

DMD (dystrophin) cDNA Reference Sequence

Używana do opisu mutacji

(ostatnie uaktualnienie 29.11.2005)

Legenda:

Numeracja nukleotydów (zgodnie z zasadami HGVS dla kodowania sekwencji informacyjnej DNA) jest ukazana z prawej strony sekwencji, traktując „A” w „ATG” metioniny inicjalizującej translację jako "1" . Każdy 10-ty nukleotyd jest zaznaczony poprzez znak kropki "." nad sekwencją. Sekwencja białka DMD jest ukazana poniżej sekwencji kodującej DNA, z numeracją ukazaną z prawej strony sekwencji, zaczynając od 1 dla metioniny inicjalizującej translację. Każdy 10-ty aminokwas jest zaznaczony pogrubioną czcionką. Pozycja intronów jest zaznaczona pionową kreską "|", dzielącą dwa egzony. Początek pierwszego egzonu (*transcription initiation site*) jest zaznaczona poprzez "\", koniec ostatniego egzonu (*poly-A addition site*) jest zaznaczona poprzez "/". Numer egzonu jest ukazany powyżej pierwszego nukleotydu(-ów) danego egzonu. Aby pomóc w określeniu mutacji przesunięcia ramki odczytu, wszystkie **stop-kodony** w ramce+1 są zaznaczone pogrubieniem, a stop-kodony w ramce+2 zaznaczono podkreśleniem.

(upstream sequence)

exon 01 tcct -241

.
ggcatcagttactgtggtgactcactcagtggtgggatcactcactttccccctacagga -181

.
ctcagatctgggaggcaattaccttcgggagaaaaacgaataggaaaaactgaagtgttac -121

.
tttttttaagctgctgaagtttggttggtttctcattgtttttaagcctactggagcaat -61

.
aaagtttgaagaacttttaccagggttttttttatcgtgccttgatatacacttttcaaa -1

ATGCTTTGGTGGGAAGAAGTAGAGGACTGTT | 2 ATGAAAGAGAAGATGTTCAAAAAGAAAAACA 60
M L W W E E V E D C Y | E R E D V Q K K T 20

TTCACAAAATGGGTAATGCACAATTTTCTAAG | 3 TTTGGGAAGCAGCATATTGAGAACCTC 120
F T K W V N A Q F S K | F G K Q H I E N L 40

TTCAGTGACCTACAGGATGGGAGGCGCCTCCTAGACCTCCTCGAAGGCCTGACAGGGCAA 180
F S D L Q D G R R L L D L L E G L T G Q 60

AAACTG | 4 CCAAAGAAAAAGGATCCACAAGAGTTCATGCCCTGAACAATGTCAACAAGGCA 240
K L | P K E K G S T R V H A L N N V N K A 80

CTGCGGGTTTTGCAGAACAATAAT | 5 GTTGATTTAGTGAATATTGGAAGTACTGACATCGTA 300
L R V L Q N N N | V D L V N I G S T D I V 100

GATGGAATCATAAACTGACTCTTGGTTTGATTTGGAATATAATCCTCCACTGGCAG | 6 GTC 360
D G N H K L T L G L I W N I I L H W Q | V 120

AAAAATGTAATGAAAAATATCATGGCTGGATTGCAACAAACCAACAGTGAAAAGATTCTC 420
K N V M K N I M A G L Q Q T N S E K I L 140

CTGAGCTGGGTCCGACAATCAACTCGTAATTATCCACAGGTTAATGTAATCAACTTCACC 480
L S W V R Q S T R N Y P Q V N V I N F T 160

ACCAGCTGGTCTGATGGCCTGGCTTTGAATGCTCTCATCCATAGTCATAG | 7 GCCAGACCTA 540
T S W S D G L A L N A L I H S H R | P D L 180

TTTACTGGAATAGTGTGGTTTGCCAGCAGTCAGCCACACAACGACTGGAACATGCATTC 600
F D W N S V V C Q Q S A T Q R L E H A F 200

AACATCGCCAGATATCAATTAGGCATAGAGAACTACTCGATCCTGAAG | 8 ATGTTGATACC 660
N I A R Y Q L G I E K L L D P E D | V D T 220

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T Y P D K K S I L M Y I T S L F Q V L P	240
CAACAAG TGAG CATTGAAGCCATCCAGGAAGTGAAATGTTGCCAAGGCCACCTAAAAG TG	780
Q Q V S I E A I Q E V E M L P R P P K V	260
ACTAAAGAAGAACATTTT CAGTTACATCATCAAATGCACTATTCTCAACAG 9	840
T K E E H F Q L H H Q M H Y S Q Q I T V	280
AGT CTAG CACAGGGATATGAGAGA ACTTCTTCCCCTAAGCCTCGATTCAAGAGCTATGCC	900
S L A Q G Y E R T S S P K P R F K S Y A	300
TACACACAGGCTGCTTATGT CACCACCTCTGACCCTACACGGAGCCCATTTCCTTCACAG	960
Y T Q A A Y V T T S D P T R S P F P S Q	320
10	
CATTTGGAAGCTCCTGAAGACAAGTCATTTGGCAGTTCAT TGATGGAGAGTGAAGTAAAC	1020
H L E A P E D K S F G S S L M E S E V N	340
CTGGACCCTTATCAAACAGCTTT TAGAAGAAGTATTATCGTGGCTTCTTTCTGCTGAGGAC	1080
L D R Y Q T A L E E V L S W L L S A E D	360
ACATTGCAAGCACAAGGAGAGATTTCTAATGATGTGGAAGTGG TGAAAGACCAGTTTCAT	1140
T L Q A Q G E I S N D V E V V K D Q F H	380
ACTCATGAG 11	
GGGTACAT GATGGATTTGAC AGCCCATCAGGGCCGGGTTGGTAAATATTCTA	1200
T H E G Y M M D L T A H Q G R V G N I L	400
CAATTGGGAAGTAAGCT GATTGGAACAGGAAAATTATCAGAAGATGAAGAAACTGAAGTA	1260
Q L G S K L I G T G K L S E D E E T E V	420
CAAGAGCAGAT GAA TCTCCTAAATTCAAGATGGGAATGCCTCAGGG TAGCTAGCATGGAA	1320
Q E Q M N L L N S R W E C L R V A S M E	440
AAACAAAGCAA 12	
TTTACATAGAGTTT TAAT GGATCTCCAGAATCAGAAACT GAAAGAGTTG	1380
K Q S N L H R V L M D L Q N Q K L K E L	460
AATGACTGGCT TAAC AAAAACAGAAGAAAGAACAAGGAAAATGGAGGAAGAGCCTCTTGGA	1440
N D W L T K T E E R T R K M E E E P L G	480
CCTGATCTTGAAGACCT TA AACGCCAAGTACAACAACATAAG 13	1500
P D L E D L K R Q V Q Q H K V L Q E D L	500
GAACAAGAACAAGTCAGGGTCAATTCTCTCACTCACATGGTGGTGG TAGTTGATGAATCT	1560
E Q E Q V R V N S L T H M V V V V D E S	520
AGTGGAGATCAGCAACTGCTGCTTTGGAAGAACA ACTTAAG 14	1620
GTATTGGGAGATCGATGG	

S G D H A T A A L **E E** Q L K | V L G D R W 540

GCAAACATCTGTAGATGGACAGAAGACCGCTGGGTTCTTTTACAAGACATCCTTCTCAAA 1680
A N I C R W T E D **R W** V L L Q D I L L **K** 560

TGGCAACGTCTTACTGAAGAACAG | 15 TGCCTTTTITAGTGCATGGCTTTCAGAAAAAGAAGAT 1740
W Q R L T E E Q | C **L F** S A W L S E K E **D** 580

GCAG**TGA**ACAAGATTACACAACCTGGCTTTAAAGATCAAAATGAAATGTTATCAAGTCTT 1800
A V N K I H T T G **F K** D Q N E M L S S **L** 600

CAAAAAGTGGCC | 16 GTTTT**TAA**AAGCGGATCT**TAG**AAAAAGAAAAAGCAATCCATGGGCAAACTG 1860
Q K L A | V L K A D **L E** K K K Q S M G K **L** 620

TATTCACTCAAACAAGATCTTCTTTCAACACT**TGA**AGAATAAGTCAG**TGA**CCCAGAAGACG 1920
Y S L K Q D L L S **T L** K N K S V T Q K **T** 640

GAAGCATGGCTGGATAACTTTGCCCGGTGTTGGGATAATTT**TAG**TCCAAAAACTTGAAAAG 1980
E A W L D N F A R **C W** D N L V Q K L E **K** 660

AGTACAGCACAG | 17 ATTTACAGGCTGTACCACCACCTCAGCCATCACT**TAA**CACAGACAACT 2040
S T A Q | I S Q A V **T T** T Q P S L T Q T **T** 680

GTAATGGAAACAG**TAA**CTACGG**TGA**ACCACAAGGGAACAGATCCTGG**TAA**AGCATGCTCAA 2100
V M E T V T T V T **T R** E Q I L V K H A **Q** 700

GAGGAACTTCCACCACCACCTCCCCAAAAGAAGAGGCAGATTACTGTGGATTCTGAAATT 2160
E E L P P P P P Q **K K** R Q I T V D S E **I** 720

AGGAAAAG | 18 GTTGGATGTTGATAT**TAA**CTGAACTTACAGCTGGATTACTCGCTCAGAAGCT 2220
R K R | L D V D I T **E L** H S W I T R S E **A** 740

GTGTTGCAGAGTCCTGAATTTGCAATCTTTCGGAAGGAAGGCAACTTCTCAGACT**TAAAA** 2280
V L Q S P E F A I **F R** K E G N F S D L **K** 760

GAAAAAGTCAAT | 19 GCCAT**TAG**AGCGAGAAAAAGCTGAGAAGTTCAGAAAACTGCAAGATGCC 2340
E K V N | A I E R E **K A** E K F R K L Q D **A** 780

AGCAGATCAGCTCAGGCCCTGGTGGAACAGATGG**TGA**ATG | 20 AGGGTGT**TAA**TGCAGATAGC 2400
S R S A Q A L V E **Q M** V N E | G V N A D **S** 800

ATCAAACAAGCCTCAGAACAAC**TGA**ACAGCCGGTGGATCGAATTCTGCCAGTTG**CTAA**GT 2460
I K Q A S E Q L N **S R** W I E F C Q L L **S** 820

GAGAGACTTAACTGGCTGGAGTATCAGAACAACATCATCGCTTTCTATA**AT**CAGCTACAA 2520
E R L N W L E Y Q **N N** I I A F Y N Q L **Q** 840

CAATTGGAGCAGAT**TG**ACAACACTACTGCTGAAAACCTGGT**TG**AAAAATCCAACCCACCACCCCA 2580
 Q L E Q M T T T A **E** N W L K I Q P T T **P** 860

TCAGAGCCAACAGCAATTAAAAGTCAGT**T**AAAAATTTGTAAG | [21](#) GATGAAGTCAACCGGCTA 2640
 S E P T A I K S Q **L** K I C K | D E V N R **L** 880

TCAGGTCTTCAACCTCAAATTGAACGAT**T**AAAAATTCAAAGCAT**TAG**CCCT**TG**AAAGAGAAA 2700
 S G L Q P Q I E R **L** K I Q S I A L K E **K** 900

GGACAAGGACCCATGTTCTGGATGCAGACTTTGTGGCCTTTACAAATCATTTTAAGCAA 2760
 G Q G P M F L D A **D** F V A F T N H F K **Q** 920

GTCTTTTCTGATGTGCAGGCCAGAGAGAAAGAGCTACAGACAA | [22](#) TTTT**TG**ACACTTTGCCA 2820
 V F S D V Q A R E **K** E L Q T I | F D T L **P** 940

CCAATGCGCTATCAGGAGACCAT**TG**AGTGCCATCAGGACATGGGTCCAGCAGTCAGAAACC 2880
 P M R Y Q E T M S **A** I R T W V Q Q S E **T** 960

AAActCTCCATACCTCAACTTAGTGTACCGACTATGAAATCATGGAGCAGAGACTCGGG 2940
 K L S I P Q L S V **T** D Y E I M E Q R L **G** 980

GAATTGCAG | [23](#) GCTTTACAAAGTTCTCTGCAAGAGCAACAAAGTGGCCTATACTATCTCAGC 3000
 E L Q | A L Q S S L **Q** E Q Q S G L Y Y L **S** 1000

ACCACTG**TG**AAAGAGATGTCTGAAGAAAGCGCCCTCTGAAATTAGCCGGAAATATCAATCA 3060
 T T V K E M S K K **A** P S E I S R K Y Q **S** 1020

GAATTTGAAGAAATTGAGGGACGCTGGAAGAAGCTCTCCTCCCAGCTGGTTGAGCATTGT 3120
 E F E E I E G R W **K** K L S S Q L V E H **C** 1040

CAAAGCT**TAG**AGGAGCAAAT**GA**ATAAACTCCGAAAAATTCAG | [24](#) AATCACATACAAACCT**TG** 3180
 Q K L E E Q M N K **L** R K I Q | N H I Q T **L** 1060

AAGAAATGGATGGCTGAAGTTGATGTTTTTCT**TG**AAGGAGGAATGGCCTGCCCTTGGGGAT 3240
 K K W M A E V D V **F** L K E E W P A L G **D** 1080

TCAGAAATTC**T**AAAAAGCAGCT**TG**AAACAGTGCAGA | [25](#) CTTT**TAG**TCAGTGATATTCAGACA 3300
 S E I L K K Q L K **Q** C R | L L V S D I Q **T** 1100

ATTCAGCCCAGTCT**TAA**ACAGTGTCAATGAAGGTGGGCAGAAGAT**TAA**AGAATGAAGCAGAG 3360
 I Q P S L N S V N **E** G G Q K I K N E A **E** 1120

CCAGAGTTTGTCTTCGAGACTTTGAGACAGAACTCAAAGAACT**TAA**CACTCAGTGGGATCAC 3420
 P E F A S R L E T **E** L K E L N T Q W D **H** 1140

ATGTGCCAACAG		26	GTCTATGCCAGAAAGGAGGCCT TGA AGGGAGGTTTGGAGAAA ACTGTA	3480
M C Q Q			V Y A R K E A L K G G L E K T V	1160
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S L Q K D L S E M H E W M T Q A E E E Y				1180
CTTGAGAGAGATTTTGAATATAAA ACTCCAGATGA ATTACAGAAAGCAGTTGAAGAGAT G				3600
L E R D F E Y K T P D E L Q K A V E E M				1200
AAG		27	AGAGCTAAAGAAGAGGCCCAACAAAAAGAAGCGAAAG TGA AACTCCTTACTGAGTCT	3660
K			R A K E E A Q Q K E A K V K L L T E S	1220
GTA AATAGTGT CATAG CTCAAGCTCCACCT GTAG CACAAGAGGCCT TAAAA AGGAACTT				3720
V N S V I A Q A P P V A Q E A L K K E L				1240
GAAACT CTAA ACCACCAACTACCAGTGGCTCTGCACTAGG CTGA ATGGGAAATGCAAGACT				3780
E T L T T N Y Q W L C T R L N G K C K T				1260
TTGGAA		28	GAAGTTTGGGCATGTTGGCATGAGTTATTGTCATACTTGGAGAAAGCAAACAAG	3840
L E			E V W A C W H E L L S Y L E K A N K	1280
TGG CTAA ATGAAG TAGA ATTTAA ACTTAAAA CCACTGAAACATTCTGGCGGAGCTGAG				3900
W L N E V E F K L K T T E N I P G G A E				1300
GAAATCTCTGAGGTGCT TAG AT		29	TCACTTGA AAA ATTT TG ATGCGACATTCAGAGGATA ACCCA	3960
E I S E V L D			S L E N L M R H S E D N P	1320
AATCAGATTGCGATATTGGCACAGACCC TAA CAGATGGCGGAGTCATGGATGAGCT TAA T				4020
N Q I R I L A Q T L T D G G V M D E L I				1340
AATGAGGA ACTTGAG ACATTTAATTCTCGTTGGAGGGA ACTTACATGA AGAG		30	GCT GTAA GG	4080
N E E L E T F N S R W R E L H E E			A V R	1360
AGGCAAAGTTGCTTGAACAGAGCATCCAGTCTGCC CAGGAGACTG AAAAATCCTTACAC				4140
R Q K L L E Q S I Q S A Q E T E K S L H				1380
TTA ATCCAGGAGTCCCTCACATTCATTG ACA AGCAGTTGGCAGCTTATATTGCAGACAAG				4200
L I Q E S L T F I D K Q L A A Y I A D K				1400
GTGGACGCAGCTCAAATGCCTCAGGAAGCCCAG		31	AAAATCCAATCTG ATT T GAC AAAGTCAT	4260
V D A A Q M P Q E A Q			K I Q S D L T S H	1420
GAGATCAGTT TAGA A AAATGA A AAACATA ATCAGGGGAAGGAGGCTGCC CAA AGAGTC				4320
E I S L E E M K K H N Q G K E A A Q R V				1440
		32		

CTGTCTCAGATTGATGTTGCACAG AAAAAATTACAAGATGTCTCCATGAAGTTTCGATTA	4380
L S Q I D V A Q K K L Q D V S M K F R L	1460
TTCCAGAAACCAGCCAATTTTGAGCAGCGTCTACAAGAAAGTAAGATGATTTTAGATGAA	4440
F Q K P A N F E Q R L Q E S K M I L D E	1480
GTGAAGATGCACCTTGCCTGCATTGGAAACAAAGAGTGTGGAACAGGAAGTAGTACAGTCA	4500
V K M H L P A L E T K S V E Q E V V Q S	1500
CAGCTAAATCATTGTGTG 33	4560
Q L N H C V AACTTGTATAAAAAGTCTGAGTGAAGTGAAGTCTGAAAGTGGAA	1520
N L Y K S L S E V K S E V E	
ATGGTGATAAAGACTGGACGTGATGATGTACAGAAAAAGCAGACGGAAAAATCCCAAAGAA	4620
M V I K T G R Q I V Q K K Q T E N P K E	1540
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L D E R V T A L K L H Y N E L G A K GTAACA	1560
V T	
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E R K Q Q L E K C L K L S R K M R K E M	1580
AATGTCTTGAACAGAATGGCTGGCAGCTACAGATATGGAATTGACAAAGAGATCAGCAGTT	4800
N V L T E W L A A T D M E L T K R S A V	1600
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E G M P S N L D S E V A W G K GCTACTCAAAAAGAG	1620
A T Q K E	
ATTGAGAAACAGAAGGTGCACCTGAAGAGTATCACAGAGGTAGGAGAGGCCTTGAAAAACA	4920
I E K Q K V H L K S I T E V G E A L K T	1640
GTTTTGGGCAAGAAGGAGACGTTGGTGAAGATAAACTCAGTCTTCTGAATAGTAACTGG	4980
V L G K K E T L V E D K L S L L N S N W	1660
ATAGCTGTACCTCCCGAGCAGAAGAGTGGTTAAATCTTTTGTG 36	5040
I A V T S R A E E W L N L L L GAATACCAGAAACAC	1680
E Y Q K H	
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M E T F D Q N V D H I T K W I I Q A D T	1700
CTTTTGGATGAATCAGAGAAAAAGAAACCCAGCAAAAAGAAGACGTGCTTAAG 37	5160
L L D E S E K K K P Q Q K E D V L K CGTTTA	1720
R L	
AAGGCAGAACTGAATGACATACGCCAAAGGTGGACTCTACCGTGACCAAGCAGCAAAC	5220
K A E L N D I R P K V D S T R D Q A A N	1740
TTGATGGCAAACCGCGGTGACCACTGCAGGAAATTAGTAGAGCCCCAAATCTCAGAGCTC	5280

L M A N R G D H C R K L V E P Q I S E L 1760

AACCATCGATTTGCAGCCATTTACACAGAATTAAGACTGGAAAG | [38](#) GCCTCCATTCTTTG 5340
N H R F A A I S H R I K T G K | A S I P L 1780

AAGGAATTGGAGCAGTTTAACTCAGATATACAAAAATTGCTTGAACCACTGGAGGCTGAA 5400
K E L E Q F N S D I Q K L L E P L E A E 1800

ATTCAGCAGGGGTGAATCTGAAAGAGGAAGACTTCAATAAAGATATG | [39](#) AATGAAGACAAT 5460
I Q Q G V N L K E E D F N K D M | N E D N 1820

GAGGGTACTGTAAAAGAATTGTTGCAAAGAGGAGACAACCTTACAACAAAGAATCACAGAT 5520
E G T V K E L L Q R G D N L Q Q R I T D 1840

GAGAGAAAGCGAGAGGAAATAAAGATAAAACAGCAGCTGTTACAGACAAAACATAATGCT 5580
E R K R E E I K I K Q Q L L Q T K H N A 1860

CTCAAG | [40](#) GATTGAGGTCTCAAAGAAGAAAAAGGCTCTAGAAATTTCTCATCAGTGGTAT 5640
L K | D L R S Q R R K K A L E I S H Q W Y 1880

CAGTACAAGAGGCAGGCTGATGATCTCCTGAAATGCTTGATGACATTGAAAAAAAAATTA 5700
Q Y K R Q A D D L L K C L D D I E K K L 1900

GCCAGCTACCTGAGCCAGAGATGAAAGGAAAAATAAG | [41](#) GAAATTGATCGGGAATTGCAG 5760
A S L P E P R D E R K I K | E I D R E L Q 1920

AAGAAGAAAGAGGAGCTGAATGCAGTGCCTAGGCAAGCTGAGGGCTTGTCTGAGGATGGG 5820
K K K E E L N A V R R Q A E G L S E D G 1940

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A A M A V E P T Q I Q L S K R W R E I E 1960

AGCAAATTTGCTCAGTTTGAAGACTCAACTTTGCACAAATT | [42](#) CAACTGTCCGTGAAGAA 5940
S K F A Q F R R L N F A Q I | H T V R E E 1980

ACGATGATGGTGAATGACTGAAGACATGCCTTTGGAAATTTCTTATGTGCCTTCTACTTAT 6000
T M M V M T E D M P L E I S Y V P S T Y 2000

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L T E I T H V S Q A L L E V E Q L L N A 2020

CCTGACCTCTGTGCTAAGGACTTTGAAGATCTCTTTAAGCAAGAGGAGTCTCTGAAG | [43](#) AAT 6120
P D L C A K D F E D L F K Q E E S L K | N 2040

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I K D S L Q Q S S G R I D I I H S K K T 2060

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L D F Q W E K V N K M Y K D R Q G	2100
	44
AGATCTGTTGAGAAATGGCGGCGTTTTTCATTATGATATA TAA AGATATTTAATCAGTGGCTA	6360
R S V E K W R R F H Y D I K I F N Q W L	2120
AC AGAAGCTGAACAGTTTTCTCAGAAAGACACAAATTCCTGAGAATTGGGAACATGCTAAA	6420
T E A E Q F L R K T Q I P E N W E H A K	2140
TACAAATGGTATCTTAAG	6480
Y K W Y L K	2160
	45
GAAGCTCCAGGATGGCATTGGGCAGCGGCAAACCTGTTGTCAGA	6480
E L Q D G I G Q R Q T V V R	2160
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T L N A T G E E I I Q Q S S K T D A S I	2180
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L Q E K L G S L N L R W Q E V C K Q L S	2200
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D R K K R	2220
	46
GCT TGA AAGAACAAGAATATCTTGTGAGAATTTCAAAGAGATTTA	6660
L E E Q K N I L S E F Q R D L	2220
AATGA ATTTGTTTTATGGTTGGAGGAAGCAGATAACATTGCTAGTATCCCAGCTTGAACCT	6720
N E F V L W L E E A D N I A S I P L E P	2240
GGAAAAGAGCAGCAACT TAA AAGAAAAGCTTGAGCAAGTCAAG	6780
G K E Q Q L K E K L E Q V K	2260
	47
TACTGGTGGAAAGAGTTG	6780
L L V E E L	2260
CCCCTGCGCCAGGGAATTTCTCAAACAAT TAA ATGAACTGGAGGACCCGTGCTTGT TAAG T	6840
P L R Q G I L K Q L N E T G G P V L V S	2280
GCTCCCA TAA GCCCAAGAGCAAGATAAACTTGAAAATAAGCTCAAGCAGACAAATCTC	6900
A P I S P E E Q D K L E N K L K Q T N L	2300
CAGTGGATA AAAG	6960
Q W I K	2320
	48
GTTTCCAGAGCTTTACCTGAGAAACAAGGAGAAAT TGA AGCTCAAATA	6960
V S R A L P E K Q G E I E A Q I	2320
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K D L G Q L E K K L E D L E E Q L N H L	2340
CTGCTGTGGTTATCTCCTATTAGGAATCAGTTGGAAATTTATAACCAACCAACCAAGAA	7080
L L W L S P I R N Q L E I Y N Q P N Q E	2360

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G P F D V Q E T E I A V Q A K Q P D V E		2380
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E I L S K G Q H L Y K E K P A T Q P V K		2400
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R K L E D L S S E W K A V N R L L Q E L		2420
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R A K Q P D L A P G L T T I G A S P T Q		2440
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T V T L V T Q P V V T K E T A I S K L E		2460
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M P S S L M L E V P A L A D F N R A W T		2480
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E L T D W L S L L D Q V I K S Q R V M V		2500
GGTGACCTTGAGGATATCAACGAGATGATCATCAAGCAGAAG 52	GCAACAATGCAGGATTTG	7560
G D L E D I N E M I I K Q K A T M Q D L		2520
GAACAGAGGCGTCCCCAGTTGGAAGAACTCATTACCGCTGCCCAAAATTTGAAAAACAAG		7620
E Q R R P Q L E E L I T A A Q N L K N K		2540
ACCAGCAATCAAGAGGCTAGAACAATCATTACGGATCGAA 53	TTGAAAAGAATTCAGAATCAG	7680
T S N Q E A R T I I T D R I E R I Q N Q		2560
TGGGATGAAGTACAAGAACACCTTCAGAACCAGGAGGCAACAGTTGAATGAAATGTTAAAG		7740
W D E V Q E H L Q N R R Q Q L N E M L K		2580
GATTCAACACAATGGCTGGAAGCTAAGGAAGAAGCTGAGCAGGTCTTAGGACAGGCCAGA		7800
D S T Q W L E A K E E A E Q V L G Q A R		2600
GCCAAGCTTGAGTCATGGAAGGAGGGTCCCTATACAGTAGATGCAATCCAAAAGAAAATC		7860
A K L E S W K E G P Y T V D A I Q K K I		2620
ACAGAAACCAAG 54	CAGTTGGCCAAAGACCTCCGCCAGTGGCAGACAAATGTAGATGTGGCA	7920
T E T K Q L A K D L R Q W Q T N V D V A		2640
AATGACTTGGCCCTGAAACTTCTCCGGGATTATTCTGCAGATGATACCAGAAAAGTCCAC		7980
N D L A L K L L R D Y S A D D T R K V H		2660
	55	

ATGATAACAGAGAATATCAATGCCTCTTGGAGAAGCATTTCATAAAAAG GGTGAGTGAGCGA	8040
M I T E N I N A S W R S I H K R V S E R	2680
GAGGCTGCTTTGGAAGAACTCATAGATTACTGCAACAGTTCCCCCTGGACCTGGAAAAG	8100
E A A L E E T H R L L Q Q F P L D L E K	2700
TTTCTTGCCTGGCTTACAGAAGCTGAAACAACCTGCCAATGTCTACAGGATGCTACCCGT	8160
F L A W L T E A E T T A N V L Q D A T R	2720
AAGGAAAGGCTCCTAGAAAGACTCCAAGGGAGTAAAAGAGCTGATGAAACAATGGCAA 56.	8220
K E R L L E D S K G V K E L M K Q W Q GAC	2740
CTCCAAGGTGAAATTGAAGCTCACACAGATGTTTATCACAACCTGGATGAAAACAGCCAA	8280
L Q G E I E A H T D V Y H N L D E N S Q	2760
AAAATCCTGAGATCCCTGGAAGGTTCCGATGATGCAGTCCTGTTACAAAAGACGTTTGGAT	8340
K I L R S L E G S D D A V L L Q R R L D	2780
AACATGAACTTCAAGTGGAGTGAAGTTCGGAAAAAGTCTCTCAACATTAG 57.	8400
N M N F K W S E L R K K S L N I R GTCCATTG	2800
GAAGCCAGTTCTGACCAGTGAAGCGTCTGCACCTTTCTCTGCAGGAACTTCTGGTGTGG	8460
E A S S D Q W K R L H L S L Q E L L V W	2820
CTACAGCTGAAAGATGATGAATTAAAGCCGGCAGGCACCTATTGGAGGCGACTTTCAGCA	8520
L Q L K D D E L S R Q A P I G G D F P A	2840
GTTCAGAAGCAGAACGATGTACATAGG 58.	8580
V Q K Q N D V H R GCCTTCAAGAGGGAATTGAAAACATAAAGAACCT	2860
GTAATCATGAGTACTCTTGAGACTGTACGAATATTTCTGACAGAGCAGCCTTTGGAAGGA	8640
V I M S T L E T V R I F L T E Q P L E G	2880
CTAGAGAACTCTACCAGGAGCCAGAG 59.	8700
L E K L Y Q E P R E AGCTGCCTCCTGAGGAGAGAGCCAGAAATGTC	2900
ACTCGGCTTCTACGAAAGCAGGCTGAGGAGGTCAATACTGAGTGGAAAAAATTGAACCTG	8760
T R L L R K Q A E E V N T E W E K L N L	2920
CACTCCGCTGACTGGCAGAGAAAAATAGATGAGACCCTTGAAAGACTCCAGGAACTTCAA	8820
H S A D W Q R K I D E T L E R L Q E L Q	2940
GAGGCCACGGATGAGCTGGACCTCAAGCTGCGCCAAGCTGAGGTGATCAAGGGATCCTGG	8880
E A T D E L D L K L R Q A E V I K G S W	2960
CAGCCCGTGGGCGATCTCCTCATTGACTCTCTCCAAGATCACCTCGAGAAAGTCAAG 60.	8940
	GCA

Q P V G D L L I D S L Q D H L E K V K | A 2980
 CTTTCGAGGAGAAATTGCGCCTCT**TGAAAGAGAACGTGAGCCACGTCAATGACCTTGCTCGC** 9000
 L R G E I A P L K E N V S H V N D L A R 3000
 CAGCTTACCACCTTTGGGCATTTCAGCTCTCACCGTATAACCTCAGCACTCTGGAAGACCT**G** 9060
 Q L T T L G I Q L S P Y N L S T L E D L 3020
 AACACCAGATGGAAGCTTCTGCAG | [61](#) GTGGCCGTCGAGGACCGAGTCAGGCAGCTGCATGAA 9120
 N T R W K L L Q | V A V E D R V R Q L H E 3040
 GCCCACAGGGACTTTGGTCCAGCATCTCAGCACTTTCTTTCCA | [62](#) CGTCTGTCCAGGGTCCC 9180
 A H R D F G P A S Q H F L S T | S V Q G P 3060
 TGGGAGAGAGCCATCTCGCCAAACAAAGTGCCCTACTATATCAA | [63](#) CCACGAGACTCAAACA 9240
 W E R A I S P N K V P Y Y I N | H E T Q T 3080
 ACTTGCTGGGACCATCCCAAAAT**TGACAGAGCTCTACCAGTCTTTAG** | [64](#) CTGACCTGAATAAT 9300
 T C W D H P K M T E L Y Q S L A | D L N N 3100
 GTCAGATTCTCAGCTTATAGGACTGCCAT**TGAAACTCCGAAGACTGCAGAAGGCCCTTTGC** 9360
 V R F S A Y R T A M K L R R L Q K A L C 3120
 T | [65](#) TGGATCTCT**TGAGCCTGT**CAGCTGCATGTGATGCCTTGGACCAGCACAACTCAAGCAA 9420
 L | D L L S L S A A C D A L D Q H N L K Q 3140
 AATGACCAGCCCATGGATATCCTGCAGATTATTAATTGTT**TGACCACTATTTATGACCGC** 9480
 N D Q P M D I L Q I I N C L T T I Y D R 3160
 CTGGAGCAAGAGCACAACAATTTGGTCAACGTCCCTCTCTGCGTGGATATGTGTCT**TGAAC** 9540
 L E Q E H N N L V N V P L C V D M C L N 3180
 TGGCTGCT**TGAATGTTTATGATAC** | [66](#) GGGACGAACAGGGAGGATCCGTGTCTCTTTTAAA 9600
 W L L N V Y D T | G R T G R I R V L S F K 3200
 ACTGGCATCATTTCCTGTGTAAAGCACATTTGGAAGACAAGTACAGAT | [67](#) ACCTTTTCAAG 9660
 T G I I S L C K A H L E D K Y R Y | L F K 3220
 CAAGTGGCAAGTTCAACAGGATTTTGTGACCAGCGCAGGCTGGGCCTCCTTCTGCATGAT 9720
 Q V A S S T G F C D Q R R L G L L L H D 3240
 TCTATCCAAATTCCAAGACAGTTGGGTGAAGTTGCATCCTTTGGGGGCAGTAAACATTGAG 9780
 S I Q I P R Q L G E V A S F G G S N I E 3260
 CCAAGTGTCCGGAGCTGCTTCCAATTT | [68](#) GCTAATAATAAGCCAGAGATCGAAGCGGCCCTC 9840
 P S V R S C F Q F | A N N K P E I E A A L 3280

TTCC TAG ACTGGAT AG ACTGGAACCCAGTCCATGGTGTGGCTGCCCGTCCTGCACAGA	9900
F L D W M R L E P Q S M V W L P V L H R	3300
GTGGCTGCTGCAGAACTGCCAAGCATCAGGCCAAATG TAA CATCTGCAAAGAGTGTCCA	9960
V A A A E T A K H Q A K C N I C K E C P	3320
ATCATTGGATTCAG 69 GTACAGGAGT CTAA AGCACTTTAATTATGACATCTGCCAAAGCTGC	10020
I I G F R Y R S L K H F N Y D I C Q S C	3340
TTTTTTTCTGGTCGAGTTGCAAAAGGCCATAAAATGCACTATCCCATGGTGGAAATATTGC	10080
F F S G R V A K G H K M H Y P M V E Y C	3360
ACTCCG 70 ACTACATCAGGAGAAGATGTTTCGAGACTTTGCCAAGGTACT TAAAAA CAAATTT	10140
T P T T S G E D V R D F A K V L K N K F	3380
CGAACCAAAAGGTATTTTGCGAAGCATCCCCGAATGGGCTACCTGCCAGTGCAGACTGTC	10200
R T K R Y F A K H P R M G Y L P V Q T V	3400
TTAG AGGGGGACAACATGGAAAC 71 TCCCGTTACT CTGAT CAACTTCTGGCCAG TAG ATTCT	10260
L E G D N M E T P V T L I N F W P V D S	3420
GC 72 GCCTGCCTCGTCCCCTCAGCTTTACACGATGATACTCATTACGCATTGAAACATTAT	10320
A P A S S P Q L S H D D T H S R I E H Y	3440
GCTAGCAG 73 GCT TAG CAGAAATGGAAAACAGCAATGGATCTTATCT TAAAT GATAGCATCTCT	10380
A S R L A E M E N S N G S Y L N D S I S	3460
CCTAATGAGAGCAT 74 AGAT GATGAACATTTGTT TAA TCCAGCATTACTGCCAAAGTT TGA AC	10440
P N E S I D D E H L L I Q H Y C Q S L N	3480
CAGGACTCCCCCT TGAG CCAGCCTCGTAGTCCTGCCAGATCT TGAT TTCC TAG AGAGT	10500
Q D S P L S Q P R S P A Q I L I S L E S	3500
GAGGAAAGAGGGGAGCT TAG AGAGAATCCT TAG CAGATCTTGAGGAAGAAAAACAG 75 GAATCTG	10560
E E R G E L E R I L A D L E E E N R N L	3520
CAAGCAGAATATGACCGTCT TAA AGCAGCAGCACGAACATAAAAGGCCTGTCCCCACTGCCG	10620
Q A E Y D R L K Q Q H E H K G L S P L P	3540
TCCCCTCCTGAAAT TGA TGCCACCTCTCCCCAGAGTCCCCGGGATGCTGAGCTCATTGCT	10680
S P P E M M P T S P Q S P R D A E L I A	3560
GAGCCAAGCTACTGCGTCAACACAAAGGCCCGCCTGGAAGCCAGGATGCAAATCCTGGAA	10740
E A K L L R Q H K G R L E A R M Q I L E	3580

GACCACAATAAACAGCTGGAGTGCACAGTTACACAGGCT**TAAGGC**CAGCTGCTGGAGCAA | [76.](#) 10800
D H N K Q L E S Q L H R L R Q L L E Q | CCC 3600
P

CAGGCAGAGGCCAAAG**TGA**ATGGCACAACGGTGTCTCTCTCTACCTCTCTACAGAGG 10860
Q A E A K V N G T T V S S P S T S L Q R 3620

TCCGACAGCAGTCAGCCTATGCTGCTCCGAGTGGTTGGCAGTCAAACCTCGGACTCCATG 10920
S D S S Q P M L L R V V G S Q T S D S M 3640

| [77](#) . 10980
G | GTGAGGAAGATCTTCTCAGTCCTCCCCAGGACACAAGCACAGGGT**TAG**AGGAGGT**GATG** 3660
G | E E D L L S P P Q D T S T G L E E V M

GAGCAACTCAACAACCTCCTTCCCTAGTTCAAGAG | [78](#) . 11040
E Q L N N S F P S S R G | GAAGAAATACCCCTGGAAAGCCAATG 3680
R N T P G K P M

AGAGAG | [79](#) . 11058
R E / GACACAATGTAG
D T M * 3685
H N V G

gaagtctttccacatggcagat**tg**atttgggcagagcgatggagtccttagtatcagtca *60
S L F H M A D D L G R A M E S L V S V M

tgacagat**tg**aagaaggagcagaataaatgttttacaactcctgattccccgcattggttttt *120
T D E E G A E *
(C-terminal end ancient dystrophin, -ex78 transcript)

ataatattcatacaacaaagaggatt**tag**acagtaagagtttacaagaaataaatctatat *180

ttttgtgaagggtagtggtattatactg**tag**atttcagtagtttctaagtctgttattgt *240

tttgttaacaatggcaggttttacacgtctatgcaattgtacaaaaagttataagaaaa *300

ctacatg**taa**aatcttgatagct**taa**ataaacttgccatttctttatatggaacgcattttg *360

ggttgtt**taa**aaatttataacagttataaagaaagattgtaaaactaaagtgtgctttata *420

aaaaaaagttgtttataaaaaaccct**taa**aaaacaaaacacacacacacacacataca *480

cacacacacacaaaaactttgagggcagcgcattgttttgcatccttttggcgtgatatcca *540

tatgaaattcatggctttttctttttttgcatat**taa**agataagacttcctctaccacca *600

caccaa**tg**actactacacactgctcatttgagaactgtcagct**tg**agtggggcaggct**tg** *660

agttttcatttcatatatctatatgtctataaagtatata**taa**atactatagttatatagata *720
 aagagatacgaatttctatagactgactttttccattttt**taa**atgttcatgtcacatcc *780
 taatagaaagaaattacttctagtcagtcacccagggttacctgcttggcttagaatgga *840
 tttttcccgagccggaagccaggaggaaactacaccacactaaaacattgtctacagct *900
 ccagatgttttctattttaaacaactttccactgacaacgaaagtaaag**taa**agtattgg *960
 atttttt**taa**agggaacatgtgaatgaatacacaggacttattatatcagag**tgag**taat *1020
 cggttggttgggttgattgattgattgattgatacattcagcttctctgctgctagcaatgc *1080
 cacgatttagatt**taatga**tgcttcagtggaatcaatcagaaggattctgaccttg**tg** *1140
 aacatcagaaggatttttt**taa**ctcccaagcagtagcaggacgatgatagggctggaggg *1200
 ctatggattcccagcccatccctgtgaaggagtaggccactcttaagtgaaggattgga *1260
 tgattgttcat**aa**atacataaaagttctctgtaaattacaactaaattattatgccctcttct *1320
 cacagtcaaaaggaactgggtggtttggttttggcttttt**tag**atttattgtccat *1380
 gtgggatgagtttttaaatgccacaagacataatttaaaa**taa**ataaaactttgggaaaag *1440
 gtgtaaaacagtagcccatcacattt**tg**atact**ga**caggtatcaaccagaagccat *1500
 gaactgtgtttccatcctttgcatttctctgagtagttccacacaggtttgtaagtaa *1560
 g**taa**gaaagaaggcaaattgattcaaatgttacaaaaaaccttcttgggtggatt**tag**ac *1620
 aggt**taa**atataaaacaaacaaacaaaaattgctcaaaaaagaggagaaaagctcaaga *1680
 ggaaaagctaaggactggttaggaaaaagctttactctttcatgccattttatttcttttt *1740
 gatttttaaatcattcattcaat**tag**ataccaccgtgtgacctata**taa**ttttgcaaatctgt *1800
 tacctctgacatcaagtgtaat**tag**cttttggagagtgggctgacatcaagtgtaaatag *1860
 cttttggagagtgggttttgtccattat**taataa**taattaatt**taa**catcaaacacggct *1920

tctcatgctat[.]tttctac[.]ctcact[.]tttgg[.]tttgg[.]gggtg[.]ttc[.]ctg[.]ata[.]attg[.]tgcacac[.]ctg *1980

ag[.]ttcacag[.]cttcacc[.]actt[.]gtcc[.]attg[.]cg[.]ttat[.]ttt[.]ct[.]ttt[.]ct[.]ttt[.]ata[.]att[.]ct[.]ttt[.]ct *2040

tt[.]ttc[.]ctt[.]cat[.]ta[.]att[.]ttt[.]caa[.]aag[.]aaa[.]acc[.]caa[.]ag[.]ctc[.]ta[.]agg[.]ta[.]aca[.]att[.]acca[.]aatta *2100

cat[.]ga[.]ag[.]att[.]gg[.]ttt[.]gt[.]ctt[.]gc[.]att[.]ttt[.]ct[.]ttt[.]at[.]gt[.]gac[.]g[.]ctgg[.]ac[.]ctt[.]tt[.]ctt *2160

tac[.]cca[.]agg[.]att[.]ttt[.]aaa[.]act[.]cag[.]att[.]taa[.]aca[.]agg[.]gg[.]ttact[.]tt[.]acat[.]cctact[.]ta[.]aga *2220

ag[.]ttt[.]ta[.]ag[.]ta[.]ag[.]ta[.]ag[.]ttt[.]catt[.]ct[.]aaa[.]at[.]cag[.]agg[.]ta[.]aat[.]tag[.]ag[.]tgc[.]ata[.]ata[.]att[.]ttt *2280

gt[.]ttt[.]ta[.]at[.]ct[.]ttt[.]gt[.]ttt[.]ct[.]ttt[.]tag[.]acac[.]att[.]ag[.]ct[.]ct[.]gg[.]ag[.]t[.]gag[.]t[.]ct[.]gt[.]cat[.]ata *2340

tt[.]ga[.]acaaa[.]aat[.]tg[.]ag[.]ag[.]ct[.]ttt[.]att[.]g[.]ct[.]gc[.]att[.]tt[.]a[.]ag[.]cata[.]atta[.]att[.]gg[.]acatt[.]at *2400

tt[.]cg[.]tgt[.]gt[.]gt[.]tt[.]ct[.]tt[.]tata[.]acc[.]acca[.]ag[.]tatt[.]aa[.]act[.]g[.]taa[.]at[.]cata[.]at[.]g[.]ta[.]act[.]ga[.]ag *2460

cata[.]aa[.]acat[.]cacat[.]gg[.]cat[.]gt[.]ttt[.]gt[.]catt[.]gt[.]ttt[.]cag[.]g[.]tact[.]gag[.]tt[.]ctt[.]act[.]tg[.]ag[.]ta *2520

tcata[.]atat[.]att[.]gt[.]gt[.]ttt[.]aa[.]cacca[.]acact[.]g[.]ta[.]acatt[.]tac[.]ga[.]att[.]att[.]ttt[.]ttt[.]aa[.]act *2580

tcag[.]ttt[.]tact[.]gc[.]att[.]ttc[.]aca[.]acat[.]at[.]cag[.]act[.]tcac[.]caaat[.]atat[.]gc[.]cctt[.]act[.]att[.]gt *2640

att[.]at[.]tag[.]tact[.]g[.]ctt[.]tact[.]gt[.]gt[.]at[.]ct[.]ca[.]ata[.]aag[.]cac[.]gc[.]cag[.]ttat[.]gt[.]tac *2691

([downstream sequence](#))