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Abstracttitel: Characterization of Rising and Falling Phases of Isometric Tension Curve by Logistic Functions in Mouse Left Ventricular Papillary Muscle

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**Purpose:** Myocardial tension is regulated by intracellular  $Ca^{2+}$  concentration. We previously demonstrated that the rising and falling phases of  $Ca^{2+}$  transient curve are fit well by logistic functions, which represent sigmoid curves, in mouse left ventricular (LV) papillary muscle. In the present study, we investigated whether the rising and falling phases of isometric tension curve could be reliably fit by logistic functions.

**Methods:** Isometric tension curves were measured in 15 mouse LV papillary muscles. The rising phase of isometric tension curve was defined as the duration from the beginning of twitch stimulation to the peak tension. The falling phase was defined as the duration from the peak tension to the resting tension. The rising and falling phases were fit by the least squares method using logistic function equation;  $F(t) = A\{1 + \exp[-(4B/A)(t - C)]\} + D$ , where  $t$  is the time from the beginning of twitch stimulation, the parameter  $A$  is the amplitude, the parameter  $B$  is the slope at the inflection point, the parameter  $C$  is the time from the beginning of twitch stimulation to the corresponding to the inflection point, the parameter  $D$  is the lower asymptote, and the parameter  $A$  plus the parameter  $D$  is the upper asymptote.

**Results:** The durations of the rising and falling phases were  $141.7 \pm 10.8$  and  $347.3 \pm 10.8$  ms, respectively. The parameter  $A$ ,  $B$ ,  $C$ , and  $D$  values for the rising phase were  $8.5 \pm 6.3$  (mN/mm<sup>2</sup>),  $158.2 \pm 100.8$  (mN/mm<sup>2</sup>/s),  $92.9 \pm 5.4$  (ms), and  $-0.1 \pm 0.1$  (mN/mm<sup>2</sup>), respectively. The parameter  $A$ ,  $B$ ,  $C$ , and  $D$  values for the falling phase were  $9.7 \pm 6.9$  (mN/mm<sup>2</sup>),  $-80.7 \pm 54.6$  (mN/mm<sup>2</sup>/s),  $197.5 \pm 18.2$  (ms), and  $0.0 \pm 0.1$  (mN/mm<sup>2</sup>), respectively. The correlation coefficient ( $r$ ) values of logistic fits for the rising and falling phases were 0.9986 and 0.9999, respectively.

**Conclusion:** Logistic functions fit well the rising and falling phases of isometric tension curve in mouse LV papillary muscle. Logistic functions accurately track the amplitudes and time courses of the rising and falling phases of isometric tension curve. These results indicate that the characterization of isometric tension curve could be evaluated by logistic time constants.

**Reference:** Mizuno J, et al. J Physiol Sci 57:349-59, 2007