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- channel diversity. *Annu Rev Neurosci* 1994; **17**: 399 - 418.
- 4 Dunlap K, Luebke JI, Turner TI. Exocytotic Ca^{2+} channels in mammalian central neurons. *Trends Neurosci* 1995; **18**: 89 - 98.
- 5 Fleckenstein A. Calcium antagonists in heart and smooth muscle. Experimental facts and therapeutic prospects. New York: Wiley, 1983: 1 - 373.
- 6 Triggle DJ. Sites, mechanisms of action, and differentiation of calcium channel antagonists. *Am J Hypertens* 1991; **4**: 422s - 429s.
- 7 Ferrante J, Triggle DJ. Homologous and heterologous regulation of voltage-dependent calcium channels. *Biochem Pharmacol* 1990; **39**: 1267 - 70.
- 8 DeLorme EM, McGee R Jr. Regulation of voltage-dependent Ca^{2+} channels of neuronal cells by chronic changes in membrane potential. *Brain Res* 1986; **397**: 189 - 92.
- 9 DeLorme EM, Rabe CS, McGee R Jr. Regulation of the number of functional voltage-sensitive Ca^{2+} channels on PC12 cells by chronic changes in membrane potential. *J Pharmacol Exp Ther* 1988; **244**: 838 - 43.
- 10 Ferrante J, Triggle DJ, Rutledge A. The effects of chronic depolarization on L-type 1, 4-dihydropyridine-sensitive Ca^{2+} channels in chick neural retina and rat cardiac cells. *Can J Physiol Pharmacol* 1991; **69**: 914 - 20.
- 11 Franklin JL, Fickbohm DJ, Willard AL. Long-term regulation of neuronal calcium currents by prolonged changes of membrane potential. *J Neurosci* 1992; **12**: 1726 - 35.
- 12 Sibley DR, Houslay MD, editors. Regulation of cellular signal transduction pathways by desensitization and amplification. New York: Wiley, 1994: 1 - 290.
- 13 Liggett SB, Lefkowitz RJ. Adrenergic receptor-coupled adenylyl cyclase systems: regulation of receptor function by phosphorylation, sequestration and downregulation. In: Sibley DR, Houslay MD, editors. Regulation of cellular signal transduction pathways by desensitization and amplifications. New York: Wiley, 1994: 71 - 97.
- 14 Hondeghem LM, Katzung BG. Time- and voltage-dependent interactions of antiarrhythmic drugs with cardiac Na^+ channels. *Biochim Biophys Acta* 1997; **472**: 373 - 98.
- 15 Wei XY, Rutledge A, Triggle DJ. Voltage-dependent binding of 1, 4-dihydropyridine Ca^{2+} channel antagonists and activators in cultured neonatal rat ventricular myocytes. *Mol Pharmacol* 1989; **35**: 541 - 52.
- 16 Liu J, Bangalore R, Rutledge A, Triggle DJ. Modulation of L-type Ca^{2+} channels in clonal rat pituitary cells by membrane depolarization. *Mol Pharmacol* 1994; **45**: 1198 - 206.
- 17 Liu J, Rutledge A, Triggle DJ. Short-term regulation of neuronal calcium channels by depolarization. *Ann New York Acad Sci* 1995; **765**: 119 - 23.
- 18 Wei XY, Perez-Reyes E, Lacerda AE, Schuster G, Brown AM, Birnbaumer L. Heterologous regulation of the cardiac Ca^{2+} channel α_1 subunit by skeletal muscle β and γ subunits. *J Biol Chem* 1991; **266**: 21943 - 7.
- 19 De Waard M, Pragnell M, Campbell KP. Ca^{2+} channel regulation by a conserved β -subunit domain. *Neuron* 1994; **13**: 495 - 503.
- 20 Choi DW. Calcium: still center-stage in hypoxic-ischemic neuronal death. *Trends Neurosci* 1995; **18**: 58 - 60.
- 21 Valentino K, Newcomb R, Gadbois T, Singh T, Bowersox S, Bitner S, et al. A selective N-type calcium channel antagonist protects against neuronal loss after global cerebral ischemia. *Proc Natl Acad Sci USA* 1993; **90**: 7894 - 7.
- 22 Scott BS. The effect of elevated potassium on the time course of neuron survival in cultures of dissociated dorsal root ganglia. *J Cell Physiol* 1976; **91**: 305 - 16.
- 23 Lipton SA. Blockade of electrical activity promotes the death of mammalian retinal ganglion cells in culture. *Proc Natl Acad Sci USA* 1986; **83**: 9774 - 8.
- 24 Gallo V, Kingsbury A, Balázs R, Jørgensen OS. The role of depolarization in the survival and differentiation of cerebellar granule cells in culture. *J Neurosci* 1987; **7**: 2203 - 13.
- 25 Franklin JL, Johnson EM. Suppression of programmed neuronal death by sustained elevation of cytoplasmic calcium. *Trends Neurosci* 1992; **15**: 501 - 8.

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去极化作为电压门控性钙通道的调节信号

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关键词 钙通道；膜电位；神经生理学；
 电生理学；钙通道激动剂；钙通道阻滞剂

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