

## Title: P-wave dispersion - the new approach to the old vision.

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**Background:** P wave duration is a measurement of an atrial electrical activation. The P wave dispersion definition was created to reflect the non-uniform atrial conduction. Its most important feature is measurement which is inconsistent with the main principle of electrocardiography, which assumes that 12 leads of ECG, recorded simultaneously, register the same events. The presence of dispersion indicates that in one lead the P wave still lasts, while in the other it has already ended. As such, this observation at the same moment could constitute a methodological artifact. The aim of the study was to demonstrate that the P wave dispersion per se is the effect of an insufficient precision of the measurement in different ECG leads.

**Materials and methods:** Our study included 150 patients (89 F, 61 M) undergoing electrophysiological procedures using electrophysiological system where the ECG tracings allowed assessing the sinus P waves. The P wave duration was measured by 3 independent researchers in all leads twice: 1. paper speed=50 mm/s, enhancement 16x (basic measurement) 2. paper speed=200 mm/s, enhancement 128-256x, simultaneously measuring the P wave dispersion. All measurements were repeated 3 times.

**Results:** The results are presented in Table 1

### Conclusions:

1. The P wave dispersion that is evaluated by the use of standard parameters is the measurement artifact. After improving the precision it does no longer exist.
2. Parameter's clinical utility may be explained by its dependence on Pmax (Pmax/Pdysp correlation) which reflects atrial conduction disturbances.
3. The significant P wave duration parameter should be total atrial activation time, from the beginning of the earliest recorded P wave, till the end of the last P wave recorded in any lead.

Table 1	AVNRT (n=50)	AFL (n=50)	AF (n=50)	p value
P-wave duration - standard method	78,2+/-10.1	74,3+/-11.8	98,5+/-21.6	p<0.05
P-wave duration - precise measurement	121,2+/-15.2	123+/-22.2	141,1+/-22.8	p<0.05
P-wave dispersion (ms) - standard method	46.5+/-16.9	48.5+/-20.3	55.8+/-23.3	p<0.02
P-wave dispersion (ms) - precise measurement	4.0+/-3.4	4.1+/-3.9	4.6+/-3.7	n.s.
p value - duration	p<0.0001	p<0.0001	p<0.0001	
p value - dispersion	p<0.0001	p<0.0001	p<0.0001	