Vesicourethral sphincter dysfunction in Ncx deficient mice with an increased neuronal cell number in vesical ganglia

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Research article


Abstract:

Ncx/Hox11L.1 knockout mice have a megacolon with an increased number of neuronal cells in the enteric ganglia. Since Ncx/Hox11L.1 is expressed in neuronal cells in the vesical ganglia, we examined lower urinary tract function and the number of neuronal cells in the vesical ganglia in Ncx/Hox11L.1 knockout mice. Female knockout and control were investigated in regard to voiding frequency, and cystometry and histological studies were done. The number of neuronal cells in the vesical ganglia was observed by staining with nicotinamide adenine dinucleotide phosphate diaphorase and cuprolinic blue. In knockout mice voiding frequency was 2-fold and bladder capacity was less than in controls. Although bladder structure was histologically similar in knockout mice and controls, cystometry showed that threshold and remaining pressure was less in knockout mice. Neuronal cells positive for nicotinamide adenine dinucleotide phosphate diaphorase or cuprolinic blue were more numerous in the vesical ganglia of knockout mice than controls. The intraperitoneal injection of a nitric oxide synthase inhibitor increased threshold and remaining pressure on cystometry in knockout mice to the control level. We concluded that the increased number of neuronal cells in the vesical ganglia induces vesicourethral sphincter muscle dysfunction in knockout mice. Since administering a nitric oxide synthase inhibitor somewhat overcomes the dysfunction, the amount of nitric oxide in vesical nerve cells is important for controlling vesicourethral sphincter muscle function.