

New Era of Respiration for Future Development with Rhythm and Coupling

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Congratulations for an inaugural issue of Archives of Pulmonology and Respiratory Medicine! A new ship is starting for the sea with good spirit and air. In the world, there are five Oceans and seven Continents, where the ship can proceed in any ocean and land any continent. We can observe the development of this journal.

The author is a Japanese physician who majors in internal medicine seeking for the philosophy of Sir Osler and Dr. Hinohara (Hinohara-ism), associated with the careers of pianist and athlete [1]. In this article, some impressive topics would be described including 1) respiration and life, 2) voice and music therapy, 3) coupling of respiration and circulatory system.

Firstly, I would like to introduce a little bit about Japanese. There are many homonyms in our language. When human is living every day, normal respiration is the fundamental of our life. Our foundation is breathing as we live [2].

Breath is translated to Japanese as 'iki' (aa), live long is 'iki' (bb), and active behavior is 'iki-iki' (cc). Thus, Japanese language has wide and deep mutual correlations among letter, pronunciation and meaning, which are observed in oriental culture for thousands of years.

Breathing is a rhythmic repetition of expiration and inspiration. The natural and easy breathing method has been educated by training such as yoga treatment.

Yoga is one of the well-known therapy among integrative medicine (IM) and/or complementary and alternative medicine (CAM). Generally speaking, IM consists of CAM and Western Medicine (WM).

From the WM point of view, breathing way is classified as costal type, cost-abdominal type, abdominal type. The important tip for good breathing is at first to expire as much as possible. During expiration, inflate the abdomen so that the intra-abdominal pressure increases [3]. When exhaling with somewhat using the abdominal muscles, it is recommended to place both hands on the umbilicus. During elevated intra-abdominal pressure, the abdomen is inflated. On contrast, the abdomen will be finally concaved, just only the phase at the end of expiration.

Actually, this breathing method has been utilized in 'Bel Canto' singing by opera singers and also in sports movement by various athletes.

Secondly, patients with asthma can make breathing easily by adequate respiration method [4]. Asthmatic patients generally suffer from stridor due to the narrowing airway during expiration, leading to dyspnea. In such a case, small mouth breathing way can raise airway pressure and make breathing much easier.

By applying this principle to medical practice, it is clinically used for the treatment of asthma in children [5]. The method is in the following. i) When a child with asthma breathes out, he makes the mouth retracted and deliberately resists the outflow of air. ii)

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In the phase of exhaling, take more than 10 seconds to raise airway pressure to some extents. iii) There are several kinds of practical way about this. They include breathing in while plucking your mouth, making a low-pitched voice with a long tone, sounding with a long tone with a musical instrument such as music recorder or trumpet. In the case of children, it is effective in singing a song for continuing with the long tone with the phrase of melody. This is a singing practice for the treatment of asthmatic children [5].

Which phase is to use abdominal muscles, either exhalation or inspiration? When you are exhaling, raise your abdominal pressure and put a little effort into your abdominal muscles [6]. Conversely, after you finish breathing out, the air will be instantaneously coming into the lungs naturally with no effort. In recent research, a randomized clinical trial (RCT) of inspiratory muscle has been found [7].

Thirdly, topic of the coupling phenomenon will be introduced. There are certain rhythms inherent in some systems in the human body. Let us consider the movements such as walking, jogging, running, bicycle pedaling, or indoor treadmill [8]. When gradually increasing the loading or the speed, the pulse rate increases. Consequently, the interesting phenomena are found at this point. The rhythm of the exercise pulse is synchronized with the rhythm of pulse and respiration, which would be the existence of coupling phenomena among some factors.

Looking back on the era of schoolchildren, everyone remembers the marathon practice in the winter. We learned how to breathe, including the repetition rhythm of 2 expiration, 2 inspiration for 8 step. This means the coupling of exercise and respiration, which was called locomotor respiratory coupling (LRC) [8, 9]. Furthermore, synchronization between exercise and cardiac pulse would be called cardiac respiratory coupling (CRC) [10, 11]. When these coupling phenomena occur simultaneously, the coupling for 3 factors are observed. For an example, Figure 1 shows the synchronized situation that pulse is 120 / min, step is 60 / min, and respiration is 30 / min with stable coupling status.

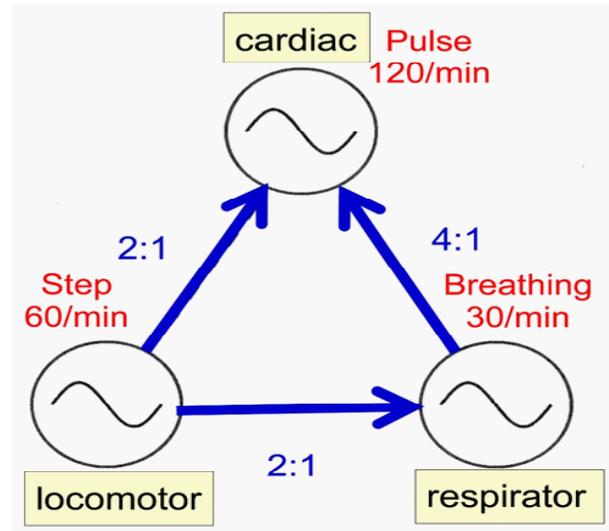


Figure 1

When it comes to the state of the coupling, there are some merits. It makes breathing easier, improves energy metabolic efficiency, and increases exercise efficiency. Therefore, any exercise can easily be continued for longer period [12]. Both voluntary and autonomic mechanism are mixed and present in the coupling status. Exercise is voluntary, and human can control it freely. Breathing is both voluntary and autonomic, while heart beat is autonomic [13]. Besides three kinds of couplings, auditory stimulation can be added using a walkman or listening apparatus [14]. Adding sounds of constant rhythm beat or rhythmic music makes these four factors together easier to synchronize [15].

In summary, some topics were introduced in this paper concerning the fundamental breathing or respiration. From now on, this magazine will be expected to navigate the world ocean and continent, and navigate medical staffs with meaningful information. Bon Voyage!

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