

<i>Real Time qPCR</i>				<i>In Situ Hybridization</i>		
Family	Gene	Orientation	Sequence (5'-3')	Gene	Orientation	Sequence (5'-3')
	<i>Gapdh*</i>	Forward	tgacaatgaatacggctacagcaa			
		Reverse	tactccttgaggccatgtagg			
	<i>Rho</i>	Forward	gcccttctccaacgtcacag	<i>Rho*</i>	Forward	gcccttctccaacgtcacag
		Reverse	gcagcttctgtgctgtacgg		Reverse	gcagcttctgtgctgtacgg
JAMM	<i>Amsh</i>	Forward	attgttcaagagttcgggaagg	<i>Amsh</i>	Forward	caccgagactacaatcagctatc
		Reverse	gggggccacatctacacaagg		Reverse	gggggccacatctacacaagg
	<i>Amsh-like</i>	Forward	gctgctatgctgaccatacaga	<i>Amsh-like</i>	Forward	gagaaccagagggcccggacta
		Reverse	gacctgaagtaacggcgtgggggtg		Reverse	gacctgaagtaacggcgtgggggtg
	<i>Brcc36</i>	Forward	gcggcgttctgacaagaaaagg	<i>Brcc36</i>	Forward	aacacaaagactggccgggta
		Reverse	ataccagccaacaactctcatggg		Reverse	cgatgcaggaaccaaagcag
	<i>Csn5</i>	Forward	ttccgggagtggtatggcccag	<i>Csn5</i>	Forward	ttccgggagtggtatggcccag
		Reverse	cgcccagagatttcttctgttg		Reverse	gtgtactaatcaatcccggag
	<i>Eif3h</i>	Forward	catgttgaagaagtccgattg	<i>Eif3h</i>	Forward	NP
		Reverse	gtgcttatcccacagctgac		Reverse	NP
	<i>Jamm2</i>	Forward	cctgcctgaatgctgtaaagattg	<i>Jamm2</i>	Forward	cctgcctgaatgctgtaaagattg
		Reverse	agtaagatggctgccagaattctgt		Reverse	tcctcttacttctcctctgtg
	<i>Jamm3</i>	Forward	cctgttctcgaggcctgt	<i>Jamm3</i>	Forward	tccatggcagctcccagctct
		Reverse	tcaatgtctgcaagcaaggagggtg		Reverse	ctctccaacagcagttcttcc
	<i>Mysm1</i>	Forward	tgtctctgctctgtgccaactg	<i>Mysm1</i>	Forward	NP
		Reverse	cacctctctgctgagaaacca		Reverse	NP
	<i>Poh1</i>	Forward	acatgggatgtcttatgacttca	<i>Poh1</i>	Forward	caatgtaaatgatggcttgg
		Reverse	gcgccactgacagctctctacgt		Reverse	gccactgacagctctctacg
	<i>Prpf8</i>	Forward	gcgtggaattaccctctgc	<i>Prpf8</i>	Forward	NP
		Reverse	caccgctgcttctgtactg		Reverse	NP
	<i>Psm7</i>	Forward		<i>Psm7</i>	Forward	NP
		Reverse		<i>Amsh</i>	Reverse	NP
MJD	<i>Atxn</i>	Forward	gcctgtggagctatcctcaat	<i>Atxn</i>	Forward	gcctgtggagctatcctcaat
		Reverse	actcccccttctgccattctc		Reverse	gagggcactctgctcttccaga
	<i>Josd1</i>	Forward	ccatggtctctgcaggtctga	<i>Josd1</i>	Forward	ccatagtttgggacagagttggg
		Reverse	tgctcaggattaacatgcaagc		Reverse	tgctcaggattaacatgcaagc
	<i>Josd2</i>	Forward	gtgcgaggtgctattggtggt	<i>Josd2</i>	Forward	gccgacgaaatctgcaagag
		Reverse	gcagcagatcagctgtgttca		Reverse	gcagcagatcagctgtgttca
	<i>Josd3</i>	Forward	gaacaccaccttaaggaatgcttg	<i>Josd3</i>	Forward	ggcatcgatagagctggagat
		Reverse	gtattgtgctcccactgtca		Reverse	gtattgtgctcccactgtca
OTU	<i>Otub1</i>	Forward	agcaggtggacaagcagacctc	<i>Otub1</i>	Forward	agcaggtggacaagcagacctc
		Reverse	cagtcgaggtagaccacaagg		Reverse	cctctgtacatgtctagcgcc
	<i>Otub2</i>	Forward	gccacttacctgcttctgtgc	<i>Otub2</i>	Forward	acattctaccattcttcgggatca

		Reverse	acaggggtggccccatggttatc		Reverse	agaagtcagctcggttcctgatg
	Otud1	Forward	catggggcagatgctgaatg	Otud1	Forward	agaagctagccctgtacctgg
		Reverse	ggccccagatagtgatcatgg		Reverse	ggccccagatagtgatcatgg
	Otud3	Forward	gatgcgaggagaacctga	Otud3	Forward	tccacatcgctaccgctac
		Reverse	tgcttcatttctgccctga		Reverse	tgcttcatttctgccctga
	Otud4	Forward	cctgtcccgtgtatcctcaga	Otud4	Forward	cctgtcccgtgtatcctcaga
		Reverse	catcggtgcaaggacagtcac		Reverse	tccaaaggcaaatccaattctcc
	Otud5	Forward	ctgagcacctgaactgcat	Otud5	Forward	gcctaccgtcatttaagccagg
		Reverse	tgaaggaggttggcaagagcta		Reverse	tgaaggaggttggcaagagcta
	Otud6a	Forward	cgagatggagcagaggcacia	Otud6a	Forward	NP
		Reverse	gctgtaaccgaatccactgc		Reverse	NP
	Otud6b	Forward	ccgggaagaaagatagcagagg	Otud6b	Forward	NP
		Reverse	gggtccaatattgagcaagtt		Reverse	NP
	Otud7a	Forward	tctgacggattcggaacacaag	Otud7a	Forward	cttgacagccagagctcc
		Reverse	ttgctaaccgggcatgtcg		Reverse	ggcgacgctcccagcgc
	Otud7b	Forward	atgatccagcgttacctgcag	Otud7b	Forward	gggcctgatgcacagcaagg
		Reverse	ccctcattcatgatcttctc		Reverse	ccctcattcatgatcttctc
	Parp11	Forward	tgctatccccatccagctttg	Parp11	Forward	NP
		Reverse	tgcttccaatttgagtactg		Reverse	NP
	Tnfaip3	Forward	ataatggattctgtgagcgttg	Tnfaip3	Forward	tttgagctgttcagcacgaatac
		Reverse	gaaggcaggcttggcactttc		Reverse	gaaggcaggcttggcactttc
	Vcpip1	Forward	atggggtgtcctcaggacctatt	Vcip1	Forward	gaaacgaaggaccgaagaatc
		Reverse	ctgcaaacttctgtctctccaa		Reverse	tgctgctgaaagtgtctctta
	Yod1	Forward	cagcgtaaactcctgatccaga	Yod1	Forward	gaaggaccgagccgagtc
		Reverse	cttcatcagctaattccagtgctg		Reverse	cgggtagccaacgaggattc
	Zranb1	Forward	tcccagacctaataacattgaagca	Zranb1	Forward	ggtggaagtagctctttgatatg
		Reverse	ctccatcgagctctgtcttctc		Reverse	ctccatcgagctctgtcttctc
UCH	Bap1	Forward	tcctgggagtgaggagtgacat	Bap1	Forward	ctgcttctgagcattgaggag
		Reverse	ctgcttctgagcattgaggag		Reverse	gctgtgactcttgagattgtg
	Uch-11	Forward	gattaaccccagatgctgaac	Uch-11	Forward	cgcttcgccgacgtgctagg
		Reverse	ggatggcactgagcccagag		Reverse	gccccatcgactcgtacaga
	Uch-13	Forward	tatgcgcgagtggtactcctctt	Uch-13	Forward	tatgcgcgagtggtactcctctt
		Reverse	tcgtccacagcattgctgat		Reverse	ggcatccttaacaacgtctcatc
	Uch-15	Forward	agatgtgattcgacaagtgacaaa	Uch-15	Forward	gggttcttaccgagctcat
		Reverse	agatgtgattcgacaagtgacaaa		Reverse	agatgtgattcgacaagtgacaaa
USP	Usp1	Forward	ggacaccattaccgacaatag	Usp1	Forward	NP
		Reverse	aacgcctgtttggtcactggat		Reverse	NP
	Usp2	Forward	acctgaagcgattctcagaatc	Usp2	Forward	gatggctcccaatgaggtg
		Reverse	ctctcaagtccaggtctctta		Reverse	ctctcaagtccaggtctctta
	Usp3	Forward	ccgctggtccattcaatgac	Usp3	Forward	NP

	Reverse	ctggcctgacgctccacataa		Reverse	NP
Usp4	Forward	tggtgaggacgatcagggaga	Usp4	Forward	NP
	Reverse	aggagttcacgaggctgaagg		Reverse	NP
Usp5	Forward	cacccatgctggacgaatccg	Usp5	Forward	cggatgagcccaaggtagcct
	Reverse	gccccgctgtttccgatatag		Reverse	gccccgctgtttccgatatag
Usp6	Forward	cggaagtatctggagctgagc	Usp6	Forward	NP
	Reverse	cagtccatctttcggccttc		Reverse	NP
Usp7	Forward	gatgatgacgtggtatccaggtg	Usp7	Forward	NP
	Reverse	catataggcatttgtcagtgtc		Reverse	NP
Usp8	Forward	caacgagcacctggatgacc	Usp8	Forward	tatttgaggatcaggaccagc
	Reverse	acgatgatggactcgttgagc		Reverse	acgatgatggactcgttgagc
Usp9X	Forward	ttaaaggaaatggacctgggc	Usp9X	Forward	tcaagaatgcagctctcgatca
	Reverse	gctttgcactggaggagacc		Reverse	gctttgcactggaggagacc
Usp9Y	Forward	gtggactgggctatggaatgg	Usp9Y	Forward	NP
	Reverse	gtactggaggagaccagttgc		Reverse	NP
Usp10	Forward	atcccaggactgtgacagc	Usp10	Forward	NP
	Reverse	cctggcatcgctcctagtg		Reverse	NP
Usp11	Forward	gcctggcagaaccataaacgac	Usp11	Forward	NP
	Reverse	cattgccacaatcagggcacac		Reverse	NP
Usp12	Forward	accagcttcaccggtacacga	Usp12	Forward	NP
	Reverse	ctgtcagggttggtcgcatct		Reverse	NP
Usp13	Forward	cactggactggatcttcagcc	Usp13	Forward	tgatgaaccagttgatagacc
	Reverse	gcctcagacagatgttgga		Reverse	gcctcagacagatgttgga
Usp14	Forward	atggaattgcatgtgattgac	Usp14	Forward	NP
	Reverse	gggcatcttgagttcaggcac		Reverse	NP
Usp15	Forward	cgcgcagtcacttaaggagca	Usp15	Forward	NP
	Reverse	ccatcagtgtgtaccagctgac		Reverse	NP
Usp16	Forward	agcacttgcgggagaagtgga	Usp16	Forward	aagggttggaacaaggttaatttg
	Reverse	ggccatccaaatccttctgtgta		Reverse	caggtttccgatttctctct
Usp17L8	Forward	ctgccaatgacaagcccagtc	Usp17L8	Forward	NP
	Reverse	cagggctgcattcaggtagca		Reverse	NP
Usp18	Forward	acgcaggagtcctgattgac	Usp18	Forward	NP
	Reverse	cagaggctttgcgtccttatcaa		Reverse	NP
Usp19	Forward	cctggctctggtgtggcgga	Usp19	Forward	NP
	Reverse	cagcagagcctggatcttcagc		Reverse	NP
Usp20	Forward	cggcatgaggtgatgtactcct	Usp20	Forward	tggtggccttcactctgg
	Reverse	cagggacgtgcactccttgg		Reverse	cagggacgtgcactccttgg
Usp21	Forward	ccgagtgggagccaagatacc	Usp21	Forward	NP
	Reverse	cctgggaggcaaaggtcgtaa		Reverse	NP
Usp22	Forward	tctacccattctggccttg	Usp22	Forward	NP

	Reverse	ttcgaggcagctctgtgagag		Reverse	NP
Usp24	Forward	gtgtgccagacaggatgtc	Usp24	Forward	NP
	Reverse	ggttctctcccactctgg		Reverse	NP
Usp25	Forward	agagcagccatcaagaagtgc	Usp25	Forward	ccaccgggagagccgggtgat
	Reverse	atcttcaagatcatgtgacgcct		Reverse	atcttcaagatcatgtgacgcct
Usp26	Forward	cgcaaggtggatccaacaaagt	Usp26	Forward	NP
	Reverse	tagtggcctccattgggactg		Reverse	NP
Usp27X	Forward	tctggactgcctggctcttg	Usp27X	Forward	NP
	Reverse	agtggatgatcctgggatgtg		Reverse	NP
Usp28	Forward	catgaggagtactccaggctct	Usp28	Forward	catgaggagtactccaggctct
	Reverse	catgctgaaggcagggtcac		Reverse	acaccaggtaggacaatgcttc
Usp29	Forward	ccagcgcagaagtgaacaagg	Usp29	Forward	NP
	Reverse	ttctctgctttgccgcctctg		Reverse	NP
Usp30	Forward	ctgccacagtgcctctgcat	Usp30	Forward	actggaagtctcagcacct
	Reverse	aactgcacgtgctcgtgcc		Reverse	aactgcacgtgctcgtgcc
Usp31	Forward	ctgacagagccagcgtcacct	Usp31	Forward	NP
	Reverse	acgtgcttgccatccactctg		Reverse	NP
Usp32	Forward	caccgactctgctacattctt	Usp32	Forward	NP
	Reverse	ctcgtgtccgcatcttcttg		Reverse	NP
Usp33	Forward	tcctccgactccagttgttc	Usp33	Forward	NP
	Reverse	gtgtcctcagaactacaagagc		Reverse	NP
Usp34	Forward	atggcaggtttgacgactgt	Usp34	Forward	tgacaaggagcaactcctgt
	Reverse	tcggattcatcttcagctagtg		Reverse	tcggattcatcttcagctagtg
Usp35	Forward	catggtggcctctctggtcaa	Usp35	Forward	NP
	Reverse	agcccgggaaccgaaacacc		Reverse	NP
Usp36	Forward	gcatcgacagctcctccca	Usp36	Forward	gcatcgacagctcctccca
	Reverse	gcaccctcaccctccgagc		Reverse	ctcttcatcctgctgtggctc
Usp37	Forward	agaggtgctggcagctgtgtt	Usp37	Forward	NP
	Reverse	gtgtccggactgctggttg		Reverse	NP
Usp38	Forward	cagcttcgttaccagtgctca	Usp38	Forward	NP
	Reverse	gacaaaggcagctgttgctgga		Reverse	NP
Usp39	Forward	caagccgtccacaagaacacc	Usp39	Forward	NP
	Reverse	tgatgaagcacgtggatcctg		Reverse	NP
Usp40	Forward	ctgaggacacagctacgcatc	Usp40	Forward	NP
	Reverse	tcaaggagccagctccatc		Reverse	NP
Usp41	Forward		Usp41	Forward	NP
	Reverse			Reverse	NP
Usp42	Forward	acaacgtcgactccccagct	Usp42	Forward	NP
	Reverse	tctgaggactcggccccatag		Reverse	NP
Usp43	Forward	gactcgggagcctcaacaaca	Usp43	Forward	NP

	Reverse	tggtgaagacaggagagtcgg		Reverse	NP
Usp44	Forward	gagcccagttccccgtacag	Usp44	Forward	NP
	Reverse	agcatggcaaacggtagagacc		Reverse	NP
Usp45	Forward	agcctcactgacggcagcg	Usp45	Forward	agcctcactgacggcagcg
	Reverse	aggctgcttgaagcgatc		Reverse	gacaggactggactgagcat
Usp46	Forward	accgggtggtcttccctctg	Usp46	Forward	NP
	Reverse	aacgaccacagcaaccaggtc		Reverse	NP
Usp47	Forward	gtccatgtcacagcttgccatc	Usp47	Forward	gagagtacagagttaaagtgtgcc
	Reverse	gcttccaacacaagctcctgg		Reverse	gcttccaacacaagctcctgg
Usp48	Forward	gcagcagcaggatgcacaaga	Usp48	Forward	NP
	Reverse	ctgctgcacaacattccgaaca		Reverse	NP
Usp49	Forward	caggagcctggagctcattca	Usp49	Forward	NP
	Reverse	cccacttcccagaccacatga		Reverse	NP
Usp50	Forward	actttggagatctggatgggtgg	Usp50	Forward	NP
	Reverse	tcactgactcgggtgtcatcaa		Reverse	NP
Usp51	Forward	gacctgggtagcagtgccaaa	Usp51	Forward	NP
	Reverse	gaaagcaggccacaatcggtaa		Reverse	NP
Usp52	Forward	cggaagtatctggagctgagc	Usp52	Forward	NP
	Reverse	cagtccatctttcgcccttc		Reverse	NP
Usp53	Forward	ggagtccatgcatgaccagg	Usp53	Forward	tgaacaactggacgggtagctg
	Reverse	tgaacaactggacgggtagctg		Reverse	catctgtgagaactgctgggct
Usp54	Forward	cacgtgcaacctgctagaa	Usp54	Forward	gaagagagcactgtcgtctgg
	Reverse	tccagttcagaggtctctctgc		Reverse	tccagttcagaggtctctctgc
Cyld	Forward	tcccaggcagtgccgcatc	Cyld	Forward	tcccaggcagtgccgcatc
	Reverse	tgcttgatcttcccagctgag		Reverse	gaatggtgaagccattctgacc

Supplementary Table 1.- Sequences of the primer pairs used in the Reverse Transcriptase Real Time qPCR (left) and *in situ* hybridisation (right) including all the DUB families.

* *Gapdh*, *Rho* and *Cerkl* genes were used for normalization and reference high and low expression values, respectively.

** Genes whose *in situ* hybridisation did not yield a reproducible pattern.

NP - cases where *in situ* hybridisation was not performed, given the low expression levels detected in the RT-qPCR.