

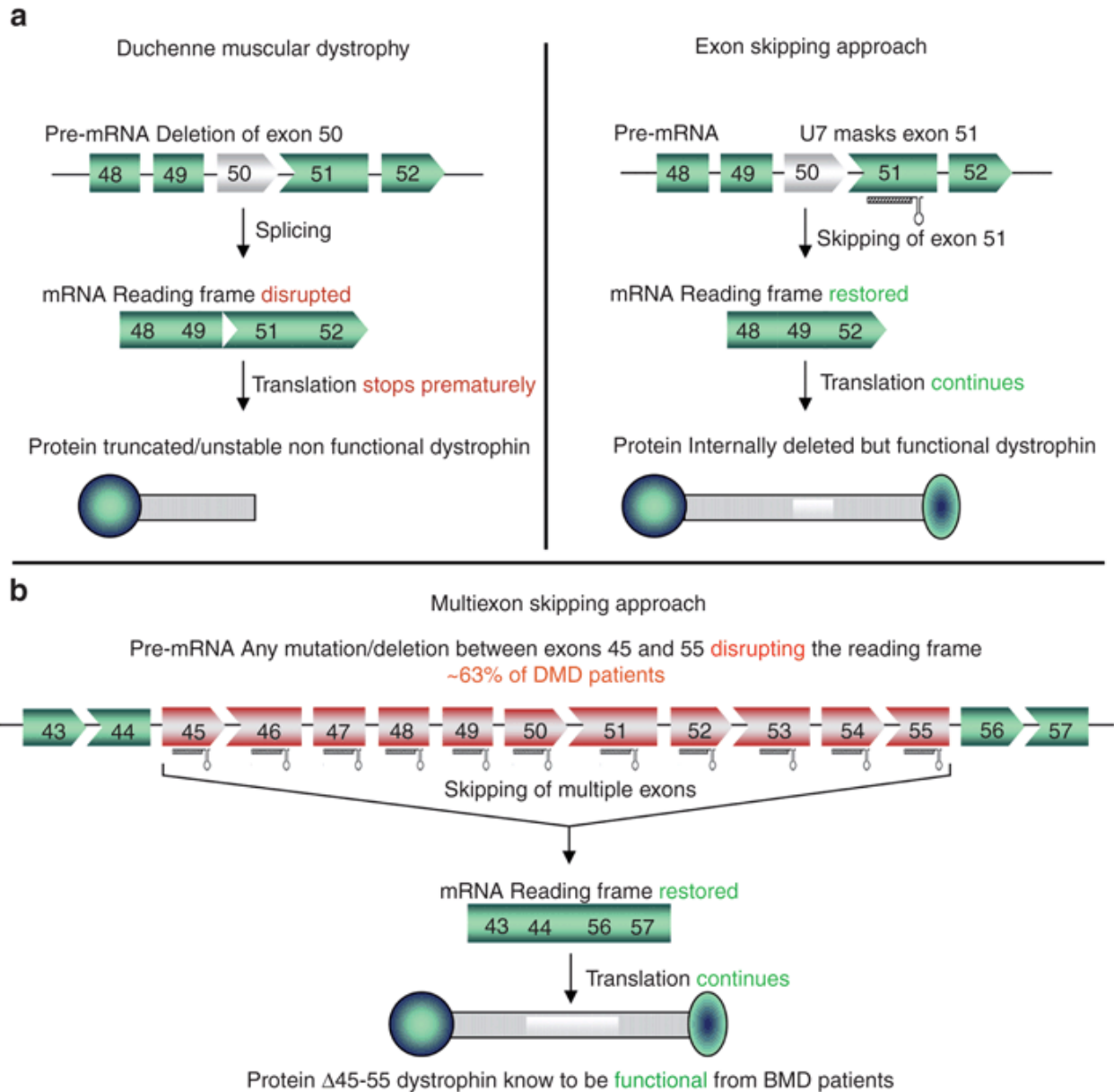
Engineering muscle cells

OUTLINE

- I. Why and how would you engineer muscles
- II. Example 1: myosin types I, IIa, and IIx
- III. Example 2: dystrophin protein (connects actin with proteins on inside of cell membrane)

B -2a	MSSDQEMAI FGEAAPYL RKSEKERIEAQN KPFDAKTSV FVAEPKESFVKGTIQSREGGKVT VKTEGGATLTVKEDQV FPMNPPKFDKIEDMAMMTHLHEP	100
B -2x	..... V..... D..... A. V..... A... A... V.....	100
B -slow	. VDA-... A..... L... TR... L. KD... PDD... E... A... L..... AE... H. K. V..... LQQ..... L. F....	99
B -2a	AVLYNLKERYAAWMIYTYSGLFCVTVPYKWL PVYNPEVVTAYRGKKRQEAPPHIFSISDNAYQFMLTDRENQSILITGESGAGKT VNTKRVIQYFATIA	200
B -2x	..... A.....	200
B -slow	..... S..... I..... A... A..... S..... Y..... V..	199
	Loop 1	
B -2a	VTGDKKKEEITS GKIQC TLEDQIISANPLLEAFGN AKTVRNDNSSRF GKFIRIHFGTTGKLASAD IETYLLEKSRVTFQLKAERSYHIF YQITSNRKPEL	300
B -2x	... E... P... M..... M. K....	300
B -slow	AI... RS. K. QAT... Q... A..... A..... I..... D..... L. K....	297
B -2a	IEMLLITTPYDYPFISQGEISVASIDDQEELIATDSA IDILGFTNEEKVSIYKLTGAVMHYGNL KFKQKQREEQAE PDGTEVADKAAYLQSLNSADLLK	400
B -2x	..... AYV..... T. P..... M..... E..... SD. R..... G.....	400
B -slow	LD..... N..... A..... TT..... A... M... N. F. V... T... N. M..... I... F... M... L..... E... S... MG.....	397
B -2a	ALCYPRVKVGN EYVTKGQTV EQVTNAVGALAKAVY EKMLWMVARINQQLDTKQPROYF IGVLDIAGFEIFDFNSLEQLCINFTNEK LQQFFNHMFVLE	500
B -2x	..... F..... Y..... D.....	500
B -slow	G... H..... N. Q... VY. K..... R... N... T... AT. E..... F.....	497
B -2a	QE EYKREGIEWTFIDFGMDLAACIELIEKPMGIFS ILEEECMFPKATDMSFKNKLYDQHLGKSANFQKPKVVKGKPEAHFAL IHYAGVVDYNTGWLEKN	600
B -2x	..... K... E..... E..... N..... PA... A... S..... T..... D... 600	
B -slow	..... K... E..... Q... D..... M..... T... A... F. N..... S..... RNI..... S..... T..... I... Q... 597	
	Loop 2	
B -2a	KDPLNDTVVGLYQKSALKTLAFLSGTPTGDSEASGGTKKGGKGGSSHQTVSALFRENLNKLM TNLRSTHPHFVRCIIPNETKTPGAMEHELVLHQLRC	700
B -2x	..... E..... SV... L... PAS. EA... P..... 698	
B -slow	..... E... D... K... S... M. SS... ANYAGF. TP... IEKG... KA..... H..... S... VIDNP... M... 695	
	ELC binding	
B -2a	NGVLEGIRICRKGFP SRILYADFQRKYKVLNASAIPEGQYIDSKKASEKLLASIDIDHTQYKFGHTKVFVKAGLLGLEEMRDEKLAQLMTRTQARCRGF	800
B -2x	..... F..... V..... I..... 798	
B -slow	..... N... G... R... RI... PA... F... R. GA... G. L... N..... R. SRII... I... QS... V 795	
	region RLC binding region	
B -2a	LARVEYQKWERRESIFCIQYNIRAFMNVKHWPWMKLFRRIKPLLSAETEKEMATMKEEFQKTKDELAKSEAKRKELEEKMVTL LKENDLQLQVQSEA	900
B -2x	..... V..... Y. K..... N..... E... E..... TQ..... 898	
B -slow	S. M. FK. II... D. LL.I... W... G... N... Y. K..... I. L... GRL. EA. E... R..... S... Q..... A. Q 895	
B -2a	EGLADAEEERC DQLIKTKIQLEAKI KEVTERAEDEEEINAELTAKKRKLEDECSSELKDDIDDELTLAKVEKEKHATENKVKNL TEEMAGLDETIAKLTKE	1000
B -2x	DA..... 998	
B -slow	DN..... N..... V... M... L... M..... R..... I..... 995	

Cow myosin heavy chain amino acid sequences. From K. Chikuni et al., *Meat Science* **67**: 87-94, 2004.



Using antisense oligonucleotides (AONs) for exon skipping, a possible treatment for Duchenne's Muscular Dystrophy (DMD). From A. Goyenvalle et al., *Molecular Therapy* **26**: 1212-1221, 2012.