

Title: Caveolinopathies *GeneReview* Table 3

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Date: September 2012

Note: The following information is provided by the authors listed above and has not been reviewed by *GeneReviews* staff.

Table 3. CAV3 Mutations and Associated Phenotypes

Nt Change	Exon	Protein	Position	Phenotype	Reference
77G>A	1	R26Q	N-terminal	Isolated HCK (s)	Carbone et al [2000]
"	"	"	"	RMD	Vorgerd et al [2001], Schara et al [2002]
"	"	"	"	LGMD-1	Figarella-Branger et al [2003]
"	"	"	"	DM	Tateyama et al [2002]
"	"	"	"	RMD + DM	Yabe et al [2002]
"	"	"	"	LGMD-1C + RMD	Fee et al [2004]
"	"	"	"	Isolated H-CK	Fulizio et al [2005]
81C>A	1	D27E	N-terminal	LGMD-1C + RMD + DM	Fisher et al [2003]
82C>A	1	P28T	N-terminal	RMD	Van der Bergh et al [2004]
83C>T	1	P28L	N-terminal	Isolated HCK (f)	Merlini et al [2002]
96C>G	1	N32K	N-terminal	LGMD-1C	Sugie et al [2004]
99C>G	1	N33K	N-terminal	DM+ HCK	Fulizio et al [2005]
IVS+2T>C	1	No protein	N-terminal	LGMD-1C	Muller et al [2006]
128T>A	2	V43E	N-terminal	LGMD-1C	Sugie et al [2004]
133G>A	2	A45T	N-terminal	LGMD-1C	Herrmann et al [2000]
"	"	"	"	RMD	Betz et al [2001]
"	"	"	"	LGMD-1C+ HCK	Fulizio et al [2005]
134C>T	2	A45V	N-terminal	RMD	Betz et al [2001]
136G>A	2	E46K	N-terminal	RMD	Ricardo et al [2005]
154A>G	2	S52G	Scaffolding domain	RMD	Dotti et al [2006]
169G>A	2	V57M	Scaffolding domain	Isolated HCK (f)	Alias et al [2004]
183C>A	2	S61R	Scaffolding domain	LGMD-1C+ HCK	Fulizio et al [2005]
187A>C	2	T63P	Scaffolding domain	LGMD-1C	Matsuda et al [2001]
188C>G	2	T63S	Scaffolding domain	HCM	Hayashi et al [2004]
186-194del	2	TFT63-65del	Scaffolding domain	LGMD-1C	Minetti et al [1998]

Nt Change	Exon	Protein	Position	Phenotype	Reference
233C>T	2	T78M	Membrane-spanning domain	LQTS	Reijneveld et al [2006], Vatta et al [2006]
257T>C	2	L85P*	Membrane-spanning domain	RMD	Kubish et al [2003]
277G>A	2	A92T*	Membrane-spanning domain	RMD + LGMD-1C	Kubish et al [2003]
290T>G		F96C	Membrane-spanning domain	LQTS	Vatta et al [2006]
290-293del	2	F96del	Membrane-spanning domain	LGMD-1C + RMD + HCK	Cagliani et al [2003]
314C>T	2	P104L	Membrane-spanning domain	LGMD-1C	Minetti et al [1998]
423C>G	2	S140R	C-terminal domain	LQTS	Vatta et al [2006]

Taken from <http://www.hgmd.cf.ac.uk/ac/index.php>

HCK, hyperCKemias (s) sporadic, (f) familiar

RMD, rippling muscle disease

LGMD, limb-girdle muscular dystrophy

DM, distal myopathy

HCM, hypertrophic cardiomyopathy

LQTS, long QT syndrome

*, homozygous mutation

References

Alias L, Gallano P, Moreno D, Pujol R, Martinez-Matos JA, Baiget M, Ferrer I, Olive M. A novel mutation in the caveolin-3 gene causing familial isolated hyperCKaemia. *Neuromuscul Disord.* 2004;14:321-4.

Betz RC, Schoser BG, Kasper D, Ricker K, Ramirez A, Stein V, Torbergson T, Lee YA, Nothen MM, Wienker TF, Malin JP, Propping P, Reis A, Mortier W, Jentsch TJ, Vorgerd M, Kubisch C. Mutations in CAV3 cause mechanical hyperirritability of skeletal muscle in rippling muscle disease. *Nat Genet.* 2001;28:218-9.

Cagliani R, Bresolin N, Prella A, Gallanti A, Fortunato F, Sironi M, Ciscato P, Fagiolari G, Bonato S, Galbiati S, Corti S, Lamperti C, Moggio M, Comi GP. A CAV3 microdeletion differentially affects skeletal muscle and myocardium. *Neurology.* 2003;61:1513-9.

Carbone I, Bruno C, Sotgia F, Bado M, Broda P, Masetti E, Panella A, Zara F, Bricarelli FD, Cordone G, Lisanti MP, Minetti C. Mutation in the CAV3 gene causes partial caveolin-3 deficiency and hyperCKemia. *Neurology.* 2000;54:1373-6.

Dotti MT, Malandrini A, Gambelli S, Salvadori C, De Stefano N, Federico A. A new missense mutation in caveolin-3 gene causes rippling muscle disease. *J Neurol Sci.* 2006;243:61-4.

Fee DB, So YT, Barraza C, Figueroa KP, Pulst SM. Phenotypic variability associated with Arg26Gln mutation in caveolin3. *Muscle Nerve.* 2004;30:375-8.

Figarella-Branger D, Pouget J, Bernard R, Krahn M, Fernandez C, Levy N, Pellissier JF. Limb-girdle muscular dystrophy in a 71-year-old woman with an R27Q mutation in the CAV3 gene. *Neurology*. 2003;61:562-4.

Fischer D, Schroers A, Blumcke I, Urbach H, Zerres K, Mortier W, Vorgerd M, Schroder R. Consequences of a novel caveolin-3 mutation in a large German family. *Ann Neurol*. 2003;53:233-41.

Fulizio L, Chiara Nascimbeni A, Fanin M, Piluso G, Politano L, Nigro V, Angelini C. Molecular and muscle pathology in a series of caveolinopathy patients. *Hum Mutat*. 2005;25:82-9.

Hayashi T, Arimura T, Ueda K, Shibata H, Hohda S, Takahashi M, Hori H, Koga Y, Oka N, Imaizumi T, Yasunami M, Kimura A. Identification and functional analysis of a caveolin-3 mutation associated with familial hypertrophic cardiomyopathy. *Biochem Biophys Res Commun*. 2004;313:178-84.

Herrmann R, Straub V, Blank M, Kutzick C, Franke N, Jacob EN, Lenard HG, Kroger S, Voit T. Dissociation of the dystroglycan complex in caveolin-3-deficient limb girdle muscular dystrophy. *Hum Mol Genet*. 2000;9:2335-40.

Matsuda C, Hayashi YK, Ogawa M, Aoki M, Murayama K, Nishino I, Nonaka I, Arahata K, Brown RH Jr. The sarcolemmal proteins dysferlin and caveolin-3 interact in skeletal muscle. *Hum Mol Genet*. 2001;10:1761-6.

Merlini L, Carbone I, Capanni C, Sabatelli P, Tortorelli S, Sotgia F, Lisanti MP, Bruno C, Minetti C. Familial isolated hyperCKaemia associated with a new mutation in the caveolin-3 (CAV-3) gene. *J Neurol Neurosurg Psychiatry*. 2002;73:65-7.

Minetti C, Sotgia F, Bruno C, Scartezzini P, Broda P, Bado M, Masetti E, Mazzocco M, Egeo A, Donati MA, Volonte D, Galbiati F, Cordone G, Bricarelli FD, Lisanti MP, Zara F. Mutations in the caveolin-3 gene cause autosomal dominant limb-girdle muscular dystrophy. *Nat Genet*. 1998;18:365-8.

Muller JS, Piko H, Schoser BG, Schlotter-Weigel B, Reilich P, Gurster S, Born C, Karcagi V, Pongratz D, Lochmuller H, Walter MC. Novel splice site mutation in the caveolin-3 gene leading to autosomal recessive limb girdle muscular dystrophy. *Neuromuscul Disord*. 2006;16:432-6.

Reijneveld JC, Ginjaar IB, Frankhuizen WS, Notermans NC. CAV3 gene mutation analysis in patients with idiopathic hyper-CK-emia. *Muscle Nerve*. 2006;34:656-8.

Schara U, Vorgerd M, Popovic N, Schoser BG, Ricker K, Mortier W. Rippling muscle disease in childhood. *J Child Neurol*. 2002;17:483-90.

Sugie K, Murayama K, Noguchi S, Murakami N, Mochizuki M, Hayashi YK, Nonaka I, Nishino I. Two novel CAV3 gene mutations in Japanese families. *Neuromuscul Disord*. 2004;14:810-4.

Tateyama M, Aoki M, Nishino I, Hayashi YK, Sekiguchi S, Shiga Y, Takahashi T, Onodera Y, Haginoya K, Kobayashi K, Iinuma K, Nonaka I, Arahata K, Itoyama Y. Mutation in the caveolin-3 gene causes a peculiar form of distal myopathy. *Neurology*. 2002;58:323-5.

Van den Bergh PY, Gerard JM, Elozegi JA, Manto MU, Kubisch C, Schoser BG. Novel missense mutation in the caveolin-3 gene in a Belgian family with rippling muscle disease. *J Neurol Neurosurg Psychiatry*. 2004;75:1349-51.

Vatta M, Ackerman MJ, Ye B, Makielski JC, Ughanze EE, Taylor EW, Tester DJ, Balijepalli RC, Foell JD, Li Z, Kamp TJ, Towbin JA. Mutant caveolin-3 induces persistent late sodium current and is associated with long-QT syndrome. *Circulation*. 2006;114:2104-12.

Vorgerd M, Ricker K, Ziemssen F, Kress W, Goebel HH, Nix WA, Kubisch C, Schoser BG, Mortier W. A sporadic case of rippling muscle disease caused by a de novo caveolin-3 mutation. *Neurology*. 2001;57:2273-7.

Yabe I, Kawashima A, Kikuchi S, Higashi T, Fukazawa T, Hamada T, Sasaki H, Tashiro K. Caveolin-3 gene mutation in Japanese with rippling muscle disease. *Acta Neurol Scand*. 2003;108:47-51.