the effects of pneumatic differentiation upon the circulation. Any diminution of peripheral pressure, the air respired being normal, would induce an extra flow of blood from the thorax to the outlying portions of the system; while it would retard the return of blood to the heart and lungs, hence we would have diminished arterial blood pressure.

On the other hand, negative differentiation would be attended by the opposite effect. Atmospheric pressure upon the surface of the body, more than balancing that admitted into the lungs for the purpose of aeration, would produce increased flow of blood toward the thorax; while the increased pressure, required to force it again out through the aorta into the general circulation, would result in raised arterial tension, with a tendency toward pulmonary congestions and hemorrhages; hence, before deciding upon treatment by pneumatic differentiation, a thorough examination of the heart should be made; and no person found suffering from insufficiency, stenosis, or regurgitation, should under any circumstances, be subjected to it.

It may be said in reference to the treatment by the pneumatic cabinet, that the size and cost of the apparatus, place it outside of the reach of the general or even special practitioner, except in institutions, where ample provision is made for the treatment of chest affections. Although to a certain extent this may be true, yet the principles of the pneumatic cabinet may be carried out in all their bearings, in a simpler and less cumbersome manner. Dr. Ketchum in his paper on "The Physics of Pneumatic Differentiation," denies this; but Dr. Platt of Brooklyn, and Dr. Shurly of Detroit, have