SUPPLEMENTARY INFORMATION

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1. Supplementary Tables
a. Capsid composition analysis

Supplementary Table 1. AAV capsid composition analysis at the DNA (**a**) and protein (**b**) levels of the top 3 isolates in reference to the parental AAVs used for library generation. The start nucleotide, end nucleotide, length of the fragment as well as possible parental AAV sources are given. Nucleotides that could not be matched to any of the parental AAVs are indicated as "?".

Supplementary Table 1a

AAV-LK01

Start	End	Length	From:						
1	12	12	AAV1	AAV6	AAV8	AAV9			
13	44	32	AAV1	AAV3B	AAV6	AAV8	AAV9		
45	45	1	AAV3B						
46	47	2							
48	54	7	AAV2						
55	56	2	AAV2	AAV8	AAV9				
57	60	4	AAV8	AAV9					
61	71	11	AAV3B	AAV8	AAV9				
72	72	1	AAV3B						
73	76	4	AAV1	AAV6					
77	86	10	AAV1	AAV4	AAV6				
87	89	3	AAV1	AAV3B	AAV4	AAV6			
90	90	1	AAV3B	AAV4					
91	91	1	AAV3B						
92	98	7	AAV3B	AAV4					
99	116	18	AAV4						
117	117	1							
118	128	11	AAV4						
129	129	1							
130	158	29	AAV3B	AAV4					
159	159	1							
160	167	8	AAV4						
168	186	19	AAV1	AAV4	AAV6	AAV8	AAV9		
187	188	2	AAV1	AAV2	AAV3B	AAV4	AAV6	AAV8	AAV9
189	191	3	AAV1	AAV2	AAV3B	AAV6	AAV8	AAV9	
192	192	1	AAV2	AAV3B					
193	199	7	AAV2	AAV3B	AAV4				
200	202	3	AAV4						
203	203	1	AAV2	AAV4					
204	204	1	AAV2						

205	209	5	AAV2	AAV3B	AAV4				
210	210	1	AAV3B	AAV4					
211	212	2	AAV3B	AAV4	AAV8				
213	312	100	AAV8						
313	341	29	AAV3B	AAV8					
342	659	318	AAV3B						
660	660	1							
661	668	8	AAV8						
669	675	7	AAV8	Avian_AAV					
676	694	19	AAV3B	AAV8	Avian_AAV				
695	699	5	AAV3B	Avian_AAV					
700	706	7	AAV3B	AAV9	Avian_AAV				
707	707	1	AAV3B	AAV9					
708	708	1	AAV9						
709	743	35	AAV2	AAV8	AAV9				
744	761	18	AAV2	AAV8					
762	762	1							
763	1065	303	AAV8						
1066	1076	11	AAV1	AAV8					
1077	1281	205	AAV1						
1282	1293	12	AAV1	AAV8					
1294	1601	308	AAV8						
1639	1641	3	AAV2						
1642	1644	3							
1645	1647	3	AAV2						
1648	1650	3	AAV1	AAV6					
1651	1655	5	AAV2						
1656	1657	2							
1658	1660	3	AAV9						
1661	1661	1							
1662	1664	3	AAV2						
1665	2031	367	AAV8						
2032	2048	17	AAV2	AAV8					
2049	2055	7	AAV2						
2056	2081	26	AAV2	AAV8					
2082	2091	10	AAV8						
2092	2093	2	AAV1	AAV2	AAV6	AAV8			
2094	2094	1	AAV1	AAV2	AAV6				
2095	2100	6	AAV8						
2101	2108	8	AAV2	AAV3B	AAV8				
2109	2112	4	AAV2	AAV3B					
2113	2117	5	AAV2	AAV3B	AAV6				
2118	2118	1	AAV6						
2119	2119	1	AAV8	AAV9					
2120	2123	4	AAV2	AAV3B	AAV8	AAV9			
2124	2124	1	AAV2	AAV3B					
2125	2127	3	AAV2	AAV3B	AAV8	AAV9			

2128	2128	1	AAV8	AAV9					
2129	2129	1							
2130	2133	4	AAV2	AAV3B					
2134	2135	2	AAV1	AAV2	AAV3B	AAV6			
2136	2138	3	AAV1	AAV6					
2139	2139	1							
2140	2151	12	AAV8						
2152	2153	2	AAV2	AAV3B	AAV8				
2154	2154	1	AAV2	AAV3B					
2155	2155	1	AAV8						
2156	2159	4	AAV8	AAV9					
2160	2162	3	AAV9						
2163	2163	1							
2164	2168	5	AAV3B						
2169	2174	6	AAV3B	AAV8					
2175	2175	1	AAV8						
2176	2190	15	AAV2	AAV8					
2191	2214	24	AAV2						

AAV-LK02

Start	End	Length	From:		
1	477	477	AAV1		
478	551	74	AAV1	AAV6	
552	993	442	AAV6		
994	1034	41	AAV1	AAV6	
1035	1050	16	AAV1	AAV6	AAV8
1051	1052	2	AAV1	AAV8	
1053	1494	442	AAV8		
1495	1499	5	AAV1	AAV8	
1500	2139	640	AAV1		
2140	2195	56	AAV1	AAV6	
2196	2211	16	AAV6		

AAV-LK03

Start	End	Length	From:						
1	55	55	AAV3B						
56	59	4	AAV3B	AAV4					
60	267	208	AAV4						
268	293	26	AAV3B	AAV4					
294	294	1	AAV3B						
295	299	5	AAV3B	AAV4					
300	300	1	AAV4						
301	303	3	AAV1	AAV2	AAV3B	AAV4	AAV6	AAV8	AAV9
304	304	1	AAV1	AAV2	AAV3B	AAV6	AAV8	AAV9	

305	308	4	AAV1	AAV2	AAV3B	AAV4	AAV6	AAV8	AAV9
309	311	3	AAV4	AAV5					
312	312	1	AAV5						
313	313	1	AAV2						
314	344	31	AAV1	AAV2	AAV6	AAV8	AAV9		
345	347	3	AAV1	AAV6	AAV8	AAV9			
348	365	18	AAV1	AAV3B	AAV4	AAV6	AAV8	AAV9	
366	372	7	AAV3B	AAV4					
373	373	1							
374	381	8	AAV4						
382	399	18	AAV3B	AAV4					
400	400	1	AAV3B						
401	404	4	AAV3B	AAV4					
405	405	1	AAV4						
406	406	1	AAV4	AAV8	AAV9				
407	411	5	AAV8	AAV9					
412	431	20	AAV3B	AAV8	AAV9				
432	2169	1738	AAV3B						
2170	2177	8	AAV1	AAV3B					
2178	2211	34	AAV1						

Supplementary Table 1b

AAV-LK01

Start	End	Length	From:		
1	56	56	AAV9		
57	83	27	AAV8	AAV9	
84	92	9	AAV8		
93	124	32	AAV3B	AAV8	
125	205	81	AAV3B		
206	211	6	AAV3B	AAV8	
212	222	11	AAV3B	AAV8	AAV9
223	232	10	AAV8	AAV9	
233	233	1	AAV9		
234	262	29	AAV8	AAV9	
263	346	84	AAV8		
347	411	65	AAV6	AAV8	
412	416	5	AAV6		
417	418	2	AAV5	AAV6	
419	419	1	AAV5		
420	425	6	AAV5	AAV8	
426	666	241	AAV8		
667	709	43	AAV8	AAV9	
710	737	28	AAV9		

AAV-LK02

Start	End	Length	From:		
1	84	84	AAV6		
85	121	37	AAV6	AAV8	
122	128	7	AAV1	AAV6	AAV8
129	129	1	AAV1	AAV8	
130	147	18	AAV1	AAV6	AAV8
148	175	28	AAV1	AAV6	
176	345	170	AAV6		
346	410	65	AAV6	AAV8	
411	495	85	AAV8		
496	501	6	AAV6	AAV8	
502	522	21	AAV6		
523	530	8	AAV2	AAV3B	AAV6
531	531	1	AAV2	AAV3B	
532	583	52	AAV6		
584	584	1			
585	597	13	AAV6		
598	598	1			
599	641	43	AAV6		
642	642	1			
643	736	94	AAV6		

AAV-LK03

Start	End	Length	From:			
1	19	19	AAV3B	AAV8	AAV9	
20	25	6	AAV3B	AAV4	AAV8	AAV9
26	31	6	AAV4			
32	101	70	AAV4	AAV9		
102	125	24	AAV9			
126	146	21	AAV3B	AAV9		
147	722	576	AAV3B			
723	734	12	AAV3B	AAV6		
735	736	2	AAV6			

3. Supplementary Figures and Legends

a. AAV Cap Sequence alignment – DNA

Supplementary Figure 1. AAV Cap gene sequence comparison. Alignment of AAV Cap gene sequences of parental AAVs used for library generation and the top three *in vivo* isolates (AAV-LK01, AAV-LK02, and AAV-LK03).

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AAV-LK01     ATGGCTGCCGATGGTTAT---CTTCCAGATTGGCTCGAG--------GACAACCTTAGTGAAGGAATTCGCG-AGTGGTGGGCTTTGAAACCTGGAGCCCCTCAACCCAAGGCA
AAV-LK02     ATGGCTGCCGATGGTTAT---CTTCCAGATTGGCTCGAG--------GACAACCTCTCTGAGGGCATTCGCG-AGTGGTGGGACTTGAAACCTGGAGCCCCGAAGCCCAAAGCC
AAV-LK03     ATGGCTGCTGACGGTTAT---CTTCCAGATTGGCTCGAG--------GACAACCTTTCTGAAGGCATTCGAG-AGTGGTGGGCGCTGCAACCTGGAGCCCCTAAACCCAAGGCA
AAV1         ATGGCTGCCGATGGTTAT---CTTCCAGATTGGCTCGAG--------GACAACCTCTCTGAGGGCATTCGCG-AGTGGTGGGACTTGAAACCTGGAGCCCCGAAGCCCAAAGCC
AAV2         ATGGCTGCCGATGGTTAT---CTTCCAGATTGGCTCGAG--------GACACTCTCTCTGAAGGAATAAGAC-AGTGGTGGAAGCTCAAACCTGGCCCACCACCACCAAAGCCC
AAV3B        ATGGCTGCTGACGGTTAT---CTTCCAGATTGGCTCGAG--------GACAACCTTTCTGAAGGCATTCGTG-AGTGGTGGGCTCTGAAACCTGGAGTCCCTCAACCCAAAGCG
AAV4         ATGACT---GACGGTTAC---CTTCCAGATTGGCTAGAG--------GACAACCTCTCTGAAGGCGTTCGAG-AGTGGTGGGCGCTGCAACCTGGAGCCCCTAAACCCAAGGCA
AAV5         ATGTCTTTTGTTGATCAC---CCTCCAGATTGGTTGGA----------AGAA-GTTGGTGAAGGTCTTCGCGAGTTTTTGGGCCTTG-AAGCGGGCCCACCGAAACCAAAACCC
AAV6         ATGGCTGCCGATGGTTAT---CTTCCAGATTGGCTCGAG--------GACAACCTCTCTGAGGGCATTCGCG-AGTGGTGGGACTTGAAACCTGGAGCCCCGAAACCCAAAGCC
AAV8         ATGGCTGCCGATGGTTAT---CTTCCAGATTGGCTCGAG--------GACAACCTCTCTGAGGGCATTCGCG-AGTGGTGGGCGCTGAAACCTGGAGCCCCGAAGCCCAAAGCC
AAV9         ATGGCTGCCGATGGTTAT---CTTCCAGATTGGCTCGAG--------GACAACCTCTCTGAGGGCATTCGCG-AGTGGTGGGCGCTGAAACCTGGAGCCCCGAAGCCCAAAGCC
Avian_AAV    ATGTCTCTCATTTCTGATGCGATTCCAGATTGGTTGGAGCGGTTGGTCAAAAAGGGAGTGAATGCTGCGGCTGATTTCTACCATTTGGAAAGCGGTCCTCCTCATCCTAAGGCA
Bovine_AAV   ATGTCTTTTGTTGACCAC---CCTCCAGATTGGTTGGA---------ATCGA--TCGGCGACGGCTTTCGTGAATTTCTCGGCCTTG-AGGCGGGTCCCCCGAAACCCAAGGCC

AAV-LK01     AATCAACAACATCAAGA-------C-AACG--C---TCGAG--GTCTTGTGCTTCCGGGTTACAAATACCTTGGACCCGGCAACGGACTCGACAAGGGGGAGCCGGTCAACGCA
AAV-LK02     AACCAGCAAAAGCAGGA-------C-GACGGC-----CGGG--GTCTGGTGCTTCCTGGCTACAAGTACCTCGGACCCTTCAACGGACTCGACAAGGGGGAGCCCGTCAACGCG
AAV-LK03     AATCAACAACATCAGGA-------C-AACG--C---TCGGG--GTCTTGTGCTTCCGGGTTACAAATACCTCGGACCCGGCAACGGACTCGACAAGGGGGAACCCGTCAACGCA
AAV1         AACCAGCAAAAGCAGGA-------C-GACGGC-----CGGG--GTCTGGTGCTTCCTGGCTACAAGTACCTCGGACCCTTCAACGGACTCGACAAGGGGGAGCCCGTCAACGCG
AAV2         GCAGAGCGGCATAAGGA-------C-GACAGC-----AGGG--GTCTTGTGCTTCCTGGGTACAAGTACCTCGGACCCTTCAACGGACTCGACAAGGGAGAGCCGGTCAACGAG
AAV3B        AACCAACAACACCAGGA-------C-AACCG-----TCGGG--GTCTTGTGCTTCCGGGTTACAAATACCTCGGACCCGGTAACGGACTCGACAAAGGAGAGCCGGTCAACGAG
AAV4         AATCAACAACATCAGGA-------CAA-CG--C---TCGGG--GTCTTGTGCTTCCGGGTTACAAATACCTCGGACCCGGCAACGGACTCGACAAGGGGGAACCCGTCAACGCA
AAV5         AATCAGCAGCATCAAGA-------TCA-AG--C---CCGTG--GTCTTGTGCTGCCTGGTTATAACTATCTCGGACCCGGAAACGGTCTCGATCGAGGAGAGCCTGTCAACAGG
AAV6         AACCAGCAAAAGCAGGA-------C-GACGGC-----CGGG--GTCTGGTGCTTCCTGGCTACAAGTACCTCGGACCCTTCAACGGACTCGACAAGGGGGAGCCCGTCAACGCG
AAV8         AACCAGCAAAAGCAGGA-------C-GACGGC-----CGGG--GTCTAGTGCTTCCTGGCTACAAGTACCTCGGACCCTTCAACGGACTCGACAAGGGGGAGCCCGTCAACGCG
AAV9         AACCAGCAAAAGCAGGA-------C-GACGGC-----CGGG--GTCTGGTGCTTCCTGGCTACAAGTACCTCGGACCCTTCAACGGACTCGACAAGGGGGAGCCCGTCAACGCG
Avian_AAV    AATCAGCAAACTCAAGAATCTCCTGAAAAGGACGATTCGAGAGGTCTCGTGTTCCCGGGTTACAAGTATCTAGGCCCTTTCAACGGTCTAGATAAAGGAAAACCCGTCAACGAG
Bovine_AAV   AATCAACAGAAGCAAGA--------TAACGC-----TCGAG--GTCTTGTGCTTCCTGGGTACAAGTATCTTGGTCCTGGGAACGGCCTTGATAAGGGCGATCCTGTCAATTTT

AAV-LK01     GCAGACGCGGCGCCCTCGAGCACGACAAGGCCTACGACCAGCAGCTGCAGGCGGGTGACAATCCGTACCTGCGGTATAACCACGCCGA-CGCCGAGTTTCAGGAGCGTCTGCA
AAV-LK02     GCGGACGCAGCGGCCCTCGAGCACGACAAGGCCTACGACCAGCAGCTCAAAGCGGGTGACAATCCGTACCTGCGGTATAACCACGCCGA-CGCCGAGTTTCAGGAGCGTCTGCA
AAV-LK03     GCGGACGCGGCAGCCCTCGAGCACGACAAGGCCTACGACCAGCAGCTCAAGGCCGGTGACAACCCCTACCTCAAGTACAACCACGCCGA-CGCCGAGTTCCAGGAGCGGCTCAA
AAV1         GCGGACGCAGCGGCCCTCGAGCACGACAAGGCCTACGACCAGCAGCTCAAAGCGGGTGACAATCCGTACCTGCGGTATAACCACGCCGA-CGCCGAGTTTCAGGAGCGTCTGCA
AAV2         GCAGACGCCGCGGCCCTCGAGCACGACAAAGCCTACGACCGGCAGCTCGACAGCGGAGACAACCCGTACCTCAAGTACAACCACGCCGA-CGCGGAGTTTCAGGAGCGCCTTAA
AAV3B        GCGGACGCGGCAGCCCTCGAACACGACAAAGCTTACGACCAGCAGCTCAAGGCCGGTGACAACCCGTACCTCAAGTACAACCACGCCGA-CGCCGAGTTTCAGGAGCGTCTTCA
AAV4         GCGGACGCGGCAGCCCTCGAGCACGACAAGGCCTACGACCAGCAGCTCAAGGCCGGTGACAACCCCTACCTCAAGTACAACCACGCCGA-CGCGGAGTTCCAGCAGCGGCTTCA
AAV5         GCAGACGAGGTCGCGCGAGAGCACGACATCTCGTACAACGAGCAGCTTGAGGCGGGAGACAACCCCTACCTCAAGTACAACCACGCGGA-CGCCGAGTTTCAGGAGAAGCTCGC
AAV6         GCGGATGCAGCGGCCCTCGAGCACGACAAGGCCTACGACCAGCAGCTCAAAGCGGGTGACAATCCGTACCTGCGGTATAACCACGCCGA-CGCCGAGTTTCAGGAGCGTCTGCA
AAV8         GCGGACGCAGCGGCCCTCGAGCACGACAAGGCCTACGACCAGCAGCTGCAGGCGGGTGACAATCCGTACCTGCGGTATAACCACGCCGA-CGCCGAGTTTCAGGAGCGTCTGCA
AAV9         GCGGACGCAGCGGCCCTCGAGCACGCAAGGCCTACGACCAGCAGCTGCAGGCGGGTGACAATCCGTACCTGCGGTATAACCACGCCGA-CGCCGAGTTTCAGGAGCGTCTGCA
Avian_AAV    GCGACGCTGCCGCCTTAGAGCACGACAAGGCTTACGACCTCGAACTCAAGGACGGGCACAACCCGTACTTTGAGTACAACGAGGCCGATAGACG-TTTCCAGGAACGTCTCAA
Bovine_AAV   GCTGACGAGGTTGCCCGAGAGCACGACCTCTCCTACCAGAAACAGCTTGAGGCGGGCGATAACCCTTACCTCAAGTACAACCACGCGGA-CGCAGAGTTTCAGGAGAAACTCGC

AAV-LK01     AGAAGATACGTCTTTTGGGGGCAACCTTGGCAGAGCAGTCTTCCAGGCCAAAAAGAGGATCCTTGAGCCTCTTGGTCTGGTTGAGGAAGCAGCTAAAACGGCTCCT---GGAAA
AAV-LK02     AGAAGATACGTCTTTTGGGGGCAACCTCGGGCGAGCAGTCTTCCAGGCCAAGAAGCGGGTTCTCGAACCTCTCGGTCTGGTTGAGGAAGGCGCTAAGACGGCTCCT---GGAAA
AAV-LK03     AGAAGATACGTCTTTTGGGGGCAACCTCGGGCGAGCAGTCTTCCAGGCCAAAAAGAGGCTTCTTGAACCTCTTGGTCTGGTTGAGGAAGCGGCTAAGACGGCTCCT---GGAAA
AAV1         AGAAGATACGTCTTTTGGGGGCAACCTCGGGCGAGCAGTCTTCCAGGCCAAGAAGCGGGTTCTCGAACCTCTCGGTCTGGTTGAGGAAGCGCTAAGACGGCTCCT---GGAAA
AAV2         AGAAGATACGTCTTTTGGGGGCAACCTCGGACGAGCAGTCTTCCAGGCGAAAAAGAGGGTTCTTGAACCTCTGGGCCTGGTTGAGGAACCTGTTAAGACGGCTCCG---GGAAA
AAV3B        AGAAGATACGTCTTTTGGGGGCAACCTTGGCAGAGCAGTCTTCCAGGCCAAAAAGAGGATCCTTGAGCCTCTTGGTCTGGTTGAGGAAGCAGCTAAAACGGCTCCT---GGAAA
AAV4         GGGCGACACATCGTTTGGGGGCAACCTCGGCAGAGCAGTCTTCCAGGCCAAAAAGAGGGTTCTTGAACCTCTTGGTCTGGTTGAGCAAGCGGGTGAGACGGCTCCT---GGAAA
AAV5         CGACGACACATCCTTCGGGGGAAACCTCGGAAAGGCAGTCTTTCAGGCCAAGAAAAGGGTTCTCGAACCTTTTGGCCTGGTTGAAGAGGGTGCTAAGACGGCCCTACCGGA--
AAV6         AGAAGATACGTCTTTTGGGGGCAACCTCGGGCGAGCAGTCTTCCAGGCCAAGAAGAGGGTTCTCGAACCTTTTGGTCTGGTTGAGGAAGGTGCTAAGACGGCTCCT---GGAAA
AAV8         AGAAGATACGTCTTTTGGGGGCAACCTCGGGCGAGCAGTCTTCCAGGCCAAGAAGCGGGTTCTCGAACCTCTCGGTCTGGTTGAGGAAGGCGCTAAGACGGCTCCT---GGAAA
AAV9         AGAAGATACGTCTTTTGGGGGCAACCTCGGGCGAGCAGTCTTCCAGGCCAAGAAGCGGGTTCTCGAACCTCTCGGTCTGGTTGAGGAAGGCGCTAAGACGGCTCCT---GGAAA
Avian_AAV    AGACGATACCTCTTTCGGAGGGAATCTCGGTAAAGCCATCTTTCAGGCCAAAAAGAGGGTCCTCGAGCCCTTTGGTCTGATTGAACAACCCGACAACACGGCCGGGACCGGGGA
Bovine_AAV   TTCTGACACTTCTTTTGGGGGAAACCTTGGGAAGGCTGTTTTCCAGGCTAAAAAGAGGATTCTCGAACCTCTTGGCCTGGTTGAGACGCCGGATAAAACGGCGCCTGCGGCAAA

AAV-LK01     GAAGAGGCCTGTAGATCAGTCTCCTCAGGA---ACCGGACTCATCATCTGGTGTTGGCAAATCGGGCAAACAGCCTGCCAGAAAAAGACTAAATTTCGGTCAGACTGGCGACTC
AAV-LK02     GAAACGTCCGGTAGAGCAGTCGCCACAAGA---GCCAGACTCCTCCTCGGGCATCGGCAAGACAGGCCAGCAGCCCGCTAAAAAGAGACTCAATTTTGGTCAGACTGGCGACTC
AAV-LK03     GAAGAGGCCTGTAGATCAGTCTCCTCAGGA---ACCGGACTCATCATCTGGTGTTGGCAAATCGGGCAAACAGCCTGCCAGAAAAAGACTAAATTTCGGTCAGACTGGCGACTC
AAV1         GAAACGTCCGGTAGAGCAGTCGCCACAAGA---GCCAGACTCCTCCTCGGGCATCGGCAAGACAGGCCAGCAGCCCGCTAAAAAGAGACTCAATTTTGGTCAGACTGGCGACTC
AAV2         AAAGAGGCCGGTAGAGCACTCTCCTGTGGA---GCCAGACTCCTCCTCGGGAACCGGAAAGGCGGGCCAGCAGCCTGCAAGAAAAAGATTGAATTTTGGTCAGACTGGAGACGC
AAV3B        GAAGAGGCCTGTAGATCAGTCTCCTCAGGA---ACCGGACTCATCATCTGGTGTTGGCAAATCGGGCAAACAGCCTGCCAGAAAAAGACTAAATTTCGGTCAGACTGGCGACTC
AAV4         GAAGAGACCGTTGATTGAATCCCCCCAGCA---GCCCGACTCCTCCACGGGTATCGGCAAAAAAGGCAAGCAGCCGGCTAAAAAGAAGCTCGTTTTCGA--AGAC----GAAAC
AAV5         -AAGCGGATAGACGACCACTTTCCAAAAA----GAAAGAAGGCTC-----GGACCG--AAGA-GGACTCCAAGCCTTCCA-------CCTC-------GTCAGAC-GCCGAAGC
AAV6         GAAACGTCCGGTAGAGCAGTCGCCACAAGA---GCCAGACTCCTCCTCGGGCATTGGCAAGACAGGCCAGCAGCCCGCTAAAAAGAGACTCAATTTTGGTCAGACTGGCGACTC
AAV8         GAAGAGACCGGTAGAGCCATCACCCCAGCGTTCTCCAGACTCCTCTACGGGCATCGGCAAGAAAGGCCAACAGCCCGCCAGAAAAAGACTCAATTTTGGTCAGACTGGCGACTC
AAV9         GAAGAGACCGGTAGAGCCATCACCCCAGCGTTCTCCAGACTCCTCTACGGGCATCGGCAAGAAAGGCCAACAGCCCGCCAGAAAAAGACTCAATTTTGGTCAGACTGGCGACTC
Avian_AAV    GAAGCGTCCCG-AACGC-GTCGAC-------------GACT--TTTTCCCGAAAAAG-AAGA-AGGCCAAGACCGAGCAAGGCAAAGCCCC-----TGCTCAAACGGGCGAA--
Bovine_AAV   AAAGAGGCCTCTAGAGCAGAGTCCTCAAGA---GCCAGACTCCTCGAGCGGAGTTGGCAAGAAAGGCAAACAGCCTGCCAGAAAGAGACTCAACTTT-----GAC-GACGAACC

AAV-LK01     A-GAGTCAGTCCCAG-ACCCTCAACCTCTCGGAGAACCACCAGC--AGCCC-CCACAAGTTTG-GGATCTAATACAATGGCTTCAGGCGGTGGCGCACCAATGGCAGACAATAA
AAV-LK02     A-GAGTCAGTCCCCG-ACCCACAACCTCTCGGAGAACCTCCAGC--AACCC-CCGCTGCTGTG-GGACCTACTACAATGGCTTCAGGCGGTGGCGCACCAATGGCAGACAATAA
AAV-LK03     A-GAGTCAGTCCCAG-ACCCTCAACCTCTCGGAGAACCACCAGC--AGCCC-CCACAAGTTTG-GGATCTAATACAATGGCTTCAGGCGGTGGCGCACCAATGGCAGACAATAA
AAV1         A-GAGTCAGTCCCCG-ATCCACAACCTCTCGGAGAACCTCCAGC--AACCC-CCGCTGCTGTG-GGACCTACTACAATGGCTTCAGGCGGTGGCGCACCAATGGCAGACAATAA
AAV2         A-GACTCAGTACCTG-ACCCCCAGCCTCTCGGACAGCCACCAGC--AGCCC-CCTCTGGTCTG-GGAACTAATACGATGGCTACAGGCAGTGGCGCACCAATGGCAGACAATAA
AAV3B        A-GAGTCAGTCCCAG-ACCCTCAACCTCTCGGAGAACCACCAGC--AGCCC-CCACAAGTTTG-GGATCTAATACAATGGCTTCAGGCGGTGGCGCACCAATGGCAGACAATAA
AAV4         TGGAG-CAGGCGACGGACCC----CCTGAGGGATCAACTTCCGG--AGC------CATGTCTGATGAC--AGTGAGATGCGTGCAGCAGCTGGCGGAGC--TG-CAGTCGAGGG
AAV5         TGGACCCAG----CGGATCC-CAGCAGCT-GCA-AATC-CCAGCCCAACCAGCCTCAAGTTTG-GGAGCTGATACAATGTCTGCGGGAGTGGCGGCCCATTGGGCGACAATAA
AAV6         A-GAGTCAGTCCCCG-ACCCACAACCTCTCGGAGAACCTCCAGC--AACCC-CCGCTGCTGTG-GGACCTACTACAATGGCTTCAGGCGGTGGCGCACCAATGGCAGACAATAA
AAV8         A-GAGTCAGTTCCAG-ACCCTCAACCTCTCGGAGAACCTCCAGC--AGCGC-CCTCTGGTGTG-GGACCTAATACAATGGCTGCAGGCGGTGGCGCACCAATGGCAGACAATAA
AAV9         A-GAGTCAGTTCCAG-ACCCTCAACCTCTCGGAGAACCTCCAGC--AGCGC-CCTCTGGTGTG-GGACCTAATACAATGGCTGCAGGCGGTGGCGCACCAATGGCAGACAATAA
Avian_AAV    --GACCCCGGAGAAGGAACCTCTTCCA-ACGCTGGATCA--AGC---GCCC-CCTCTAGTGTG-GGATCATCTGTCATGGCTGAAGGAGGTGGCGGTCCAATG---GGCGATGC
Bovine_AAV   TGGAGCCGGAGACGGG--CCTCCCCCAGAAGGACCATCTTCCGG--AGC------TATGTCTACTGAG--ACTGAAATGCGTGCAGCAGCTGGCGGA--AATGG-TGGCGATGC

AAV-LK01     CG---AGGGTGCCGATGGGGTGGGTAGTTCCTCGGGAAATTGGCATTGCGATTCCCAATGG-CTGGGGGACAGAGTCATCACCACCAGCACCCGAACCTGGGCCCTGCCCACCT
AAV-LK02     CG---AAGGCGCCGACGGAGTGGGTAATGCCTCAGGAAATTGGCATTGCGATTCCACATGG-CTGGGCGACAGAGTCATCACCACCAGCACCCGAACATGGGCCTTGCCCACCT
AAV-LK03     CG---AGGGTGCCGATGGAGTGGGTAATTCCTCAGGAAATTGGCATTGCGATTCCCAATGG-CTGGGCGACAGAGTCATCACCACCAGCACCAGAACCTGGGCCCTGCCCACTT
AAV1         CG---AAGGCGCCGACGGAGTGGGTAATGCCTCAGGAAATTGGCATTGCGATTCCACATGG-CTGGGCGACAGAGTCATCACCACCAGCACCCGCACCTGGGCCTTGCCCACCT
AAV2         CG---AGGGCGCCGACGGAGTGGGTAATTCCTCGGGAAATTGGCATTGCGATTCCACATGGA-TGGGCGACAGAGTCATCACCACCAGCACCCGAACCTGGGCCCTGCCCACCT
AAV3B        CG---AGGGTGCCGATGGAGTGGGTAATTCCTCAGGAAATTGGCATTGCGATTCCCAATGG-CTGGGCGACAGAGTCATCACCACCAGCACCAGAACCTGGGCCCTGCCCACTT
AAV4         CGGACAAGGTGCCGATGGAGTGGGTAATGCCTCGGGTGATTGGCATTGCGATTCCACCTGGTCTGAGGGCCA-CGTCACGACCACCAGCACCAGAACCTGGGTCTTGCCCACCT
AAV5         C---CAAGGTGCCGATGGAGTGGGCAATGCCTCGGGAGATTGGCATTGCGATTCCACGTGG-ATGGGGGACAGAGTCGTCACCAAGTCCACCCGAACCTGGGTGCTGCCCAGCT
AAV6         CG---AAGGCGCCGACGGAGTGGGTAATGCCTCAGGAAATTGGCATTGCGATTCCACATGG-CTGGGCGACAGAGTCATCACCACCAGCACCCGAACATGGGCCTTGCCCACCT
AAV8         CG---AAGGCGCCGACGGAGTGGGTAGTTCCTCGGGAAATTGGCATTGCGATTCCACATGG-CTGGGCGACAGAGTCATCACCACCAGCACCCGAACCTGGGCCCTGCCCACCT
AAV9         CG---AAGGCGCCGACGGAGTGGGTAATTCCTCGGGAAATTGGCATTGCGATTCCACATGG-CTGGGGGACAGAGTCATCACCACCAGCACCCGAACCTGGGCATTGCCCACCT
Avian_AAV    AGGCCAAGGTGCCGACGGAGTGGGCAATTCCTCGGGAAATTGGCATTGCGATTCCCAATGG-CTGGACAACGGAGTCGTTACCCGAACCACCTGAACCTGGGTCCTGCCCAGCT
Bovine_AAV   GGGACAAGGTGCCGAGGGAGTGGGTAATGCCTCCGGTGATTGGCATTGCGATTCCACTTGGTCAGAGAGCCA-CGTCACCACCACCTCAACCCGCACCTGGGTCCTGCCCGACCT
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Supplementary Figure 1

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AAV-LK01     ACAACAATCACCTCTACAAGCAAATCTCCAACGGGACATCGGGAG-GAGCCACCAACGACA---ACACCTACTTCGGCTACAGCACCCCCTGGGGGTATTTTGACTTTAACAGA
AAV-LK02     ATAACAACCACCTCTACAAGCAAATCTCCAGTGCTTCAACGGGGG----CCAGCAACGACA---ACCACTACTTCGGCTACAGCACCCCCTGGGGGTATTTTGATTTCAACAGA
AAV-LK03     ACAACAACCATCTCTACAAGCAAATCTCCAGCCAATCA---GGAG----CTTCAAACGACA---ACCACTACTTTGGCTACAGCACCCCTTGGGGGTATTTTGACTTTAACAGA
AAV1         ACAATAACCACCTCTACAAGCAAATCTCCAGTGCTTCAACGGGGG----CCAGCAACGACA---ACCACTACTTCGGCTACAGCACCCCCTGGGGGTATTTTGATTTCAACAGA
AAV2         ACAACAACCACCTCTACAAACAAATTTCCAGCCAATCA---GGAG----CCTCGAACGACA---ATCACTACTTTGGCTACAGCACCCCTTGGGGGTATTTTGACTTCAACAGA
AAV3B        ACAACAACCATCTCTACAAGCAAATCTCCAGCCAATCA---GGAG----CTTCAAACGACA---ACCACTACTTTGGCTACAGCACCCCTTGGGGGTATTTTGACTTTAACAGA
AAV4         ACAACAACCACCTCTACAAGCGACTC---------------GGAGAGAGCCTGC-AGTCCA---ACACCTACAACGGATTCTCCACCCCCTGGGGATACTTTGACTTCAACCGC
AAV5         ACAACAACCACCAGTACCGAGAGATCAAAAGCGGCTCCGTCGACGG----AAGCAACGCCA---ACGCCTACTTTGGATACAGCACCCCCTGGGGGTACTTTGACTTTAACCGC
AAV6         ATAACAACCACCTCTACAAGCAAATCTCCAGTGCTTCAACGGGGG----CCAGCAACGACA---ACCACTACTTCGGCTACAGCACCCCCTGGGGGTATTTTGATTTCAACAGA
AAV8         ACAACAACCACCTCTACAAGCAAATCTCCAACGGGACATCGGGAG-GAGCCACCAACGACA---ACACCTACTTCGGCTACAGCACCCCCTGGGGGTATTTTGACTTTAACAGA
AAV9         ACAACAACCACCTCTACAAGCAAATCTCCAATGGAACATCGGGAGGAAG-CACCAACGACA---ACACCTACTTTGGCTACAGCACCCCCTGGGGGTATTTTGACTTCAACAGA
Avian_AAV    ACAACAACCACTTGTACAAGCGGATC--CAAGG----ACCGGGAGG----AACCGACCCCAACAATAAATTCTTTGGATTCAGCACCCCCTGGGGGTACTTTGACTACAACCGA
Bovine_AAV   ACAACAACCACCTGTACCTGCGGCTC------GGCTC-----GAG--------CAACGCCAGCGACACCTTCAACGGATTCTCCACCCCCTGGGGATACTTTGACTTTAACCGC

AAV-LK01     TTCCACTGCCACTTTTCACCACGTGACTGGCAGCGACTCATCAACAACAACTGGGGATTCCGGCCCAAGAGACTCAGCTTCAAGCTCTTCAACATCCAGGTCAAGGAGGTCACG
AAV-LK02     TTCCACTGCCATTTCTCACCACGTGACTGGCAGCGACTCATCAACAACAATTGGGGATTCCGGCCCAAGAGACTCAACTTCAAGCTCTTCAACATCCAAGTCAAGGAGGTCACG
AAV-LK03     TTCCACTGCCACTTCTCACCACGTGACTGGCAGCGACTCATTAACAACAACTGGGGATTCCGGCCCAAGAAACTCAGCTTCAAGCTCTTCAACATCCAAGTTAAAGAGGTCACG
AAV1         TTCCACTGCCACTTTTCACCACGTGACTGGCAGCGACTCATCAACAACAATTGGGGATTCCGGCCCAAGAGACTCAACTTCAAACTCTTCAACATCCAAGTCAAGGAGGTCACG
AAV2         TTCCACTGCCACTTTTCACCACGTGACTGGCAAAGACTCATCAACAACAACTGGGGATTCCGACCCAAGAGACTCAACTTCAAGCTCTTTAACATTCAAGTCAAAGAGGTCACG
AAV3B        TTCCACTGCCACTTCTCACCACGTGACTGGCAGCGACTCATTAACAACAACTGGGGATTCCGGCCCAAGAAACTCAGCTTCAAGCTCTTCAACATCCAAGTTAAAGAGGTCACG
AAV4         TTCCACTGCCACTTCTCACCACGTGACTGGCAGCGACTCATCAACAACAACTGGGGCATGCGACCCAAAGCCATGCGGGTCAAAATCTTCAACATCCAGGTCAAGGAGGTCACG
AAV5         TTCCACAGCCACTGGAGCCCCCGAGACTGGCAAAGACTCATCAACAACTACTGGGGCTTCAGACCCCGGTCCCTCAGAGTCAAAATCTTCAACATTCAAGTCAAAGAGGTCACG
AAV6         TTCCACTGCCATTTCTCACCACGTGACTGGCAGCGACTCATCAACAACAATTGGGGATTCCGGCCCAAGAGACTCAACTTCAAGCTCTTCAACATCCAAGTCAAGGAGGTCACG
AAV8         TTCCACTGCCACTTTTCACCACGTGACTGGCAGCGACTCATCAACAACAACTGGGGATTCCGGCCCAAGAGACTCAGCTTCAAGCTCTTCAACATCCAGGTCAAGGAGGTCACG
AAV9         TTCCACTGCCACTTCTCACCACGTGACTGGCAGCGACTCATCAACAACAACTGGGGATTCCGGCCAAAGAGACTCAACTTCAAGCTGTTCAACATCCAGGTCAAGGAGGTTACG
Avian_AAV    TTCCACTGCCACTTCTCCCCCCGAGACTGGCAACGACTCATCAACAACAACTGGGGCATCCGACCCAAAGCGATGCGCTTTAGACTCTTTAACATCCAGGTTAAAGAAGTCACT
Bovine_AAV   TTCCACTGCCACTTCTCGCCAAGAGACTGGCAAAGGCTCATCAACAACCACTGGGGACTGCGCCCCAAAAGCATGCAAGTCCGCATCTTCAACATCCAAGTTAAGGAGGTCACG

AAV-LK01     CAGAATGAAGGCACCAAGACCATCGCCAATAACCTCACCAGCACCATCCAGGTGTTTACGGACTCGGAGTACCAGCTGCCGTACGTTCTCGGC-TCTGCGCACCAGGGCTGCCT
AAV-LK02     ACGAATGATGGCGTCACGACCATCGCTAATAACCTTACCAGCACGGTTCAAGTCTTCTCGGACTCGGAGTACCAGCTGCCGTACGTTCTCGGC-TCTGCCCACCAGGGCTGCCT
AAV-LK03     CAGAACGATGGCACGACGACTATTGCCAATAACCTTACCAGCACGGTTCAAGTGTTTACGGACTCGGAGTATCAGCTCCCGTACGTGCTCGGG-TCGGCGCACCAAGGCTGTCT
AAV1         ACGAATGATGGCGTCACAACCATCGCTAATAACCTTACCAGCACGGTTCAAGTCTTCTCGGACTCGGAGTACCAGCTTCCGTACGTCCTCGGC-TCTGCGCACCAGGGCTGCCT
AAV2         CAGAATGACGGTACGACGACGATTGCCAATAACCTTACCAGCACGGTTCAGGTGTTTACTGACTCGGAGTACCAGCTCCCGTACGTCCTCGGC-TCGGCGCATCAAGGATGCCT
AAV3B        CAGAACGATGGCACGACGACTATTGCCAATAACCTTACCAGCACGGTTCAAGTGTTTACGGACTCGGAGTATCAGCTCCCGTACGTGCTCGGG-TCGGCGCACCAAGGCTGTCT
AAV4         ACGTCGAACGGCGAGACAACGGTGGCTAATAACCTTACCAGCACGGTTCAGATCTTTGCGGACTCGTCGTACGAACTGCCGTACGTGAT-GGATGCGGGTCAAGAGGGCAGCCT
AAV5         GTGCAGGACTCCACCACCACCATCGCCAACAACCTCACCTCCACGTCCAAGTGTTTACGGACGACGACTACAGCTGCCCTACGTCGTCGGCAACGGGAC-CGAGGGATGCCT
AAV6         ACGAATGATGGCGTCACGACCATCGCTAATAACCTTACCAGCACGGTTCAAGTCTTCTCGGACTCGGAGTACCAGTTGCCGTACGTCCTCGGC-TCTGCGCACCAGGGCTGCCT
AAV8         CAGAATGAAGGCACCAAGACCATCGCCAATAACCTCACCAGCACCATCCAGGTGTTTACGGACTCGGAGTACCAGCTGCCGTACGTTCTCGGC-TCTGCCCACCAGGGCTGCCT
AAV9         ACGAACGAAGGCACCAAGACCATCGCCAATAACCTTACCAGCACCGTCCAGGTCTTTACGGACTCGGAGTACCAGCTACCGTACGTCCTAGGC-TCTGCCCACCAAGGATGCCT
Avian_AAV    GTCCAAGACTCCAACACCACCATCGCCAACAACCTCACCAGCACGGTCCAAGTCTTTGCGGACAAGGACTACCAGCTGCCGTACGTCCTCGGA-TCGGCTACAGAGGGCACCTT
Bovine_AAV   ACGTCTAACGGGGAGACGACCGTATCCAACAACCTCACCAGCACGGTCCAGATCTTTGCGGACAGCACGTACGAGCTCCCGTACGTGAT-GGATGCAGGTCAGGAGGGCAGCTT

AAV-LK01     CCCTCCGTTCCCGGCGGACGTGTTCATGATTCCGCAATACGGCTAC--CTGAC-GCTCAACAATGGCAGC---CA--AGCCGT--GGGA-CGTTCATCC-TTTTACTGCCTGGA
AAV-LK02     GCCTCCGTTCCCGGCGGACGTGTTCATGATTCCCCAGTACGGCTAC--CTAAC-ACTCAACAACGGTAGT---CA--GGCCGT--GGGA-CGCTCCTCC-TTCTACTGCCTGGA
AAV-LK03     CCCGCCGTTTCCAGCGGACGTCTTCATGGTCCCTCAGTATGGATAC--CTCAC-CCTGAACAACGGAAGT---CA--AGCGGT--GGGA-CGCTCATCC-TTTTACTGCCTGGA
AAV1         CCCTCCGTTCCCGGCGGACGTGTTCATGATTCCGCAATACGGCTAC--CTGAC-GCTCAACAATGGCAGC---CA--AGCCGT--GGGA-CGTTCATCC-TTTTACTGCCTGGA
AAV2         CCCGCCGTTCCCAGCAGACGTCTTCATGGTGCCACAGTATGGATAC--CTCAC-CCTGAACAACGGGAGT---CA--GGCAGT--AGGA-CGCTCTT-CATTTTACTGCCTGGA
AAV3B        CCCGCCGTTTCCAGCGGACGTCTTCATGGTCCCTCAGTATGGATAC--CTCAC-CCTGAACAACGGAAGT---CA--AGCGGT--GGGA-CGCTCATCC-TTTTACTGCCTGGA
AAV4         GCCTCCTTTTCCCAACGACGTCTTTATGGTGCCCCAGTACGGCTACTGTGGACTGGTGACCGGCAACACTTCGCAGCAACAGA--CTGA-CAGAAATGCCTTCTACTGCCTGGA
AAV5         GCCGGCCTTCCCTCCGCAGGTCTTTACGCTGCCGCAGTACGGTTAC-GC-GAC-GCTGAACCGCGACAACACAGAAAATCCCACCGAGA-GGAGCAGC--TTCTTCTGCCTAGA
AAV6         CCCTCCGTTCCCGGCGGACGTGTTCATGATTCCGCAGTACGGCTAC--CTAAC-GCTCAACAATGGCAGC---CA--GGCAGT--GGGA-CGGTCATCC-TTTTACTGCCTGGA
AAV8         GCCTCCGTTCCCGGCGGACGTGTTCATGATTCCCCAGTACGGCTAC--CTAAC-ACTCAACAACGGTAGT---CA--GGCCGT--GGGA-CGCTCCTCC-TTCTACTGCCTGGA
AAV9         GCCACCGTTTCCTGCAGACGTCTTCATGGTTCCTCAGTACGGCTAC--CTGAC-GCTCAACAATGGAAGT---CA--AGCGTT--AGGA-CGTTCTT-CTTTCTACTGTCTGGA
Avian_AAV    CCCGCCGTTCCCAGCGGATATCTACACGATCCCGCAGTATGGTTACTGC--AC-GCTAAACTACAACAAC---GA--GGCGGT---GGATCGTTCGGCC-TTCTACTGTCTAGA
Bovine_AAV   GCCTCCTTTCCCCAACGACGTGTTCATGGTGCCTCAGTACGGGTACTGCGGACTGGTAACCGGAGGCAGCTCTCAAAACCAGAC--AGA-CAGAAATGCCTTCTACTGTCTGGA

AAV-LK01     ATATTT-CCCTTCTCAGATGCTGAGAACGGGCAACAACTTTACCTTCAGCTACACCTTTGAGGAAGTGCCTTTCCACAGCAGCTACGCGCACAGCCAGAGCTTGGACCGGCTGA
AAV-LK02     ATACTT-TCCTTCGCAGATGCTGAGAACCGGCAACAACTTTACCTTCAGTTTACTACACCTTCGAGGACGTGCCTTTCCACAGCAGCTACGCCCACAGCCAGAGCTTGGACCGGCTGA
AAV-LK03     GTACTT-CCCTTCGCAGATGCTAAGGACTGGAAATAACTTCCAATTCAGCTATACCTTCGAGGATGTACCTTTTCACAGCAGCTACGCTCACAGCCAGAGTTTGGATCGCTTGA
AAV1         ATATTT-CCCTTCTCAGATGCTGAGAACGGGCAACAACTTTACCTTCAGCTACACCTTTGAGGAAGTGCCTTTCCACAGCAGCTACGCGCACAGCCAGAGCCTGGACCGGCTGA
AAV2         GTACTT-TCCTTCTCAGATGCTGCGTACCGGAAACAACTTTACCTTCAGCTACACTTTTGAGGACGTTCCTTTCCACAGCAGCTACGCTCACAGCCAGAGTCTGGACCGTCTCA
AAV3B        GTACTT-CCCTTCGCAGATGCTAAGGACTGGAAATAACTTCCAATTCAGCTATACCTTCGAGGATGTACCTTTTCACAGCAGCTACGCTCACAGCCAGAGTTTGGATCGCTTGA
AAV4         GTACTT-TCCTTCGCAGATGCTGCGGACTGGCAACAACTTTGAAATTACGTACAGTTTTGAGAAGGTGCCTTTCCACTCGATGTACGCGCACAGCCAGAGCCTGGACCGGCTGA
AAV5         GTACTTTCCCAGCA-AGATGCTGAGAACGGGCAACAACTTTGAGTTTACCTACAACTTTGAGGAGGTGCCCTTCCACTCCAGCTTCGCTCCCAGTCAGAACCTGTTCAAGCTGG
AAV6         ATATTT-CCCATCGCAGATGCTGAGAACGGGCAATAACTTTACCTTCAGCTACACCTTCGAGGACGTGCCTTTCCACAGCAGCTACGCGCACAGCCAGAGCCTGGACCGGCTGA
AAV8         ATACTT-TCCTTCGCAGATGCTGAGAACCGGCAACAACTTCCAGTTTACTTACACCTTCGAGGACGTGCCTTTCCACAGCAGCTACGCCCACAGCCAGAGCTTGGACCGGCTGA
AAV9         ATACTT-CCCTTCTCAGATGCTGAGAACCGGCAACAACTTTCAGTTTACAGTACTTTCGAGGACGTGCCTTTCCACAGCAGCTACGCACACAGCCAGAGTCTAGATCGACTGA
Avian_AAV    CTATTT-CCCCTCAGACATGCTGCGGACAGGAAATAACTTTGAATTCACTTACACGTTCGAGGACGTTCCTTTCCATAGCATGTTTGCTCACAACCAGACGCTAGACCGGCTGA
Bovine_AAV   GTACTTTCCCAGC-CAGATGCTGAGAACCGGAAACAACTTTGAGATGGTGTACAAGTTTGAAAACGTGCCCTTCCACTCCATGTACGCTCACAGCCAGAGCCTGGATAGGCTGA

AAV-LK01     TGAATCCTCTGATTGACCAGTACCTGTA--CTACTTGTCTCGG--ACTCAAAC-AACAG-GAGGCA-CGGCAAATACGCAGACT-----CTGGGCTTCAGCCAAGGTG-GGCCT
AAV-LK02     TGAATCCTCTGATTGACCAGTACCTGTA--CTACTTGTCTCGG--ACTCAAAC-AACAG-GAGGCA-CGGCAAATACGCAGACT-----CTGGGCTTCAGCCAAGGTG-GGCCT
AAV-LK03     TGAATCCTCTTATTGATCAGTATCTGTA--CTACCTGAACAG--AACGCAAGG-AACAACCTC----TGGAACAACCAACCAATCACGGCTGCTTTTTAGCCAGGCTG-GGCCT
AAV1         TGAATCCTCTCATCGACCAATACCTGTA--TTACCTGAACAG--AACTCAAA--ATCAGTCCGGAAGTGCCCAAAACAAGGACT------TGCTGTTTAGCCGTGG-GTCTCCA
AAV2         TGAATCCTCTCATCGACCAGTACCTGTA--TTACTTGAGCAGA----ACAAAC-A-----CTCCAAGTGGAACCACCACGCAGTCAAGGCTTCAGTTTTCTCAGGCCG-GAGCG
AAV3B        TGAATCCTCTTATTGATCAGTATCTGTA--CTACCTGAACAGA--ACGCAAGG-AACAACCTC----TGGAACAACCAACCAATCACGGCTGCTTTTTAGCCAGGCTG-GGCCT
AAV4         TGAACCCTCTCATCGACCAGTACCTGTG-------GGGACTGC--AATCGACC-ACCACCGGAACCACCCTGAATGCCGGGACTGCCACCACCAACTTTACCAAGCTGCGGCCT
AAV5         CCAACCCGCTGGTGGACCAGTACTTGTA------CCGCTTCGTGAGCACAAAT-AACAC--------TGG--------CGGAGT-------CCAGTTCAACAAGAACCTGGCCG
AAV6         TGAATCCTCTCATCGACCAGTACCTGTA--TTACCTGAACAG--AACTCAGA--ATCAGTCCGGAAGTGCCCAAAACAAGGACT------TGCTGTTTAGCCGGGG-GTCTCCA
AAV8         TGAATCCTCTGATTGACCAGTACCTGTA--CTACTTGTCTCGG--ACTCAAAC-AACAG-GAGGCA-CGGCAAATACGCAGACT-----CTGGGCTTCAGCCAAGGTG-GGCCT
AAV9         TGAACCCCCTCATCGACCAGTACCTATA--CTACCTGGTCAG--AACACAGAC-AAC----TGGAACTGGGGGA-ACTCAAACTT-----TGGCATTCAGCCAAGCAG-GCCCT
Avian_AAV    TGAATCCTCTCGTCGATCAGTACCTGTGGGCTTTCAGTTCCG-----TCAGCCAAACAGGCTCGTC-TGG-----ACGGGCACT--------CAATT-ATTCACGC-GCGACCA
Bovine_AAV   TGAACCCGCTGCTGGACCAGTACCTGTG--GGAGCT--CCAG-----TCTACC-ACCTCTGGAGGAACTCTCAACCAGGGCAATTCAGCCACCAACTTTGCCAAGCTG--ACCA

AAV-LK01     AATACAAT--GGCCAATCAGGCAAAGAACTGGCTGCCAGGACCC-TGTTACCGCCAACAACGCGTCTC-AAC-GACAACCGGGCAAAACAACAATAGCAACTTTGCCTG----G
AAV-LK02     AATACAAT--GGCCAATCAGGCAAAGAACTGGCTGCCAGGACCC-TGTTACCGCCAACAACGCGTCTC-AAC-GACAACCGGGCAAAACAACAATAGCAATTTTACCTG----G
AAV-LK03     CAGTCTAT--GTCTTTGCAGGCCAGAAATTGGCTACCTGGGCCC-TGCTACCGGCAACAGAGACTTTC-AAA-GACTGCTAACGACAACAACAACAGTAACTTTCCTTG----G
AAV1         GCTGGCAT--GTCTGTTCAGCCCAAAAACTGGCTACCTGGACCC-TGTTATCGGCAGCAGCGCGTTTCTAAA--ACAAAAACAGACAACAACAACAGCAATTTTACCTG----G
AAV2         AGTGACATTCGG--GACCAGTCTAGGAACTGGCTTCCTGGACCC-TGTTACCGCCAGCAGCGAGTATC-AAA-GACATCTGCGGATAACAACAACAGTGAATACTCGTG----G
AAV3B        CAGTCTAT--GTCTTTGCAGGCCAGAAATTGGCTACCTGGGCCC-TGCTACCGGCAACAGAGACTTTC-AAA-GACTGCTAACGACAACAACAACAGTAACTTTCCTTG----G
AAV4         A--CCAACTTTTCCAACTTTAAAAAGAACTGGCTGCCCGGGCCT-TCAATCAAGCAGCAGGGCTTCTC-AAA-GACTGCCAATCAAAACTACAAGATCCCTGCCACCGGGT---
AAV5         GGAGATAC---GCCAACACCTACAAAAACTGGTTCCCGGGGCCCATG-GGCCGAACCCAGGGCTGGA--ACCTGGGCTCCGGGGTCAACCGCGCCAGTGTCAGCGCCT------
AAV6         GCTGGCAT--GTCTGTTCAGCCCAAAAACTGGCTACCTGGACCC-TGTTACCGGCAGCAGCGCGTTTCTAAA--ACAAAAACAGACAACAACAACAGCAACTTTACCTGG----
AAV8         AATACAAT--GGCCAATCAGGCAAAGAACTGGCTGCCAGGACCC-TGTTACCGCCAACAACGCGTCTC--AACGACAACCGGGCAAAACAACAATAGCAACTTTGCCTGG----
AAV9         AGCTCAAT--GGCCAATCAGGCTAGAAACTGGGTACCCGGGCCT-TGCTACCGTCAGCAGCGCGTCTCCACA--ACCACCAACCAAAATAACAACAGCAACTTTGCGTGG----
Avian_AAV    AAACCAATATGGCAACCCAGTACAGAAACTGGTTACCTGGACCCTTCGT-CCGGGATCAGCAAATCTTTAC--GGGGGCTAGCAACATCACCCAAAACAACGTGTTCA---A--
Bovine_AAV   AAACAAACTTTTCTGGCTACCGCAAAAACTGGCTCCCGGGGCCCATGATGAAG-CAGCAGAGATTCTCCAA--GACTGCCAGTCAAAACTACAAGATTCCCCAGGGAAGAAACA
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Supplementary Figure 1

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AAV-LK01     ACTG-CTGGGACCA--AATACCA------T------CTGAATGGAAGA--AATTCAT-TGGCTAATCCTGGCATCGCTATGGCAAC-AC--ACAAAGACG--A-CGAGG-AGCG
AAV-LK02     ACTG-GTGCTTCAA--AATATAA------C------CTCAATGGGCGT--GAATCCA-TCATCAACCCTGGCACTGCTATGGCCTC-AC--ACAAAGACG--A-CGAAG-ACAA
AAV-LK03     ACAG-CGGCCAGCA--AATATCA------T------CTCAATGGCCGC--GACTCGC-TGGTGAATCCAGGACCAGCTATGGCCAG-TC--ACAAGGACG--A-TGAAG-AAAA
AAV1         ACTG-GTGCTTCAA--AATATAA------C------CTCAATGGGCGT--GAATCCA-TCATCAACCCTGGCACTGCTATGGCCTC-AC--ACAAAGACG--A-CGAAG-ACAA
AAV2         ACTG-GAGCTACCA--AGTACCA------C------CTCAATGGCAGA--GACTCTC-TGGTGAATCCGGGCCCGGCCATGGCAAGCC---ACAAGGACG--A-TGAAG-AAAA
AAV3B        ACAG-CGGCCAGCA--AATATCA------T------CTCAATGGCCGC--GACTCGC-TGGTGAATCCAGGACCAGCTATGGCCAGTC---ACAAGGACG--A-TGAAG-AAAA
AAV4         -CAGACAGTCTCATCAAATACGAGACGCACAGCACTCTGGACGGAAGATGGAGTGCC---CTGACCCCGGACCTCCAATGGCCACGGC-----TGGACC----TGCGG-ACAG
AAV5         -----TCGCCACGACCAATAGGATGG--------AGCTCGA-GGGCGC--GAGTTACCAGGTGCCCCC--GCAGCCGAACGGCATG-ACCAACAACCTCC--AGGGCAGCAACA
AAV6         ACTG-GTGCTTCAA--AATATAA--C----------CTTAATGGGCGT--GAATCTA-TAATCAACCCTGGCACTGCTATGGCCTC-AC--ACAAAGACG--A-CAAAG-ACAA
AAV8         ACTG-CTGGGACCA--AATACCA--T----------CTGAATGGAAGA--AATTCAT-TGGCTAATCCTGGCATCGCTATGGCAAC-AC--ACAAAGACG--A-CGAGG-AGCG
AAV9         ACGG-GAGCTGCTA--AATTCAAG-C-----------TGAACGGGAGA--GACTCGC-TAATGAATCCTGGCGTGGCTATGGCATCGC---ACAAAGACG--A-CGAGG-ACCG
Avian_AAV    --CGTTTGGGATA---AAGGCAAG------CAGTGGGTGATAGACAATCGGATCAATATGATGCAGCCCGGCCCTGCA---GCAGCG----ACCACCTTT--AGCGGAGAACCC
Bovine_AAV   ACAGTCTGCTCC----ATTATGAGACCAGAACTACCCTCGACGGAAGATGGAG-CAATT--TTGCCCCGGGAACGGCCATGGCAACCGCAGCCAACGACGCCACCGA-------

AAV-LK01     TTTTTTTC--CCAGTAAC-GGGATCCTGATTTTT-----G--GC--AAACAAAATGCTGCCAGAG--ACAATG---CGGATTACAGCGATGTCATGCTCACCAGCGAGGAAGAA
AAV-LK02     GTTCTTTC--CCATGAGC-GGTGTCATGATTTTT-----G--GA--AAAGAGA---GCGCCGGAGCTTCAAAC-ACTGCATTGGA-CAATGTCATGATTACAGACGAAGAGGAA
AAV-LK03     ATTTTTCC--CTATGCAC-GGCAATCTAATATTT-----G--GC--AAAGAA---GGGACAACGGCAAGTAACG-CAGAATTAGA-TAATGTAATGATTACGGATGAAGAAGAG
AAV1         GTTCTTTC--CCATGAGC-GGTGTCATGATTTTT-----G--GA--AAAGAGA---GCGCCGGAGCTTCAAAC-ACTGCATTGGA-CAATGTCATGATTACAGACGAAGAGGAA
AAV2         GTTTTTTC--CTCAGAGC-GGGGTTCTCATCTTT-----G--G--GAAGCAA---GGCTCAGAGAAAACAAATGTGGACATTGAA--AAGGTCATGATTACAGACGAAGAGGAA
AAV3B        ATTTTTCC--CTATGCAC-GGCAATCTAATATTT-----G--GC--AAAGAA---GGGACAACGGCAAGTAACG-CAGAATTAGA-TAATGTAATGATTACGGATGAAGAAGAG
AAV4         CAAGTT-----CAGCAACAGCCA-GCTCATCTTT-GCGGG--GCCTAAACAGAACGGCAACACGGCCACCGTACCCGGGACTC--------TGATCTTCACCTCTGAGGAGGAG
AAV5         CCTATGC---CCTGGAG--AACACTATGATCTTCAACAGCCAGCCGGCGAACCCGGGCACCACCGCCACGTAC--CTCGAGGGCAACA---TGCTCATCACCAGCGAGAGCGAG
AAV6         GTTCTTTC--CCATGAGC-GGTGTCATGATTTTT-----GGA----AAGGAGA---GCGCCGGAGCTTCAAAC-ACTGCATTGGA-CAATGTCATGATCACAGACGAAGAGGAA
AAV8         TTTTTTTC--CCAGTAAC-GGGATCCTGATTTTT-----G--GC--AAACAAAATGCTGCCAGAG--ACAATG---CGGATTACAGCGATGTCATGCTCACCAGCGAGGAAGAA
AAV9         CTTCTTT---CCATCAAGTGGCGTTCTCATATTT-----G--GC--AAGCAA---GGAGCCGGGA--ACGATGGAGTCGACTACAGCCAGGTGCTGATTACAGATGAGGAAGAA
Avian_AAV    GACCGTCAAGCCATGCA-AAACACGCTGGCCTTTAGTCGGACGGTCTACGACCAGACAACCAGTACGAC--------CGATCGTAACCAGTTGCTCATTACCAACGAAGATGAA
Bovine_AAV   CTTCTCT----CAGGCCCAG-----CTCATCTTT---GCGGGGCCCAACATCACCGGCAACACCACCACA--------GATGCCAATAACCTGATGTTCACTTCAGAAGATGAA

AAV-LK01     ATCAAAACCACTAACCCTGTGGC-TACAGAGGAATACG-GTATCG-TGGCAGATAACTTGCAGC---AGCAAAACAC-GGCTCCTCAAATTGGAACTGTCAACAGCCA-GGGGG
AAV-LK02     ATTAAAGCCACTAACCCTGTGGC-CACCGAAAGATTTG-GGACCG-TGGCAGTCAATTTCCAGAGC-AGCAGCACA---GACCCTGCGACCGGAGATGTGCAT-GCTATGGGAG
AAV-LK03     ATTCGTACCACCAATCCTGTGGC-AACAGAGCAGTATG-GAACTG-TGGCAAATAACTTGCAGAGC-TCAAATACA---GCTCCCACGACTAGAACTGTCAATGATCA-GGGGG
AAV1         ATTAAAGCCACTAACCCTGTGGC-CACCGAAAGATTTG-GGACCG-TGGCAGTCAATTTCCAGAGC-AGCAGCACA---GACCCTGCGACCGGAGATGTGCAT-GCTATGGGAG
AAV2         ATCAGGACAACCAATCCCGTGGC-TACGGAGCAGTATG-GTTCTG-TATCTACCAACCTCCAGAGA-GGCAACAGACAAGCAGCT---ACCGCAGATGTCAACACACAAGGCGT
AAV3B        ATTCGTACCACCAATCCTGTGGC-AACAGAGCAGTATG-GAACTG-TGGCAAATAACTTGCAGAGC-TCAAATACA---GCTCCCACGACTAGAACTGTCAATGATCA-GGGGG
AAV4         CTGGCAGCCACCAACGCCACCGA-TACGGACATGTGGGGCAACC--TACCTGGCGGTGACCAGAGCAACAGCAAC-----CTGCCGACCGTGGACAGACTGACAGCCTTGGGAG
AAV5         ACGCAGCCGGTGAACCGCGTGGCGTACA---ACGTCGGCGGGCAGATGGCCACCAACAACCAGAGC-TCCACCACT---GCCCCCGCGACCGGCACGTACAACCTCCA-GGAAA
AAV6         ATCAAAGCCACTAACCCCGTGGC-CACCGAAAGATTTG-GGACTG-TGGCAGTCAATCTCCAGAGC-AGCAGCACA---GACCCTGCGACCGGAGATGTGCAT-GTTATGGGAG
AAV8         ATCAAAACCACTAACCCTGTGGC-TACAGAGGAATACG-GTATCG-TGGCAGATAACTTGCAGC---AGCAAAACAC-GGCTCCTCAAATTGGAACTGTCAACAGCCA-GGGGG
AAV9         ATTAAAGCCACCAACCCTGTAGC-CACAGAGGAATACG--GAGCAGTGGCCATCAACAACCAG-GCCGCTAACACGCAGGCGC---AAACTGGACTTGTGCATAACCA-GGGAG
Avian_AAV    ATCAGACCCACCAACTCGGTCGG-CATCGACACGT--GGGGAGTAGTTCCCAACAACAACCAGTCCAAGGTGACCGCCGGCACTCGCG--CGGCCA--TCAACAACCAAGGGGC
Bovine_AAV   CTTAGGGCCACCAACCCCCGGGA-CACTGACCTGTTTGGCCACC--TGGCAACCAACCAGCAAAAC-GCCACCACC---GTTCCTACCGTAGACGACGTGGACGGAG-TCGGCG

AAV-LK01     CCTTACCCGGTATGGTCTGGCAGAACCGGGACGTGTACCTGCAGGGTCCCATCTGGGCCAAGATTCCTCACACGGACGGCAACTTCCACCCGTCTCCGCTGATGGGCGGCTTTG
AAV-LK02     CATTACCTGGCATGGTGTGGCAAGATAGAGACGTGTACCTGCAGGGTCCCATTTGGGCCAAAATTCCTCACACAGATGGACACTTTCACCCGTCTCCTCTTATGGGCGGCTTTG
AAV-LK03     CCTTACCTGGCATGGTGTGGCAAGATCGTGACGTGTACCTTCAAGGACCTATCTGGGCAAAGATTCCTCACACGGATGGACACTTTCATCCTTCTCCTCTGATGGGAGGCTTTG
AAV1         CATTACCTGGCATGGTGTGGCAAGATAGAGACGTGTACCTGCAGGGTCCCATTTGGGCCAAAATTCCTCACACAGATGGACACTTTCACCCGTCTCCTCTTATGGGCGGCTTTG
AAV2         TCTT-CCAGGCATGGTCTGGCAGGACAGAGATGTGTACCTTCAGGGGCCCATCTGGGCAAAGATTCCACACACGGACGGACATTTTCACCCCTCTCCCCTCATGGGTGGATTCG
AAV3B        CCTTACCTGGCATGGTGTGGCAAGATCGTGACGTGTACCTTCAAGGACCTATCTGGGCAAAGATTCCTCACACGGATGGACACTTTCATCCTTCTCCTCTGATGGGAGGCTTTG
AAV4         CCGTGCCTGGAATGGTCTGGCAAAACAGAGACATTTACTACCAGGGTCCCATTTGGGCCAAGATTCCTCATACCGATGGACACTTTCACCCCTCACCGCTGATTGGTGGGTTTG
AAV5         TCGTGCCCGGCAGCGTGTGGATGGAGAGGGACGTGTACCTCCAAGGACCCATCTGGGCCAAGATCCCAGAGACGGGGGCGCACTTTCACCCCTCTCCGGCCATGGGCGGATTCG
AAV6         CCTTACCTGGAATGGTGTGGCAAGACAGAGACGTATACCTGCAGGGTCCTATTTGGGCCAAAATTCCTCACACGGATGGACACTTTCACCCGTCTCCTCTCATGGGCGGCTTTG
AAV8         CCTTACCCGGTATGGTCTGGCAGAACCGGGACGTGTACCTGCAGGGTCCCATCTGGGCCAAGATTCCTCACACGGACGGCAACTTCCACCCGTCTCCGCTGATGGGCGGCTTTG
AAV9         TTATTCCTGGTATGGTCTGGCAGAACCGGGACGTGTACCTGCAGGGCCCTATTTGGGCTAAAATACCTCACACAGATGGCAACTTTCACCCGTCTCCTCTGATGGGTGGATTTG
Avian_AAV    GCTT-CCCGGGATGGTGTGGCAAAACAGAGACATTTACCTCCAAGGACCCATTTGGGCCAAAATCCCCGACACAGACAATCACTTCCATCCGTCCCCGCTTATTGGCGGGTTTG
Bovine_AAV   TGTACCCGGGAATGGTGTGGCAGGACAGAGACATTTACTACCAAGGGCCCATTTGGGCCAAAATTCCACACACGGATGGACACTTTCACCCGTCTCCTCTCATTGGCGGATTTG

AAV-LK01     GCCTGAAACATCCTCCGCCTCAGATCCTGATCAAGAACACGCCTGTACCTGCGGAT-CCTCCGAC-CACCTT-CAACCA-GTCAAAGCTGAACTCTTTCATCACGCAATACAGC
AAV-LK02     GACTCAAGAACCCGCCTCCTCAGATCCTCATCAAAAACACGCCTGTTCCTGCGAAT-CCTCCGGCGGAGTTTTCAGCTA---CAAAGTTTGCTTCATTCATCACCCAATACTCC
AAV-LK03     GACTGAAACATCCGCCTCCTCAAATCATGATCAAAAATACTCCGGTACCGGCAAAT-CCTCCGAC-GACTTT-CAGCCC-GGCCAAGTTTGCTTCATTTATCACTCAGTACTCC
AAV1         GACTCAAGAACCCGCCTCCTCAGATCCTCATCAAAAACACGCCTGTTCCTGCGAAT-CCTCCGGCGGAGTTTTCAGCTA---CAAAGTTTGCTTCATTCATCACCCAATACTCC
AAV2         GACTTAAACACCCTCCTCCACAGATTCTCATCAAGAACACCCCGGTACCTGCGAAT-CCTTCGAC-CACCTT-CAGTGC-GGCAAAGTTTGCTTCCTTCATCACACAGTACTCC
AAV3B        GACTGAAACATCCGCCTCCTCAAATCATGATCAAAAATACTCCGGTACCGGCAAAT-CCTCCGAC-GACTTT-CAGCCC-GGCCAAGTTTGCTTCATTTATCACTCAGTACTCC
AAV4         GGCTGAAACACCCGCCTCCTCAAATTTTTATCAAGAACACCCCGGTACCTGCGAAT-CCTGCAAC-GACCTT-CAGCTCT-ACTCCGGTAAACTCCTTCATTACTCAGTACAGC
AAV5         GACTCAAACACCCACCGCCCATGATGCTCATCAAGAACACGCCTGTGCCCGGAAATATCACCAGC----TTCTCGGACGTGCCC--GTCAGCAGC-TTCATCACCCAGTACAGC
AAV6         GACTTAAGCACCCGCCTCCTCAGATCCTCATCAAAAACACGCCTGTTCCTGCGAAT-CCTCCGGCAGAGTTTTCGGCTA---CAAAGTTTGCTTCATTCATCACCCAGTATTCC
AAV8         GCCTGAAACATCCTCCGCCTCAGATCCTGATCAAGAACACGCCTGTACCTGCGGAT-CCTCCGAC-CACCTT-CAACCA-GTCAAAGCTGAACTCTTTCATCACGCAATACAGC
AAV9         GACTGAAACACCCACCTCCACAGATTCTAATTAAAAATACACCAGTGCCGGCAGAT-CCTCCT-CTTACCTT-CAATCAAG-CCAAGCTGAACTCTTTCATCACGCAGTACAGC
Avian_AAV    GCTGCAAGCATCCCCCTCCCCAGATTTTCATTAAAAACACACCCGTCCCGGCCAAC-CCTTCGGAA-ACGTTCCAGAC--GGCCAAGGTGGCCTCCTTCATCAACCAGTACTCG
Bovine_AAV   GACTGAAAAGCCCGCCTCCACAAATATTCATCAAAAACACTCCTGTACCCGCCAAT-CCCGCAAC-GACCTT-CTCTCCGGCCAGAATCAACAGC-TTCATCACCCAGTACAGC

AAV-LK01     ACCGGACAGGTCAGCGTGGAGATCGAGTGGGAGCTGCAGAAGGAAAACAGCAAGCGCTGGAACCCGGAGATCCAGTACACTTCCAACTATT----ACAAG-TCT-AATAATGTT
AAV-LK02     ACAGGACAAGTGAGTGTGGAAATTGAATGGGAGCTGCAGAAAGAAAACAGCAAGCGCTGGAATCCCGAAGTGCAGTACACATCCAATTATG-----CAAAATCT-GCCAACGTT
AAV-LK03     ACTGGACAGGTCAGCGTGGAAATTGAGTGGGAGCTACAGAAAGAAAACAGCAAACGTTGGAATCCAGAGATTCAGTACACTTCCAACTACA----ACAAG-TCT-GTTAATGTG
AAV1         ACAGGACAAGTGAGTGTGGAAATTGAATGGGAGCTGCAGAAAGAAAACAGCAAGCGCTGGAATCCCGAAGTGCAGTACACATCCAATTATG-----CAAAATCT-GCCAACGTT
AAV2         ACGGGACAGGTCAGCGTGGAGATCGAGTGGGAGCTGCAGAAGAAAACAGCAAACGCTGGAATCCCGAAATTCAGTACACTTCCAACTACA----ACAAG-TCT-GTTAATGTG
AAV3B        ACTGGACAGGTCAGCGTGGAAATTGAGTGGGAGCTACAGAAAGAAAACAGCAAACGTTGGAATCCAGAGATTCAGTACACTTCCAACTACA----ACAAG-TCT-GTTAATGTG
AAV4         ACTGGCCAGGTGTCGGTGCAGATTGACTGGGAGATCCAGAAGGAGCGGTCCAAACGCTGGAACCCCGAGGTCCAGTTTACCTCCAACTACGGACAGCAAA-ACTCTCTGTTGTG
AAV5         ACCGGGCAGGTCACCGTGGAGATGGAGTGGGAGCTCAAGAAGGAAACTCCAAGAGGTGGAACCCAGAGATCCAGTACACAAACAACTACAA----CGACCCCCAGTT--TGTG
AAV6         ACAGGACAAGTGAGCGTGGAGATTGAATGGGAGCTGCAGAAAGAAAACAGCAAACGCTGGAATCCCGAAGTGCAGTATACATCTAACTATG-----CAAAATCT-GCCAACGTT
AAV8         ACCGGACAGGTCAGCGTGGAAATTGAATGGGAGCTGCAGAAGGAAAACAGCAAGCGCTGGAACCCCGAGATCCAGTACACCTCCAACTACT----ACAAA-TCT-ACAAGTGTG
AAV9         ACGGGACAAGTCAGCGTGGAAATCGAGTGGGAGCTGCAGAAAGAAAACAGCAAGCGCTGGAATCCAGAGATCCAGTATACTTCAAACTACT----ACAAA-TCT-ACAAATGTG
Avian_AAV    ACCGGACAGTGCACCGTCGAAATCTTTTGGGAACTCAAGAAGGAAACCTCCAAGCGCTGGAACCCCGAAATCCAGTTCACCTCCAACTTTG----GCAAC-GCG-GCCGACATC
Bovine_AAV   ACCGGACAGGTGGCTGTCAAAATAGAATGGGAAATCCAGAAGGAGCGGTCCAAGAGATGGAACCCAGAGGTCCAGTTCACGTCCAACTACGGAGCACAGGA-CTCGCTTCTCTG

AAV-LK01     GAATTTGCTGTTAATACTGAAGGTGTATATAGTGAACCCC--GCCCCATTGGCACCAGATACCTGACTCGTAATCTGTAA
AAV-LK02     GATTTTACTGTGGACAACAATGGACTTTATACTGAGCCTC--GCCCCATTGGCACCCGTTACCTCACCCGTCCCCTGTAA
AAV-LK03     GACTTTACTGTAGACACTAATGGTGTTTATAGTGAACCTC--GCCCCATTGGCACCCGTTACCTTACCCGTCCCCTGTAA
AAV1         GATTTTACTGTGGACAACAATGGACTTTATACTGAGCCTC--GCCCCATTGGCACCCGTTACCTTACCCGTCCCCTGTAA
AAV2         GACTTTACTGTGGACACTAATGGCGTGTATTCAGAGCCTC--GCCCCATTGGCACCAGATACCTGACTCGTAATCTGTAA
AAV3B        GACTTTACTGTAGACACTAATGGTGTTTATAGTGAACCTC--GCCCTATTGGAACCCGGTATCTCACACGAAACTTGTAA
AAV4         GG-----CTCCCGATGCGGCTGGGAAATACACTGAGCCTA--GGGCTATCGGTACCCGCTACCTCACCCACCACCTGTAA
AAV5         GACTTTGCCCCGGACAGCACCGGGGA--ATACAGAACCACCAGACCTATCGGAACCCGATACCTTACCCGACCCCTTTAA
AAV6         GATTTCACTGTGGACAACAATGGACTTTATACTGAGCCTC--GCCCCATTGGCACCCGTTACCTCACCCGTCCCCTGTAA
AAV8         GACTTTGCTGTTAATACAGAAGGCGTGTACTCTGAACCCC--GCCCCATTGGCACCCGTTACCTCACCCGTAATCTGTAA
AAV9         GACTTTGCTGTCAATACCAAAGGTGTTTACTCTGAGCCTC--GCCCCATTGGTACTCGTTACCTCACCCGTAATTTGTAA
Avian_AAV    CAGTTTGCTGTCTCCGACACCGGATCCTATTCCGAACCTC--GTCCCATCGGTACCCGGTACCTTACCAAACCTCTGTAA
Bovine_AAV   G-----GCTCCCGACAACGCCGGAGCCTACAAAGAGCCCA--GGGCCATTGGATCCCGATACCTCACCAACCACCTCTAG
```

Supplementary Figure 1

b. AAV Cap Sequence alignment – Protein

Supplementary Figure 2. AAV Cap protein sequence comparison. Alignment of AAV Cap amino acid sequences of parental AAVs used for library generation and the top three *in vivo* isolates (AAV-LK01, AAV-LK02, and AAV-LK03).

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                                  1         10        20        30        40        50        60        70        80
AAV-LK01 translation              MA-ADGYLPDWLEDNLSEGIR---EWWALKPGAPQPKANQQHQ-----DNARGLVLPGYKYLGPGNGLDKGEPVNAADAAAL
AAV-LK02 translation              MA-ADGYLPDWLEDNLSEGIR---EWWDLKPGAPKPKANQQKQ-----DDGRGLVLPGYKYLGPFNGLDKGEPVNAADAAAL
AAV-LK03 translation              MA-ADGYLPDWLEDNLSEGIR---EWWALQPGAPKPKANQQHQ-----DNARGLVLPGYKYLGPGNGLDKGEPVNAADAAAL
AAV1 translation                  MA-ADGYLPDWLEDNLSEGIR---EWWDLKPGAPKPKANQQKQ-----DDGRGLVLPGYKYLGPFNGLDKGEPVNAADAAAL
AAV2 translation                  MA-ADGYLPDWLEDTLSEGIR---QWWKLKPGPPPPKPAERHK-----DDSRGLVLPGYKYLGPFNGLDKGEPVNEADAAAL
AAV3B translation                 MA-ADGYLPDWLEDNLSEGIR---EWWALKPGVPQPKANQQHQ-----DNRRGLVLPGYKYLGPGNGLDKGEPVNEADAAAL
AAV4 translation                  MT--DGYLPDWLEDNLSEGVR---EWWALQPGAPKPKANQQHQ-----DNARGLVLPGYKYLGPGNGLDKGEPVNAADAAAL
AAV5 translation                  MSFVD-HPPDWLEE-VGEGLR---EFLGLEAGPPKPKPNQQHQ-----DQARGLVLPGYNYLGPGNGLDRGEPVNRADEVAR
AAV6 translation                  MA-ADGYLPDWLEDNLSEGIR---EWWDLKPGAPKPKANQQKQ-----DDGRGLVLPGYKYLGPFNGLDKGEPVNAADAAAL
AAV8 translation                  MA-ADGYLPDWLEDNLSEGIR---EWWALKPGAPKPKANQQKQ-----DDGRGLVLPGYKYLGPFNGLDKGEPVNAADAAAL
AAV9 translation                  MA-ADGYLPDWLEDNLSEGIR---EWWALKPGAPKPKANQQKQ-----DDGRGLVLPGYKYLGPFNGLDKGEPVNAADAAAL
Avian_AAV translation             MSLISDAIPDWLERLVKKGVNAAADFYHLESGPPHPKANQQTQESPEKDDSRGLVFPGYKYLGPFNGLDKGKPVNEADAAAL
Bovine_AAV translation            MSFVD-HPPDWLE-SIGDGFR---EFLGLEAGPPKPKANQQKQ-----DNARGLVLPGYKYLGPGNGLDKGDPVNFADEVAR

                                          90        100       110       120       130       140       150       160
AAV-LK01 translation              EHDKAYDQQLQAGDNPYLRYNHADAEFQERLQEDTSFGGNLGRAVFQAKKRILEPLGLVEEAAKTAPG-KKRPVDQSPQ-EP
AAV-LK02 translation              EHDKAYDQQLKAGDNPYLRYNHADAEFQERLQEDTSFGGNLGRAVFQAKKRVLEPLGLVEEGAKTAPG-KKRPVEQSPQ-EP
AAV-LK03 translation              EHDKAYDQQLKAGDNPYLKYNHADAEFQERLKEDTSFGGNLGRAVFQAKKRLLEPLGLVEEAAKTAPG-KKRPVDQSPQ-EP
AAV1 translation                  EHDKAYDQQLKAGDNPYLRYNHADAEFQERLQEDTSFGGNLGRAVFQAKKRVLEPLGLVEEGAKTAPG-KKRPVEQSPQ-EP
AAV2 translation                  EHDKAYDRQLDSGDNPYLKYNHADAEFQERLKEDTSFGGNLGRAVFQAKKRVLEPLGLVEEPVKTAPG-KKRPVEHSPV-EP
AAV3B translation                 EHDKAYDQQLKAGDNPYLKYNHADAEFQERLQEDTSFGGNLGRAVFQAKKRILEPLGLVEEAAKTAPG-KKRPVDQSPQ-EP
AAV4 translation                  EHDKAYDQQLKAGDNPYLKYNHADAEFQQRLQGDTSFGGNLGRAVFQAKKRVLEPLGLVEQAGETAPG-KKRPLIESPQ-QP
AAV5 translation                  EHDISYNEQLEAGDNPYLKYNHADAEFQEKLADDTSFGGNLGKAVFQAKKRVLEPFGLVEEGAKTAPTGKR--IDDH---FP
AAV6 translation                  EHDKAYDQQLKAGDNPYLRYNHADAEFQERLQEDTSFGGNLGRAVFQAKKRVLEPFGLVEEGAKTAPG-KKRPVEQSPQ-EP
AAV8 translation                  EHDKAYDQQLQAGDNPYLRYNHADAEFQERLQEDTSFGGNLGRAVFQAKKRVLEPLGLVEEGAKTAPG-KKRPVEPSPQRSP
AAV9 translation                  EHGKAYDQQLQAGDNPYLRYNHADAEFQERLQEDTSFGGNLGRAVFQAKKRVLEPLGLVEEGAKTAPG-KKRPVEPSPQRSP
Avian_AAV translation             EHDKAYDLELKDGHNPYFEYNEADRRFQERLKDDTSFGGNLGKAIFQAKKRVLEPFGLIEQPDNTAGTGEKRP-ERVDDFFP
Bovine_AAV translation            EHDLSYQKQLEAGDNPYLKYNHADAEFQEKLASDTSFGGNLGKAVFQAKKRILEPLGLVETPDKTAPAAKKRPLEQSPQ-EP

                                      170       180       190       200       210       220       230       240
AAV-LK01 translation              DSSSGVGKSGKQPARKRLNF-GQTGDSESVPDPQPLGEPPAAP-TSLGSNTMASGGAPMADNNEGADGVGSSSGNWHCDSQ
AAV-LK02 translation              DSSSGIGKTGQQPAKKRLNF-GQTGDSESVPDPQPLGEPPATP-AAVGPTTMASGGAPMADNNEGADGVGNASGNWHCDST
AAV-LK03 translation              DSSSGVGKSGKQPARKRLNF-GQTGDSESVPDPQPLGEPPAAP-TSLGSNTMASGGAPMADNNEGADGVGNSSGNWHCDSQ
AAV1 translation                  DSSSGIGKTGQQPAKKRLNF-GQTGDSESVPDPQPLGEPPATP-AAVGPTTMASGGAPMADNNEGADGVGNASGNWHCDST
AAV2 translation                  DSSSGTGKAGQQPARKRLNF-GQTGDADSVPDPQPLGQPPAAP-SGLGTNTMATGSGAPMADNNEGADGVGNSSGNWHCDST
AAV3B translation                 DSSSGVGKSGKQPARKRLNF-GQTGDSESVPDPQPLGEPPAAP-TSLGSNTMASGGAPMADNNEGADGVGNSSGNWHCDSQ
AAV4 translation                  DSSTGIGKKGKQPAKKKLVFEDETGAGDGPPEGSTSGAMS-------DDSEMRAAAGGAAVEGGQGADGVGNASGDWHCDST
AAV5 translation                  KRKKARTEEDSKPST--------SSDAEAGPSGSQQLQIPAQPASSLGADTMSAGGGGPLGDNNQGADGVGNASGDWHCDST
AAV6 translation                  DSSSGIGKTGQQPAKKRLNF-GQTGDSESVPDPQPLGEPPATP-AAVGPTTMASGGAPMADNNEGADGVGNASGNWHCDST
AAV8 translation                  DSSTGIGKKGQQPARKRLNF-GQTGDSESVPDPQPLGEPPAAP-SGVGPNTMAAGGGAPMADNNEGADGVGSSSGNWHCDST
AAV9 translation                  DSSTGIGKKGQQPARKRLNF-GQTGDSESVPDPQPLGEPPAAP-SGVGPNTMAAGGGAPMADNNEGADGVGNSSGNWHCDST
Avian_AAV translation             KKKKAKTEQGKAPA--------QTGEDPGEGTSSNAGS--SAP-SSVGSSVMAEGGGGPMGDAGQGADGVGNSSGNWHCDSQ
Bovine_AAV translation            DSSSGVGKKGKQPARKRLNFDDEPGAGDGPPPEGPSSGAMST------ETEMRAAAGGNGGDAGQGAEGVGNASGDWHCDST

                                      250       260       270       280       290       300       310       320
AAV-LK01 translation              WLGDRVITTSTRTWALPTYNNHLYKQISNGTSGGATNDNTYFGYSTPWGYFDFNRFHCHFSPRDWQRLINNNWGFRPKRLSF
AAV-LK02 translation              WLGDRVITTSTRTWALPTYNNHLYKQISS-ASTGASNDNHYFGYSTPWGYFDFNRFHCHFSPRDWQRLINNNWGFRPKRLNF
AAV-LK03 translation              WLGDRVITTSTRTWALPTYNNHLYKQISS--QSGASNDNHYFGYSTPWGYFDFNRFHCHFSPRDWQRLINNNWGFRPKKLSF
AAV1 translation                  WLGDRVITTSTRTWALPTYNNHLYKQISS-ASTGASNDNHYFGYSTPWGYFDFNRFHCHFSPRDWQRLINNNWGFRPKRLNF
AAV2 translation                  WMGDRVITTSTRTWALPTYNNHLYKQISS--QSGASNDNHYFGYSTPWGYFDFNRFHCHFSPRDWQRLINNNWGFRPKRLNF
AAV3B translation                 WLGDRVITTSTRTWALPTYNNHLYKQISS--QSGASNDNHYFGYSTPWGYFDFNRFHCHFSPRDWQRLINNNWGFRPKKLSF
AAV4 translation                  WSEGHVTTTSTRTWVLPTYNNHLYKRLGE-----SLQSNTYNGFSTPWGYFDFNRFHCHFSPRDWQRLINNNWGMRPKAMRV
AAV5 translation                  WMGDRVVTKSTRTWVLPSYNNHQYREIKSGSVDG-SNANAYFGYSTPWGYFDFNRFHSHWSPRDWQRLINNYWGFRPRSLRV
AAV6 translation                  WLGDRVITTSTRTWALPTYNNHLYKQISS-ASTGASNDNHYFGYSTPWGYFDFNRFHCHFSPRDWQRLINNNWGFRPKRLNF
AAV8 translation                  WLGDRVITTSTRTWALPTYNNHLYKQISNGTSGGATNDNTYFGYSTPWGYFDFNRFHCHFSPRDWQRLINNNWGFRPKRLSF
AAV9 translation                  WLGDRVITTSTRTWALPTYNNHLYKQISNGTSGGSTNDNTYFGYSTPWGYFDFNRFHCHFSPRDWQRLINNNWGFRPKRLNF
Avian_AAV translation             WLDNGVVTRTTRTWVLPSYNNHLYKRIQG--PGGTDPNNKFFGFSTPWGYFDYNRFHCHFSPRDWQRLINNNWGIRPKAMRF
Bovine_AAV translation            WSESHVTTTSTRTWVLPTYNNHLYLRLGS-----SNASDTFNGFSTPWGYFDFNRFHCHFSPRDWQRLINNHWGLRPKSMQV

                                  330       340       350       360       370       380       390       400       410
AAV-LK01 translation              KLFNIQVKEVTQNEGTKTIANNLTSTIQVFTDSEYQLPYVLGSAHQGCLPPFPADVFMIPQYGY---LTLNNGSQAVGRSSF
AAV-LK02 translation              KLFNIQVKEVTTNDGVTTIANNLTSTVQVFSDSEYQLPYVLGSAHQGCLPPFPADVFMIPQYGY---LTLNNGSQAVGRSSF
AAV-LK03 translation              KLFNIQVKEVTQNDGTTTIANNLTSTVQVFTDSEYQLPYVLGSAHQGCLPPFPADVFMVPQYGY---LTLNNGSQAVGRSSF
AAV1 translation                  KLFNIQVKEVTTNDGVTTIANNLTSTVQVFSDSEYQLPYVLGSAHQGCLPPFPADVFMIPQYGY---LTLNNGSQAVGRSSF
AAV2 translation                  KLFNIQVKEVTQNDGTTTIANNLTSTVQVFTDSEYQLPYVLGSAHQGCLPPFPADVFMVPQYGY---LTLNNGSQAVGRSSF
AAV3B translation                 KLFNIQVKEVTQNDGTTTIANNLTSTVQVFTDSEYQLPYVLGSAHQGCLPPFPADVFMVPQYGY---LTLNNGSQAVGRSSF
AAV4 translation                  KIFNIQVKEVTTSNGETTVANNLTSTVQIFADSSYELPYVMDAGQEGSLPPFPNDVFMVPQYGYCGLVTGNTSQQQTDRNAF
AAV5 translation                  KIFNIQVKEVTVQDSTTTIANNLTSTVQVFTDDDYQLPYVVGNGTEGCLPAFPPQVFTLPQYGYA-TLNRDNTENPTERSSF
AAV6 translation                  KLFNIQVKEVTTNDGVTTIANNLTSTVQVFSDSEYQLPYVLGSAHQGCLPPFPADVFMIPQYGY---LTLNNGSQAVGRSSF
AAV8 translation                  KLFNIQVKEVTQNEGTKTIANNLTSTIQVFTDSEYQLPYVLGSAHQGCLPPFPADVFMIPQYGY---LTLNNGSQAVGRSSF
AAV9 translation                  KLFNIQVKEVTTNEGTKTIANNLTSTVQVFTDSEYQLPYVLGSAHQGCLPPFPADVFMVPQYGY---LTLNNGSQALGRSSF
Avian_AAV translation             RLFNIQVKEVTVQDSNTTIANNLTSTVQVFADKDYQLPYVLGSATEGTFPPFPADIYTIPQYGY---CTLNYNNEAVDRSAF
Bovine_AAV translation            RIFNIQVKEVTTSNGETTVSNNLTSTVQIFADSTYELPYVMDAGQEGSLPPFPNDVFMVPQYGYCGLVTGGSSQNQTDRNAF
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Supplementary Figure 2

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                                   420       430       440       450       460       470       480       490
AAV-LK01 translation               YCLEYFPSQMLRTGNNFTFSYTFEEVPFHSSYAHSQSLDRLMNPLIDQYLYYLSRTQ-TTGGTANTQTLGFSQGGPNTMANQ
AAV-LK02 translation               YCLEYFPSQMLRTGNNFQFTYTFEDVPFHSSYAHSQSLDRLMNPLIDQYLYYLSRTQ-TTGGTANTQTLGFSQGGPNTMANQ
AAV-LK03 translation               YCLEYFPSQMLRTGNNFQFSYTFEDVPFHSSYAHSQSLDRLMNPLIDQYLYYLNRTQGTTSGTTNQSRLLFSQAGPQSMSLQ
AAV1 translation                   YCLEYFPSQMLRTGNNFTFSYTFEEVPFHSSYAHSQSLDRLMNPLIDQYLYYLNRTQ-NQSGSAQNKDLLFSRGSPAGMSVQ
AAV2 translation                   YCLEYFPSQMLRTGNNFTFSYTFEDVPFHSSYAHSQSLDRLMNPLIDQYLYYLSRTN-TPSGTTTQSRLQFSQAGASDIRDQ
AAV3B translation                  YCLEYFPSQMLRTGNNFQFSYTFEDVPFHSSYAHSQSLDRLMNPLIDQYLYYLNRTQGTTSGTTNQSRLLFSQAGPQSMSLQ
AAV4 translation                   YCLEYFPSQMLRTGNNFEITYSFEKVPFHSMYAHSQSLDRLMNPLIDQYLWGLQSTTTGTTLNAGTATTNFTKLRPTNFSNF
AAV5 translation                   FCLEYFPSKMLRTGNNFEFTYNFEEVPFHSSFAPSQNLFKLANPLVDQYLYRFVSTN-------NTGGVQFNKNLAGRYANT
AAV6 translation                   YCLEYFPSQMLRTGNNFTFSYTFEDVPFHSSYAHSQSLDRLMNPLIDQYLYYLNRTQ-NQSGSAQNKDLLFSRGSPAGMSVQ
AAV8 translation                   YCLEYFPSQMLRTGNNFQFTYTFEDVPFHSSYAHSQSLDRLMNPLIDQYLYYLSRTQ-TTGGTANTQTLGFSQGGPNTMANQ
AAV9 translation                   YCLEYFPSQMLRTGNNFQFSYTFEDVPFHSSYAHSQSLDRLMNPLIDQYLYYLVRTQ--TTGTGGTQTLAFSQAGPSSMANQ
Avian_AAV translation              YCLDYFPSDMLRTGNNFEFTYTFEDVPFHSMFAHNQTLDRLMNPLVDQYLWAFSSVSQTGS---SGRALNYSRATKTNMATQ
Bovine_AAV translation             YCLEYFPSQMLRTGNNFEMVYKFENVPFHSMYAHSQSLDRLMNPLLDQYLWELQSTTSGGTLNQGNSATNFAKLTKTNFSGY

                                   500       510       520       530       540       550       560       570
AAV-LK01 translation               AKNWLPGPCYRQQRVSTTTGQN-----NNSNFAWTAGTKYHLNGRNSLANPGIAMATHKDDEERFFPSNGILIF-GKQNAAR
AAV-LK02 translation               AKNWLPGPCYRQQRVSTTTGQN-----NNSNFTWTGASKYNLNGRESIINPGTAMASHKDDEDKFFPMSGVMIF-GKESAGA
AAV-LK03 translation               ARNWLPGPCYRQQRLSKTANDN-----NNSNFPWTAASKYHLNGRDSLVNPGPAMASHKDDEEKFFPMHGNLIF-GKEGTTA
AAV1 translation                   PKNWLPGPCYRQQRVSKTKTDN-----NNSNFTWTGASKYNLNGRESIINPGTAMASHKDDEDKFFPMSGVMIF-GKESAGA
AAV2 translation                   SRNWLPGPCYRQQRVSKTSADN-----NNSEYSWTGATKYHLNGRDSLVNPGPAMASHKDDEEKFFPQSGVLIF-GKQGSEK
AAV3B translation                  ARNWLPGPCYRQQRLSKTANDN-----NNSNFPWTAASKYHLNGRDSLVNPGPAMASHKDDEEKFFPMHGNLIF-GKEGTTA
AAV4 translation                   KKNWLPGPSIKQQGFSKTANQNYKIPATGSDSLIKYETHSTLDGRWSALTPGPPMATAGPADSKF--SNSQLIFAGPKQNGN
AAV5 translation                   YKNWFPGPMGRTQGWNLGSGVN-----RASVSAFATTNRMELEGASYQVPPQPNGMTNNLQGSNTYALENTMIFNSQPANPG
AAV6 translation                   PKNWLPGPCYRQQRVSKTKTDN-----NNSNFTWTGASKYNLNGRESIINPGTAMASHKDDKDKFFPMSGVMIF-GKESAGA
AAV8 translation                   AKNWLPGPCYRQQRVSTTTGQN-----NNSNFAWTAGTKYHLNGRNSLANPGIAMATHKDDEERFFPSNGILIF-GKQNAAR
AAV9 translation                   ARNWVPGPCYRQQRVSTTTNQN-----NNSNFAWTGAAKFKLNGRDSLMNPGVAMASHKDDEDRFFPSSGVLIF-GKQGAGN
Avian_AAV translation              YRNWLPGPFVRDQQIFTGASNIT---QNNVFNVWDKGKQWVIDNRINMMQPGPAAATTFSGEPDRQAMQNTLAF-SRTVYDQ
Bovine_AAV translation             RKNWLPGPMMKQQRFSKTASQNYKIPQGRNNSLLHYETRTTLDGRWSNFAPGTAMATAANDATDF--SQAQLIFAGPNITGN

                                   580       590       600       610       620       630       640       650
AAV-LK01 translation               DNADY--SDVMLTSEEEIKTTNPVATEEYGIVADNLQQQNTAPQIGTVNSQGALPGMVWQNRDVYLQGPIWAKIPHTDGNFH
AAV-LK02 translation               SNTAL--DNVMITDEEEIKATNPVATERFGTVAVNFQSSSTDPATGDVHAMGALPGMVWQDRDVYLQGPIWAKIPHTDGHFH
AAV-LK03 translation               SNAEL--DNVMITDEEEIRTTNPVATEQYGTVANNLQSSNTAPTTRTVNDQGALPGMVWQDRDVYLQGPIWAKIPHTDGHFH
AAV1 translation                   SNTAL--DNVMITDEEEIKATNPVATERFGTVAVNFQSSSTDPATGDVHAMGALPGMVWQDRDVYLQGPIWAKIPHTDGHFH
AAV2 translation                   TNVDI--EKVMITDEEEIRTTNPVATEQYGSVSTNLQRGNRQAATADVNTQGVLPGMVWQDRDVYLQGPIWAKIPHTDGHFH
AAV3B translation                  SNAEL--DNVMITDEEEIRTTNPVATEQYGTVANNLQSSNTAPTTRTVNDQGALPGMVWQDRDVYLQGPIWAKIPHTDGHFH
AAV4 translation                   TATVP--GTLIFTSEEELAATNATDTDMWGNLPGGDQSNSNLPTVDRLTALGAVPGMVWQNRDIYYQGPIWAKIPHTDGHFH
AAV5 translation                   TTATYLEGNMLITSESETQPVNRVAYNVGGQMATNNQSSTTAPATGTYNLQEIVPGSVWMERDVYLQGPIWAKIPETGAHFH
AAV6 translation                   SNTAL--DNVMITDEEEIKATNPVATERFGTVAVNLQSSSTDPATGDVHVMGALPGMVWQDRDVYLQGPIWAKIPHTDGHFH
AAV8 translation                   DNADY--SDVMLTSEEEIKTTNPVATEEYGIVADNLQQQNTAPQIGTVNSQGALPGMVWQNRDVYLQGPIWAKIPHTDGNFH
AAV9 translation                   DGVDY--SQVLITDEEEIKATNPVATEEYGAVAINNQAANTQAQTGLVHNQGVIPGMVWQNRDVYLQGPIWAKIPHTDGNFH
Avian_AAV translation              TTSTTDRNQLLITNEDEIRPTNSVGIDTWGVVPNNNQSKVTAGTRAAINNQGALPGMVWQNRDIYLQGPIWAKIPDTDNHFH
Bovine_AAV translation             TTTDA--NNLMFTSEDELRATNPRDTDLFGHLATNQQNATTVPTVDDVDGVGVYPGMVWQDRDIYYQGPIWAKIPHTDGHFH

                                   660       670       680       690       700       710       720       730
AAV-LK01 translation               PSPLMGGFGLKHPPPQILIKNTPVPADPPTTFNQSKLNSFITQYSTGQVSVEIEWELQKENSKRWNPEIQYTSNYYKSNNVE
AAV-LK02 translation               PSPLMGGFGLKNPPPQILIKNTPVPANPPAEFSATKFASFITQYSTGQVSVEIEWELQKENSKRWNPEVQYTSNYAKSANVD
AAV-LK03 translation               PSPLMGGFGLKHPPPQIMIKNTPVPANPPTTFSPAKFASFITQYSTGQVSVEIEWELQKENSKRWNPEIQYTSNYNKSVNVD
AAV1 translation                   PSPLMGGFGLKNPPPQILIKNTPVPANPPAEFSATKFASFITQYSTGQVSVEIEWELQKENSKRWNPEVQYTSNYAKSANVD
AAV2 translation                   PSPLMGGFGLKHPPPQILIKNTPVPANPSTTFSAAKFASFITQYSTGQVSVEIEWELQKENSKRWNPEIQYTSNYNKSVNVD
AAV3B translation                  PSPLMGGFGLKHPPPQIMIKNTPVPANPPTTFSPAKFASFITQYSTGQVSVEIEWELQKENSKRWNPEIQYTSNYNKSVNVD
AAV4 translation                   PSPLIGGFGLKHPPPQIFIKNTPVPANPATTFSSTPVNSFITQYSTGQVSVQIDWEIQKERSKRWNPEVQFTSNYGQQNSLL
AAV5 translation                   PSPAMGGFGLKHPPPMMLIKNTPVPGN-ITSFSDVPVSSFITQYSTGQVTVEMEWELKKENSKRWNPEIQYTNNYNDPQFVD
AAV6 translation                   PSPLMGGFGLKHPPPQILIKNTPVPANPPAEFSATKFASFITQYSTGQVSVEIEWELQKENSKRWNPEVQYTSNYAKSANVD
AAV8 translation                   PSPLMGGFGLKHPPPQILIKNTPVPADPPTTFNQSKLNSFITQYSTGQVSVEIEWELQKENSKRWNPEIQYTSNYYKSTSVD
AAV9 translation                   PSPLMGGFGLKHPPPQILIKNTPVPADPPLTFNQAKLNSFITQYSTGQVSVEIEWELQKENSKRWNPEIQYTSNYYKSTNVD
Avian_AAV translation              PSPLIGGFGCKHPPPQIFIKNTPVPANPSETFQTAKVASFINQYSTGQCTVEIFWELKKETSKRWNPEIQFTSNFGNAADIQ
Bovine_AAV translation             PSPLIGGFGLKSPPPQIFIKNTPVPANPATTFSPARINSFITQYSTGQVAVKIEWEIQKERSKRWNPEVQFTSNYGAQDSLL

                                   740       750       762
AAV-LK01 translation               FAVNTEGVYSEPRPIGTRYLTRNL
AAV-LK02 translation               FTVDNNGLYTEPRPIGTRYLTRPL
AAV-LK03 translation               FTVDTNGVYSEPRPIGTRYLTRPL
AAV1 translation                   FTVDNNGLYTEPRPIGTRYLTRPL
AAV2 translation                   FTVDTNGVYSEPRPIGTRYLTRNL
AAV3B translation                  FTVDTNGVYSEPRPIGTRYLTRNL
AAV4 translation                   WAPDAAGKYTEPRAIGTRYLTHHL
AAV5 translation                   FAPDSTGEYRTTRPIGTRYLTRPL
AAV6 translation                   FTVDNNGLYTEPRPIGTRYLTRPL
AAV8 translation                   FAVNTEGVYSEPRPIGTRYLTRNL
AAV9 translation                   FAVNTKGVYSEPRPIGTRYLTRNL
Avian_AAV translation              FAVSDTGSYSEPRPIGTRYLTKPL
Bovine_AAV translation             WAPDNAGAYKEPRAIGSRYLTNHL
```
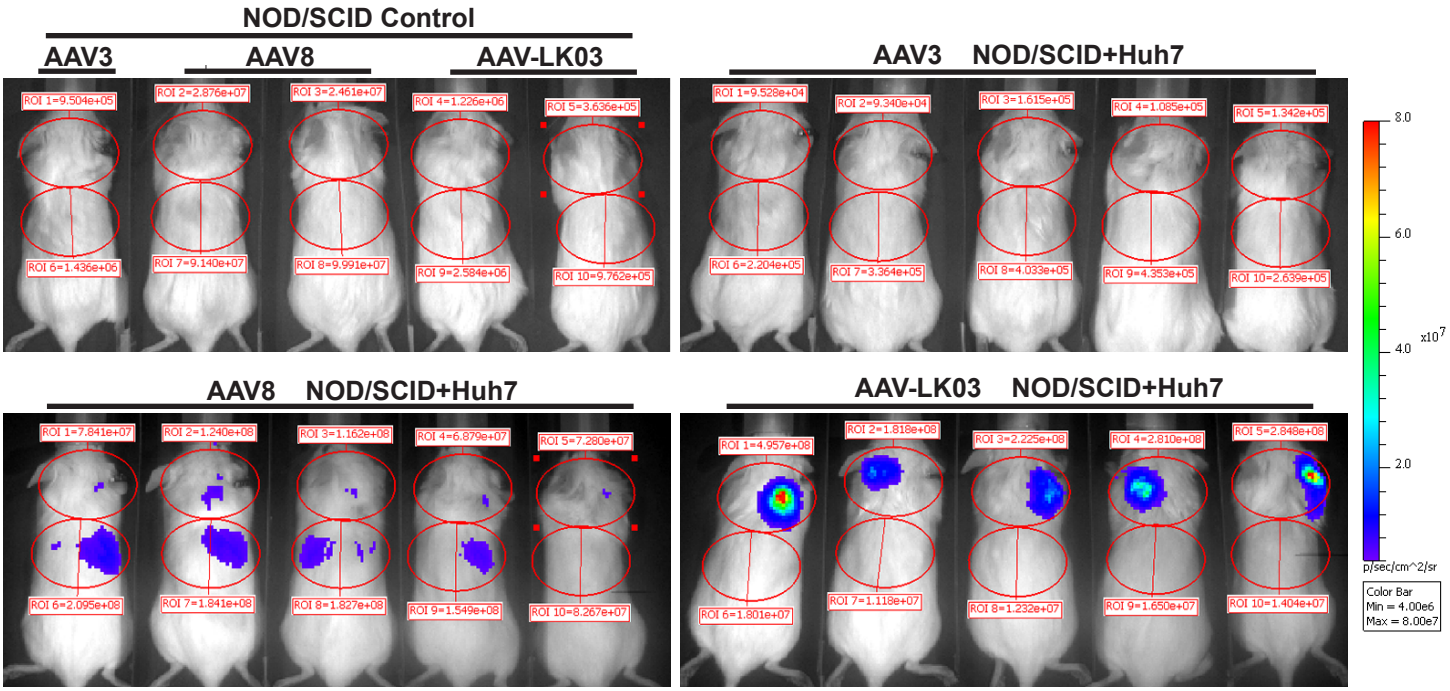

Supplementary Figure 2

c. Bioluminescence analysis in HCC xenografts – common pseudo-scale

Supplementary Figure 3. Detailed analysis of bioluminescence analysis for animals shown in Figure 4a on dorsal (**a**) and ventral (**b**) side. ROIs and photon outputs are indicated in the figure. Table represents detailed information on signal for each animal/ROI. In each animal the upper ROI was selected to analyze the signal from implanted hepatocellular carcinomas, while the lower ROI was selected to obtain information on Luc signal from the liver. Identical pseudo scale was applied to all animals (shown in the figure).

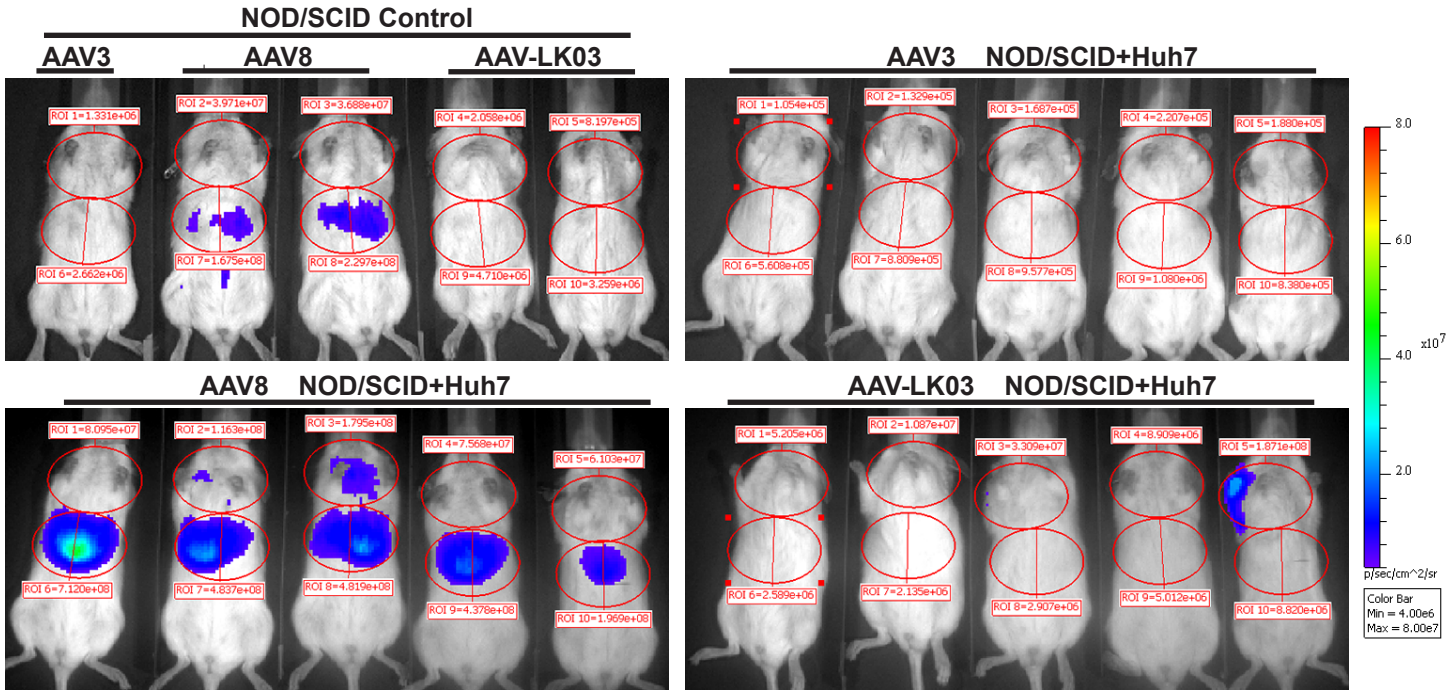
Dorsal



Serotype	Animal	ROI	ROI Target	Total Flux (p/s)	Avg Radiance (p/s/cm2/sr)	Stdev Radiance	Min Radiance	Max Radiance	Area (cm2)
AAV3	NOD/SCID Control	ROI 1	Tumor	9.50E+05	1.57E+04	1.20E+04	-1.47E+04	5.92E+04	4.87E+00
AAV8	NOD/SCID Control	ROI 2	Tumor	2.88E+07	4.82E+05	2.15E+05	3.75E+04	1.18E+06	4.87E+00
AAV8	NOD/SCID Control	ROI 3	Tumor	2.46E+07	4.08E+05	1.76E+05	3.22E+04	1.25E+06	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 4	Tumor	1.23E+06	2.04E+04	1.37E+04	-1.39E+04	7.07E+04	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 5	Tumor	3.64E+05	6.02E+03	1.04E+04	-2.32E+04	3.93E+04	4.87E+00
AAV3	NOD/SCID Control	ROI 6	Liver	1.44E+06	2.39E+04	1.52E+04	-1.22E+04	6.86E+04	4.87E+00
AAV8	NOD/SCID Control	ROI 7	Liver	9.14E+07	1.53E+06	6.05E+05	1.17E+05	3.96E+06	4.87E+00
AAV8	NOD/SCID Control	ROI 8	Liver	9.99E+07	1.65E+06	5.49E+05	1.39E+05	3.01E+06	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 9	Liver	2.58E+06	4.31E+04	2.18E+04	-7.75E+03	1.15E+05	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 10	Liver	9.76E+05	1.62E+04	1.30E+04	-2.26E+04	6.29E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 1	Tumor	9.53E+04	1.59E+03	8.25E+03	-2.21E+04	3.00E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 2	Tumor	9.34E+04	1.55E+03	8.43E+03	-2.81E+04	2.65E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 3	Tumor	1.62E+05	2.69E+03	8.50E+03	-2.06E+04	3.35E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 4	Tumor	1.09E+05	1.82E+03	8.22E+03	-1.97E+04	2.94E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 5	Tumor	1.34E+05	2.23E+03	9.21E+03	-2.65E+04	3.04E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 6	Liver	2.20E+05	3.67E+03	8.66E+03	-2.39E+04	3.27E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 7	Liver	3.36E+05	5.60E+03	8.76E+03	-2.24E+04	2.82E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 8	Liver	4.03E+05	6.65E+03	8.72E+03	-1.67E+04	3.34E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 9	Liver	4.35E+05	7.28E+03	9.41E+03	-2.11E+04	4.50E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 10	Liver	2.64E+05	4.39E+03	1.01E+04	-2.86E+04	3.68E+04	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 1	Tumor	7.84E+07	1.26E+06	8.72E+05	1.55E+05	4.38E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 2	Tumor	1.24E+08	1.98E+06	1.15E+06	2.44E+05	5.21E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 3	Tumor	1.16E+08	1.87E+06	9.51E+05	3.14E+05	4.38E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 4	Tumor	6.88E+07	1.11E+06	7.80E+05	1.62E+05	5.59E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 5	Tumor	7.28E+07	1.17E+06	8.54E+05	2.18E+05	5.20E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 6	Liver	2.10E+08	3.39E+06	1.87E+06	4.32E+05	8.83E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 7	Liver	1.84E+08	2.98E+06	1.53E+06	6.76E+05	6.83E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 8	Liver	1.83E+08	2.95E+06	1.09E+06	5.55E+05	5.99E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 9	Liver	1.55E+08	2.50E+06	1.22E+06	4.78E+05	6.21E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 10	Liver	8.27E+07	1.32E+06	5.07E+05	2.11E+05	2.84E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 1	Tumor	4.96E+08	7.93E+06	1.42E+07	1.27E+05	8.42E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 2	Tumor	1.82E+08	2.94E+06	3.98E+06	3.51E+04	2.26E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 3	Tumor	2.23E+08	3.58E+06	4.96E+06	-2.10E+03	2.49E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 4	Tumor	2.81E+08	4.50E+06	6.80E+06	5.94E+04	3.78E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 5	Tumor	2.85E+08	4.56E+06	1.04E+07	-5.77E+04	8.08E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 6	Liver	1.80E+07	2.88E+05	3.10E+05	-1.92E+05	2.31E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 7	Liver	1.12E+07	1.81E+05	1.41E+05	-1.55E+05	8.45E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 8	Liver	1.23E+07	1.98E+05	1.75E+05	-9.20E+04	1.10E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 9	Liver	1.65E+07	2.65E+05	2.10E+05	-9.89E+04	1.12E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 10	Liver	1.40E+07	2.25E+05	2.14E+05	-2.47E+05	1.66E+06	4.87E+00

Supplementary Figure 3a

Ventral



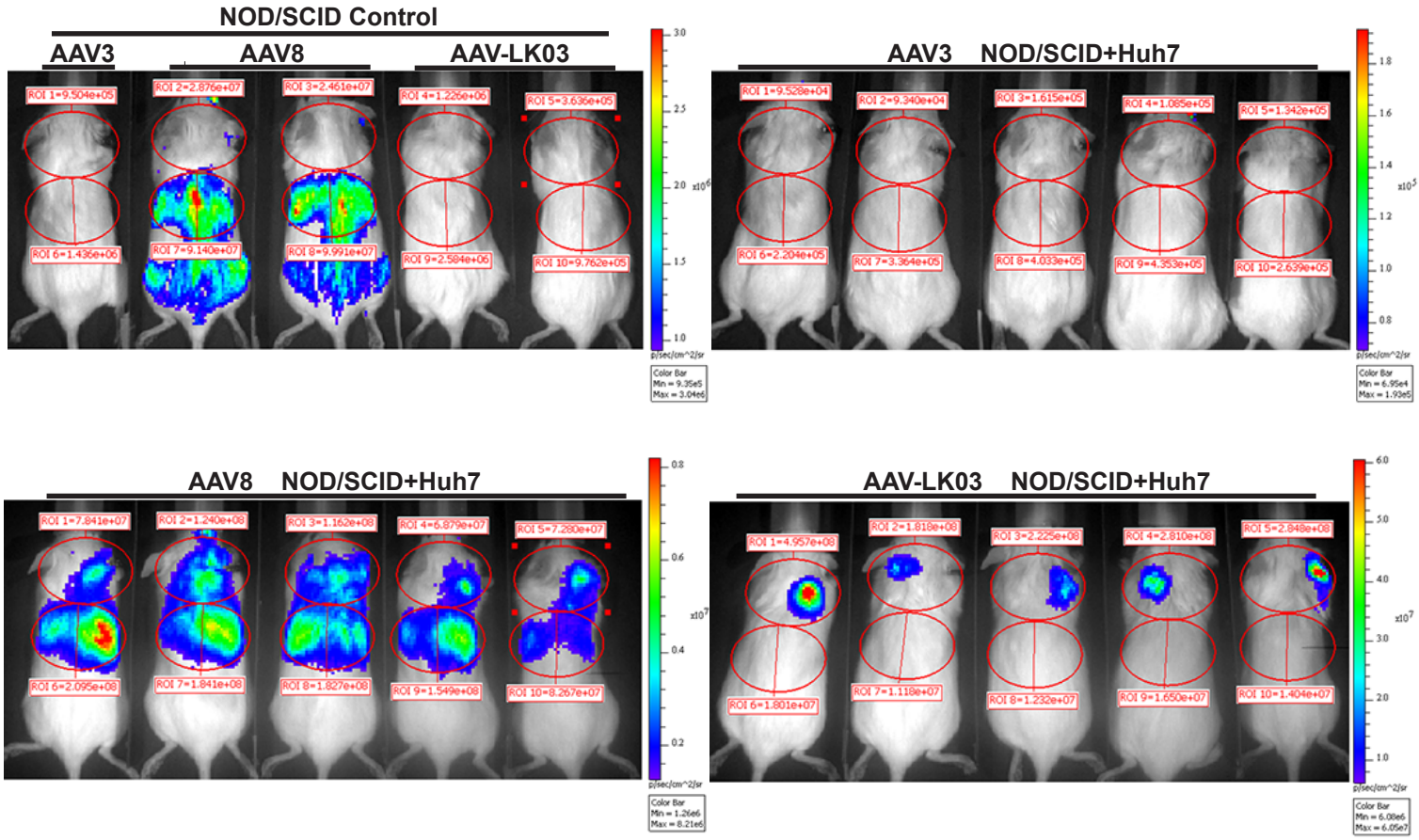
Serotype	Animal	ROI	ROI Target	Total Flux (p/s)	Avg Radiance (p/s/cm2/sr)	Stdev Radiance	Min Radiance	Max Radiance	Area (cm2)
AAV3	NOD/SCID Control	ROI 1	Tumor	1.33E+06	2.20E+04	1.28E+04	-2.72E+04	6.42E+04	4.87E+00
AAV8	NOD/SCID Control	ROI 2	Tumor	3.97E+07	6.61E+05	3.61E+05	6.08E+04	1.96E+06	4.87E+00
AAV8	NOD/SCID Control	ROI 3	Tumor	3.69E+07	6.13E+05	3.29E+05	7.61E+04	2.15E+06	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 4	Tumor	2.06E+06	3.46E+04	2.30E+04	-1.20E+04	1.52E+05	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 5	Tumor	8.20E+05	1.36E+04	1.41E+04	-1.86E+04	7.06E+04	4.87E+00
AAV3	NOD/SCID Control	ROI 6	Liver	2.66E+06	4.42E+04	2.23E+04	-6.09E+03	1.33E+05	4.87E+00
AAV8	NOD/SCID Control	ROI 7	Liver	1.68E+08	2.78E+06	1.42E+06	3.05E+05	7.97E+06	4.87E+00
AAV8	NOD/SCID Control	ROI 8	Liver	2.30E+08	3.84E+06	2.24E+06	6.47E+05	9.74E+06	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 9	Liver	4.71E+06	7.80E+04	4.94E+04	1.91E+03	2.21E+05	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 10	Liver	3.26E+06	5.41E+04	4.49E+04	-1.25E+04	1.95E+05	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 1	Tumor	1.05E+05	1.75E+03	8.35E+03	-3.13E+04	2.71E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 2	Tumor	1.33E+05	2.19E+03	7.81E+03	-1.87E+04	2.81E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 3	Tumor	1.69E+05	2.80E+03	7.94E+03	-1.86E+04	3.00E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 4	Tumor	2.21E+05	3.67E+03	8.58E+03	-2.48E+04	2.54E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 5	Tumor	1.88E+05	3.12E+03	9.30E+03	-2.67E+04	2.75E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 6	Liver	5.61E+05	9.32E+03	1.20E+04	-2.17E+04	4.42E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 7	Liver	8.81E+05	1.46E+04	1.38E+04	-1.50E+04	7.84E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 8	Liver	9.58E+05	1.59E+04	1.33E+04	-1.86E+04	6.48E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 9	Liver	1.08E+06	1.79E+04	1.41E+04	-1.77E+04	7.51E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 10	Liver	8.38E+05	1.39E+04	1.46E+04	-1.81E+04	6.48E+04	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 1	Tumor	8.10E+07	1.30E+06	7.29E+05	2.24E+05	3.97E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 2	Tumor	1.16E+08	1.88E+06	1.07E+06	3.03E+05	5.42E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 3	Tumor	1.80E+08	2.90E+06	1.67E+06	3.94E+05	8.76E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 4	Tumor	7.57E+07	1.21E+06	5.46E+05	2.59E+05	3.07E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 5	Tumor	6.10E+07	9.83E+05	5.86E+05	1.35E+05	3.77E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 6	Liver	7.12E+08	1.14E+07	9.19E+06	9.92E+05	4.18E+07	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 7	Liver	4.84E+08	7.78E+06	5.75E+06	7.98E+05	2.35E+07	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 8	Liver	4.82E+08	7.71E+06	4.78E+06	1.02E+06	2.43E+07	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 9	Liver	4.38E+08	7.00E+06	5.02E+06	8.34E+05	2.01E+07	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 10	Liver	1.97E+08	3.15E+06	2.25E+06	2.74E+05	1.04E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 1	Tumor	5.21E+06	8.42E+04	1.16E+05	-2.83E+03	6.43E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 2	Tumor	1.09E+07	1.76E+05	3.84E+05	4.20E+03	2.37E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 3	Tumor	3.31E+07	5.28E+05	7.88E+05	1.78E+04	4.40E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 4	Tumor	8.91E+06	1.43E+05	1.34E+05	1.86E+04	8.42E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 5	Tumor	1.87E+08	2.99E+06	5.03E+06	6.90E+04	2.29E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 6	Liver	2.59E+06	4.19E+04	4.62E+04	1.51E+03	4.12E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 7	Liver	2.14E+06	3.42E+04	1.83E+04	1.11E+03	8.34E+04	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 8	Liver	2.91E+06	4.71E+04	3.55E+04	4.71E+03	1.86E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 9	Liver	5.01E+06	7.99E+04	4.10E+04	1.67E+04	2.32E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 10	Liver	8.82E+06	1.43E+05	1.46E+05	2.26E+04	1.14E+06	4.87E+00

Supplementary Figure 3b

d. Bioluminescence analysis in HCC xenografts – individual pseudo-scale

Supplementary Figure 4. Detailed analysis of bioluminescence analysis for animals shown in Figure 4a on dorsal (**a**) and ventral (**b**) side using auto-pseudo scale for each animal group (as indicated in the figure).

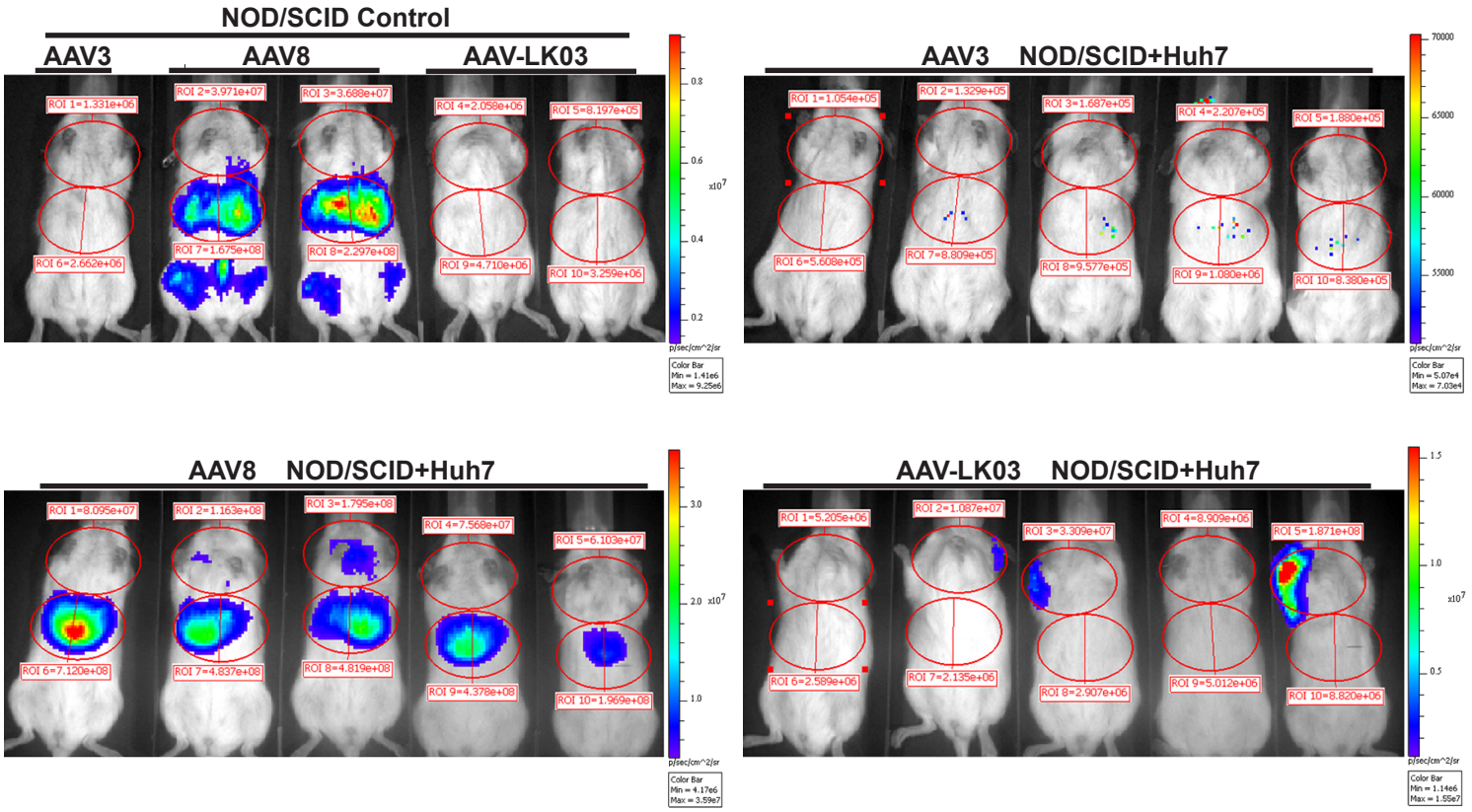
Dorsal



Serotype	Animal	ROI	ROI Target	Total Flux (p/s)	Avg Radiance (p/s/cm2/sr)	Stdev Radiance	Min Radiance	Max Radiance	Area (cm2)
AAV3	NOD/SCID Control	ROI 1	Tumor	9.50E+05	1.57E+04	1.20E+04	-1.47E+04	5.92E+04	4.87E+00
AAV8	NOD/SCID Control	ROI 2	Tumor	2.88E+07	4.82E+05	2.15E+05	3.75E+04	1.18E+06	4.87E+00
AAV8	NOD/SCID Control	ROI 3	Tumor	2.46E+07	4.08E+05	1.76E+05	3.22E+04	1.25E+06	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 4	Tumor	1.23E+06	2.04E+04	1.37E+04	-1.39E+04	7.07E+04	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 5	Tumor	3.64E+05	6.02E+03	1.04E+04	-2.32E+04	3.93E+04	4.87E+00
AAV3	NOD/SCID Control	ROI 6	Liver	1.44E+06	2.39E+04	1.52E+04	-1.22E+04	6.86E+04	4.87E+00
AAV8	NOD/SCID Control	ROI 7	Liver	9.14E+07	1.53E+06	6.05E+05	1.17E+05	3.96E+06	4.87E+00
AAV8	NOD/SCID Control	ROI 8	Liver	9.99E+07	1.65E+06	5.49E+05	1.39E+05	3.01E+06	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 9	Liver	2.58E+06	4.31E+04	2.18E+04	-7.75E+03	1.15E+05	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 10	Liver	9.76E+05	1.62E+04	1.30E+04	-2.26E+04	6.29E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 1	Tumor	9.53E+04	1.59E+03	8.25E+03	-2.21E+04	3.00E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 2	Tumor	9.34E+04	1.55E+03	8.43E+03	-2.81E+04	2.65E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 3	Tumor	1.62E+05	2.69E+03	8.50E+03	-2.06E+04	3.35E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 4	Tumor	1.09E+05	1.82E+03	8.22E+03	-1.97E+04	2.94E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 5	Tumor	1.34E+05	2.23E+03	9.21E+03	-2.65E+04	3.04E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 6	Liver	2.20E+05	3.67E+03	8.66E+03	-2.39E+04	3.27E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 7	Liver	3.36E+05	5.60E+03	8.76E+03	-2.24E+04	2.82E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 8	Liver	4.03E+05	6.65E+03	8.72E+03	-1.67E+04	3.34E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 9	Liver	4.35E+05	7.28E+03	9.41E+03	-2.11E+04	4.50E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 10	Liver	2.64E+05	4.39E+03	1.01E+04	-2.86E+04	3.68E+04	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 1	Tumor	7.84E+07	1.26E+06	8.72E+05	1.55E+05	4.38E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 2	Tumor	1.24E+08	1.98E+06	1.15E+06	2.44E+05	5.21E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 3	Tumor	1.16E+08	1.87E+06	9.51E+05	3.14E+05	4.38E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 4	Tumor	6.88E+07	1.11E+06	7.80E+05	1.62E+05	5.59E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 5	Tumor	7.28E+07	1.17E+06	8.54E+05	2.18E+05	5.20E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 6	Liver	2.10E+08	3.39E+06	1.87E+06	4.32E+05	8.83E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 7	Liver	1.84E+08	2.98E+06	1.53E+06	6.76E+05	6.83E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 8	Liver	1.83E+08	2.95E+06	1.09E+06	5.55E+05	5.99E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 9	Liver	1.55E+08	2.50E+06	1.22E+06	4.78E+05	6.21E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 10	Liver	8.27E+07	1.32E+06	5.07E+05	2.11E+05	2.84E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 1	Tumor	4.96E+08	7.93E+06	1.42E+07	1.27E+05	8.42E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 2	Tumor	1.82E+08	2.94E+06	3.98E+06	3.51E+04	2.26E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 3	Tumor	2.23E+08	3.58E+06	4.96E+06	-2.10E+03	2.49E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 4	Tumor	2.81E+08	4.50E+06	6.80E+06	5.94E+04	3.78E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 5	Tumor	2.85E+08	4.56E+06	1.04E+07	-5.77E+04	8.08E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 6	Liver	1.80E+07	2.88E+05	3.10E+05	-1.92E+05	2.31E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 7	Liver	1.12E+07	1.81E+05	1.41E+05	-1.55E+05	8.45E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 8	Liver	1.23E+07	1.98E+05	1.75E+05	-9.20E+04	1.10E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 9	Liver	1.65E+07	2.65E+05	2.10E+05	-9.89E+04	1.12E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 10	Liver	1.40E+07	2.25E+05	2.14E+05	-2.47E+05	1.66E+06	4.87E+00

Supplementary Figure 4a

Ventral



Serotype	Animal	ROI	ROI Target	Total Flux (p/s)	Avg Radiance (p/s/cm2/sr)	Stdev Radiance	Min Radiance	Max Radiance	Area (cm2)
AAV3	NOD/SCID Control	ROI 1	Tumor	1.33E+06	2.20E+04	1.28E+04	-2.72E+04	6.42E+04	4.87E+00
AAV8	NOD/SCID Control	ROI 2	Tumor	3.97E+07	6.61E+05	3.61E+05	6.08E+04	1.96E+06	4.87E+00
AAV8	NOD/SCID Control	ROI 3	Tumor	3.69E+07	6.13E+05	3.29E+05	7.61E+04	2.15E+06	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 4	Tumor	2.06E+06	3.46E+04	2.30E+04	-1.20E+04	1.52E+05	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 5	Tumor	8.20E+05	1.36E+04	1.41E+04	-1.86E+04	7.06E+04	4.87E+00
AAV3	NOD/SCID Control	ROI 6	Liver	2.66E+06	4.42E+04	2.23E+04	-6.09E+03	1.33E+05	4.87E+00
AAV8	NOD/SCID Control	ROI 7	Liver	1.68E+08	2.78E+06	1.42E+06	3.05E+05	7.97E+06	4.87E+00
AAV8	NOD/SCID Control	ROI 8	Liver	2.30E+08	3.84E+06	2.24E+06	6.47E+05	9.74E+06	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 9	Liver	4.71E+06	7.80E+04	4.94E+04	1.91E+03	2.21E+05	4.87E+00
AAV-LK03	NOD/SCID Control	ROI 10	Liver	3.26E+06	5.41E+04	4.49E+04	-1.25E+04	1.95E+05	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 1	Tumor	1.05E+05	1.75E+03	8.35E+03	-3.13E+04	2.71E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 2	Tumor	1.33E+05	2.19E+03	7.81E+03	-1.87E+04	2.81E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 3	Tumor	1.69E+05	2.80E+03	7.94E+03	-1.86E+04	3.00E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 4	Tumor	2.21E+05	3.67E+03	8.58E+03	-2.48E+04	2.54E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 5	Tumor	1.88E+05	3.12E+03	9.30E+03	-2.67E+04	2.75E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 6	Liver	5.61E+05	9.32E+03	1.20E+04	-2.17E+04	4.42E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 7	Liver	8.81E+05	1.46E+04	1.38E+04	-1.50E+04	7.84E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 8	Liver	9.58E+05	1.59E+04	1.33E+04	-1.86E+04	6.48E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 9	Liver	1.08E+06	1.79E+04	1.41E+04	-1.77E+04	7.51E+04	4.87E+00
AAV3	NOD/SCID + Huh7	ROI 10	Liver	8.38E+05	1.39E+04	1.46E+04	-1.81E+04	6.48E+04	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 1	Tumor	8.10E+07	1.30E+06	7.29E+05	2.24E+05	3.97E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 2	Tumor	1.16E+08	1.88E+06	1.07E+06	3.03E+05	5.42E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 3	Tumor	1.80E+08	2.90E+06	1.67E+06	3.94E+05	8.76E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 4	Tumor	7.57E+07	1.21E+06	5.46E+05	2.59E+05	3.07E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 5	Tumor	6.10E+07	9.83E+05	5.86E+05	1.35E+05	3.77E+06	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 6	Liver	7.12E+08	1.14E+07	9.19E+06	9.92E+05	4.18E+07	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 7	Liver	4.84E+08	7.78E+06	5.75E+06	7.98E+05	2.35E+07	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 8	Liver	4.82E+08	7.71E+06	4.78E+06	1.02E+06	2.43E+07	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 9	Liver	4.38E+08	7.00E+06	5.02E+06	8.34E+05	2.01E+07	4.87E+00
AAV8	NOD/SCID + Huh7	ROI 10	Liver	1.97E+08	3.15E+06	2.25E+06	2.74E+05	1.04E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 1	Tumor	5.21E+06	8.42E+04	1.16E+05	-2.83E+03	6.43E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 2	Tumor	1.09E+07	1.76E+05	3.84E+05	4.20E+03	2.37E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 3	Tumor	3.31E+07	5.28E+05	7.88E+05	1.78E+04	4.40E+06	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 4	Tumor	8.91E+06	1.43E+05	1.34E+05	1.86E+04	8.42E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 5	Tumor	1.87E+08	2.99E+06	5.03E+06	6.90E+04	2.29E+07	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 6	Liver	2.59E+06	4.19E+04	4.62E+04	1.51E+03	4.12E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 7	Liver	2.14E+06	3.42E+04	1.83E+04	1.11E+03	8.34E+04	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 8	Liver	2.91E+06	4.71E+04	3.55E+04	4.71E+03	1.86E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 9	Liver	5.01E+06	7.99E+04	4.10E+04	1.67E+04	2.32E+05	4.87E+00
AAV-LK03	NOD/SCID + Huh7	ROI 10	Liver	8.82E+06	1.43E+05	1.46E+05	2.26E+04	1.14E+06	4.87E+00

Supplementary Figure 4b