

INDIVIDUAL CHANGES IN HEART RATE DURING INSPIRATION TEST COMPARED WITH GRADED OCULOCARDIAC REFLEX

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It is generally accepted that during inspiration as well as during breath holding in inspiration the heart rate is quickened. However, individual differences in the inspiratory arrhythmia have not been studied.

For this purpose the changes in the heart rate of 50 healthy persons aged 20-27 years holding their breath for 20 sec in deep inspiration were analyzed.

EXPERIMENTAL METHOD

The respiration and heart rates during the experiment were recorded continuously on a kymograph [5]. For analysis of the kymograms the heart rate was determined every 3 sec during inspiration and the values obtained were then converted into rates per minute.

EXPERIMENTAL RESULTS

Four different types of changes of the heart rate appeared in the healthy subjects during inspiration; I — a slowing of the rate; II — a slowing followed by a quickening during the test; III — quickening followed by slowing, and IV — quickening of the heart rate only (Table 1). It may be assumed that during breath holding the final effect on the heart is determined by the relationship between the degree of reflex excitation of the sympathetic and parasympathetic centers.

TABLE 1. Relationship between Character of Changes in Heart Rate (beats per min) during Breath Holding in Inspiration and during Oculocardiac Reflex

Type of react.	No. of tests	Inspiratory test					Oculo-cardiac reflex				
		background	during inspiration	after-effect	$M \pm m$	P	background	on compression of the eyes	after-effect	$M \pm m$	P
I	18	83,1	63,0	76,7	$-20,1 \pm 1,8$	$<0,001$	80,5	71,7	77,2	$-8,8 \pm 0,7$	$<0,001$
II	12	79,1	67,0	78,8	$-6,4 \pm 1,2$	$<0,001$	71,0	65,1	74,2	$-3,3 \pm 0,8$	$<0,001$
			91,2		$-12,1 \pm 2,1$	$<0,001$				$-5,9 \pm 0,7$	$<0,001$
III	22	73,9	85,2	74,2	$+12,1 \pm 1,9$	$<0,001$	75,6	81,7	70,2	$+3,2 \pm 1,4$	$<0,05$
			61,5		$-0,3 \pm 2,7$	$>0,5$				$-0,5 \pm 1,6$	$>0,5$
IV	8	73,0	93,5	77,2	$+11,3 \pm 1,1$	$<0,001$	78,2	85,6	78,0	$+6,1 \pm 0,9$	$<0,001$
					$-12,4 \pm 2,4$	$<0,001$				$-5,4 \pm 0,9$	$<0,001$
					$+0,3 \pm 1,9$	$>0,05$				$+0,5 \pm 0,8$	$>0,5$
					$+20,5 \pm 2,8$	$<0,001$				$+7,4 \pm 2,2$	$<0,02$
					$+4,2 \pm 1,1$	$<0,001$				$-0,2 \pm 2,6$	$>0,5$

A similar simultaneous participation of both divisions of the autonomic nervous system was demonstrated previously by the author during oculocardiac reflex [1-4]. It is interesting to compare the results of the two tests in the same subject during the same experiment (see Table 1). The results showed that with the same initial level of the heart rate before carrying out each test, complete agreement was found in the individual characteristics of the arrhythmia arising both after voluntary breath holding in inspiration (inspiratory reflex), and in the case of the oculocardiac reflex.

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