

Figure S1:

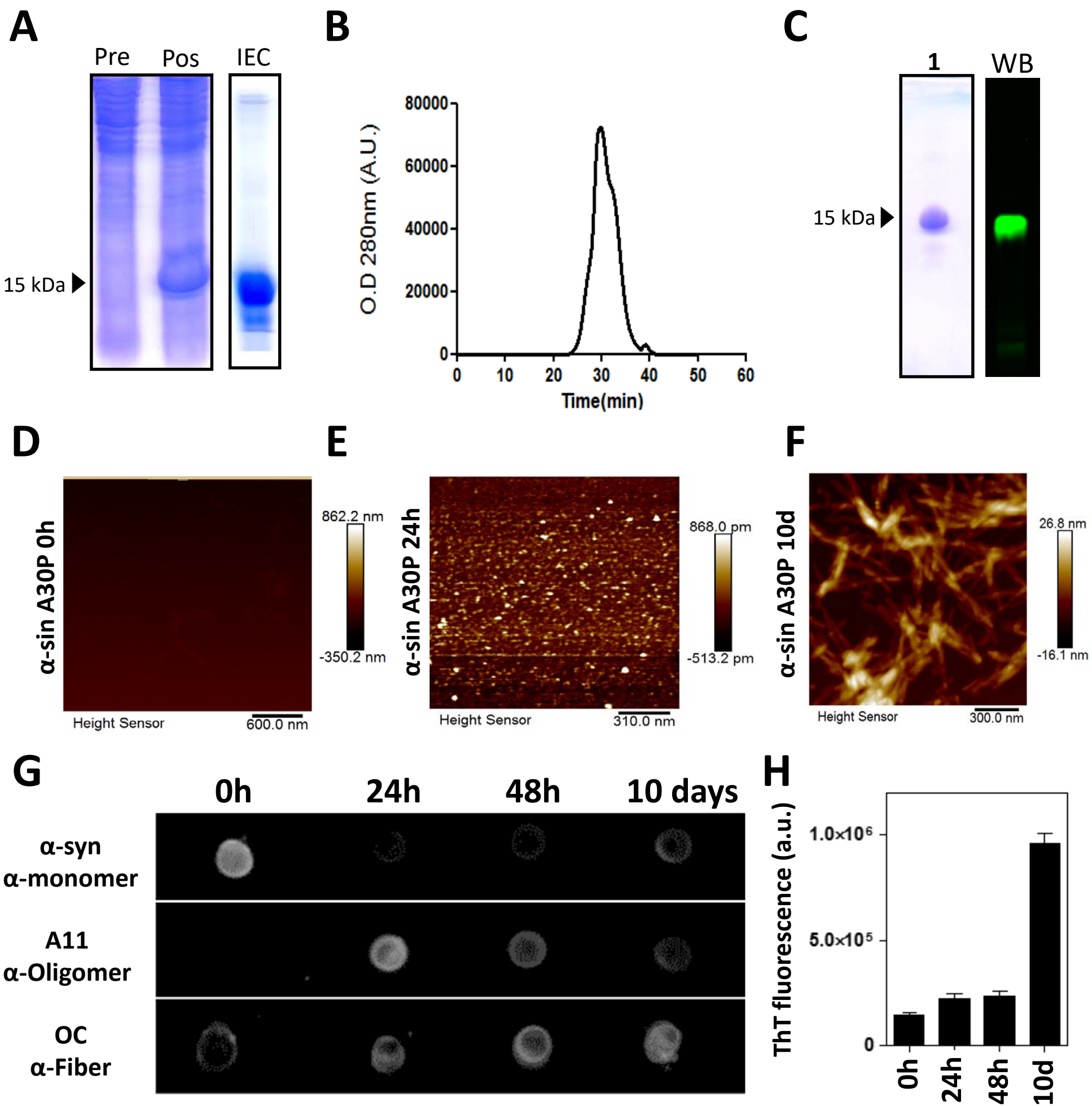


Figure S2:

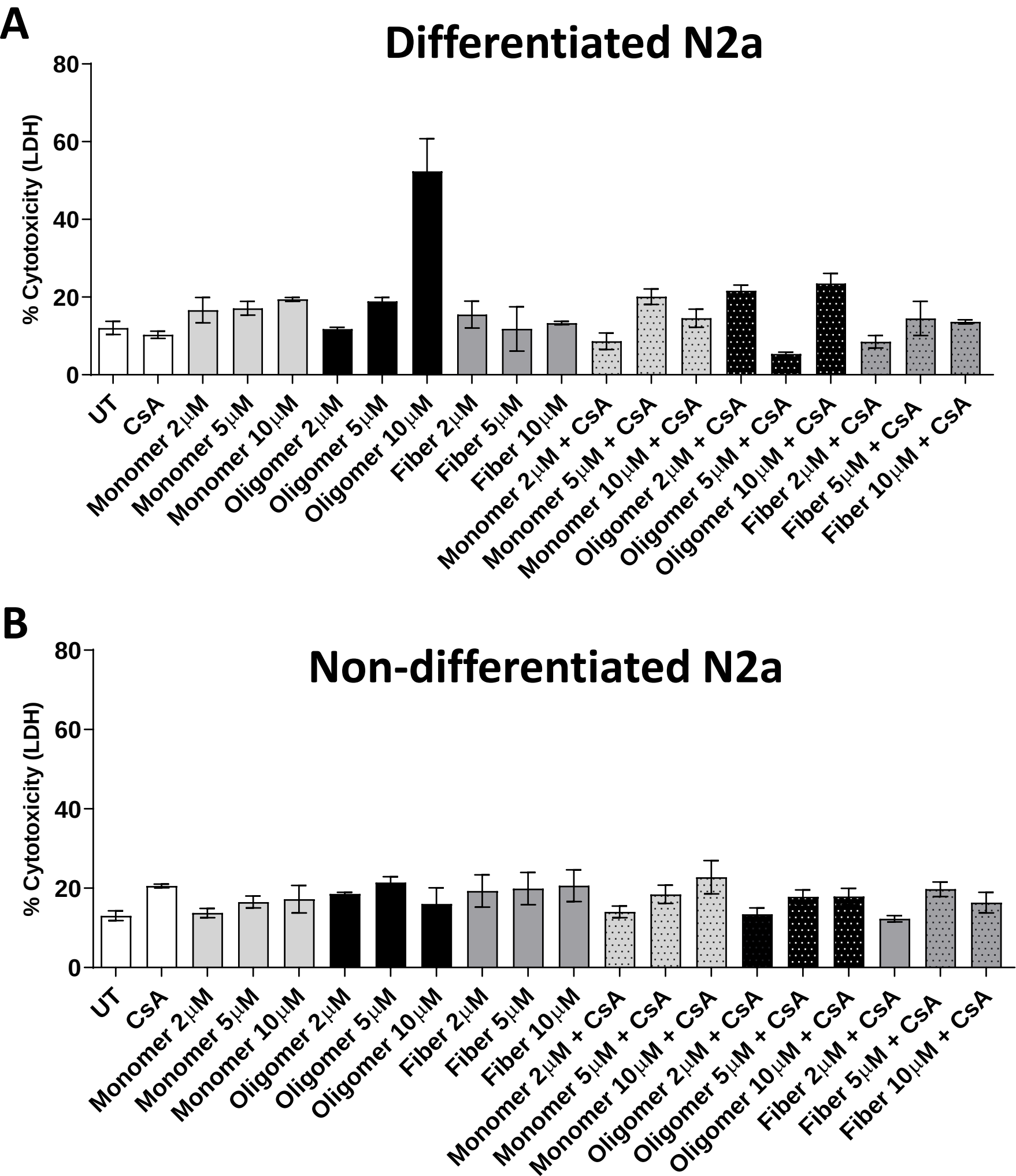


Figure S3:

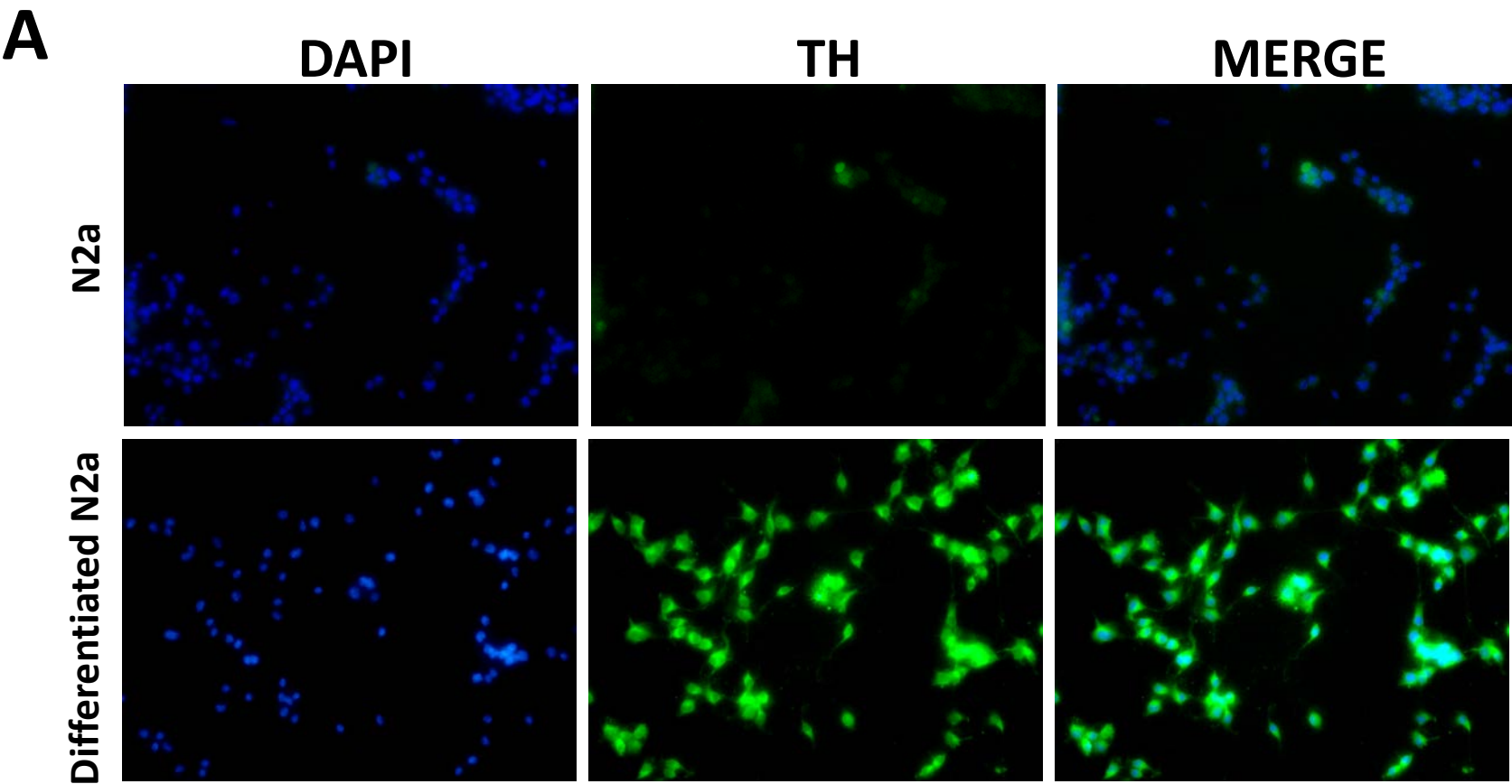


Table S1:

Gene Abbreviation	Gene Name	FORWARD PRIMER	REVERSE PRIMER	Up or Down regulation by α -syn-O (2-folds)	VIVIT restored normal phenotype
Actr2	ARP2 actin-related protein 2 homolog (yeast)	GCTCTCTGTCCTTTTGACA	GCAAGAAAGCAAAAATTGGA		
Actr3	ARP3 actin-related protein 3 homolog (yeast)	ACCCGAGATCTTTTCCATC	AGTCCCTGAACATGGTTGAA		
Arc	activity regulated cytoskeletal-associated protein	CAGGAGAATGACACCAGGTC	CAGGCACCTCCTCTCTGTAA		
Arhgef2	rho/rac guanine nucleotide exchange factor (GEF) 2	TGCCTGTAACAAGAGCATCA	GAAGGGGAGACAGACTGCAAA		
Arhgef25	Rho guanine nucleotide exchange factor (GEF) 25	TGAGGGGAAACTGACTGCTC	GCTCACCTTGATGCTGTTCT		
Arhgef6	Rac/Cdc42 guanine nucleotide exchange factor (GEF) 6	TTGAGCTTTGTGCTTTGTGG	GTAAAGGGGCTGTTGGGCATA		
Bad	BCL2-associated agonist of cell death	AGTCTTTCGAGGCCTTAGGA	CCCCAGTTATGACAGGACAG		
Bax	BCL2-associated X protein	TAGCAAATGGTGCTCAAGG	ATGGTCACTGTCTGCCATGT		
Bbc3	BCL2 binding component 3	GGGGGTCTGTGAAGAGCATA	GCAGAGCACAGGATTCACAG	UP	NO
Bcl2	B cell leukemia/lymphoma 2	TGACTTCTCTCGTCGCTACC	GAACTCAAAGAAGGCCACAA		
Bcl2A1A	B cell leukemia/lymphoma 2 related protein A1a	TAActGGGGAAGGATTGTGA	CCCAGATCTGTCTGTGCATC	DOWN	YES
Bcl2L1	BCL2-like 1	CATCCCAGCTTCACATAACC	GCAATCCGACTCACCAATAC	UP	YES
Bcl2L10	Bcl2-like 10	CTTTGCAACAGCCATCTTTT	ATCACAAACCCAGAACTCCA		
Bcl2L11	BCL2-like 11 (apoptosis facilitator)	GAGTTAGGGGCTGGCTCTAC	GACCAAGAAAGAGCACCTCA		
Bcl2L2	BCL2-like 2	CAGGAACCAAGGGTCAGGTTA	CCTGGTTTTCCCTGACAGAA		
Bcl6	B cell leukemia/lymphoma 6	ACCTGAGGGAAGGCAATATC	GGCTGTTCAGGAACTCTTCA		
Bdnf	brain derived neurotrophic fator	GGTGCAGAAAAGCAACAAGT	GCACAAAAAGTTCCAGAGA		
Bid	BH3 interacting domain death agonist	CTTGCTACGGAATGCAAAGA	TTACCCAGGGAAAAGAGGATG		
Bik	BCL2-interacting killer	GGGGGTCTGTGAAGAGCATA	GCAGAGCACAGGATTCACAG		
Birc2	baculoviral IAP repeat-containing 2	TGCTTGCTGTATGTCCTTCA	GATGCACGCCTTTAAAAGAA		
Birc3	baculoviral IAP repeat-containing 3	TTTCCAACATTTGACGTGTG	GTTGCTGCAGTGTTTCCTTT		
Birc5	baculoviral IAP repeat-containing 5	GGTTTTGTGGCTTTGCTCTA	CTGCATTAGCAGCCCTGTAT		
Bmf	BCL2 modifying fator	CAGGCTTCTGGTATGTGCTT	TCAAActCTGGGCTCAGTTC		
Bmp2	bone morphogenetic protein 2	TTGCACACTTGCTGTCTGTT	GTTCTCACGGATTGGACAAC		
Bmp4	bone morphogenetic protein 4	TGAGAGCTCTGCTTTTCGTT	TGGTGTCCAGTAGTCGTGTG	DOWN	NO
Calm2	calmodulin 2	GAAGCAGAACTGCAGGACAT	TAActTCTCGCCAAGGTTTG		
Calm3	calmodulin 3	ACCAGCTGACTGAGGAACAG	GCCATCATGGTCAAGAACTC		
Ccl2	chemokine (C-C motif) ligand 2	AGTTTTTGTACCAAGCTCA	GGGTCAActTCACATTCAAA		
Cdh2	cadherin 2	TATGTGATGACGGTCACTGC	GAAAGGCCATAAGTGGGATT		
Cdkn1B	cyclin-dependent kinase inhibitor 1B	AGCGTTTCTTCATTGCCTGT	CACAAAACATGCCACTTTGG		
Cfl1	cofilin 1, non-muscle	GGCTCCTACTAAACGGAAGG	GTCCTCACTCAGGCAAAAGA		
Creb1	cAMP responsive element binding protein 1	TAGCTGTGACTTGGCATTCA	TTGTTCTGTTTGGGACCTGT		
Dstn	Destrin	GGAGTCCAGGAAAGAAGAGC	TACACAGGGGATCCTTCAAA		
Egr1	early growth response 1	ACAGCAGTCCCATCTACTCG	CTCCCTGTTGTTGTGGAAC		
Fasl	Fas ligand (TNF superfamily, member 6)	CATGGAGTGGTCCTTAATGC	AAGTAGACCCACCCTGGAAG		
Fgf2	fibroblast growth factor 2	GCTGCTGGCTTCTAAGTGTG	GTATGGCCTTCTGTCCAGGT		
Gria1	glutamate receptor, ionotropic, AMPA1 (alpha 1)	ATAAAGGGGAATGTGGAAGC	GCTACGGGATTTGTAGCAGA		
Gria2	glutamate receptor, ionotropic, AMPA2 (alpha 2)	CTGCGAAAGGGATAAAGTCA	GTGTGTGCTCCAGGGTATTC		
Grin2B	glutamate receptor, ionotropic, NMDA2B (epsilon 2)	CCGCAGCACTATTGAGAACA	ATCCATGTGTAGCCGTAGCC		
Hrk	harakiri, BCL2 interacting protein (contains only BH3 domain)	AGGCTCTGGGAAGTCTGTCT	ACAAAAGAGCACAAAGGCAAC		
Il1B	interleukin 1 beta	CCCAActGGTACATCAGCAC	TCTGCTCATTACGAAAAGG		
Il6	interleukin 6	CTACCCCAATTTCCAATGCT	ACCACAGTGAGGAATGTCCA		
Itpr1	inositol 1,4,5-trisphosphate receptor 1	GAAActCCTGGAGAAGCACA	GAAACGCCTTCAAActCAAA		
Kalrn	Kalirin, RhoGEF kinase	GTTCATACAGGAGGGCACAC	GGCTTCAGGAAGGACTTAGG	UP	YES
Map2	Microtubule-associated protein 2	TCCTTCTTCCCTCGTTTCT	TCTTGCCAGCAGTCACAATA		

Gene Abbreviation	Gene Name	FORWARD PRIMER	REVERSE PRIMER	Up or Down regulation by α-syn-O (2-folds)	VIVIT restored normal phenotype
Map2K4	mitogen-activated protein kinase kinase 4	GAAAGAGGCAGTCTGTTGGA	TGGCTTCTTTTCGTTTTGTC	DOWN	NO
Mcl1	myeloid cell leukemia sequence 1	GGGGACTCTTAAAGCTCCAG	TTTGCTGAGAGGGAACTTTG	UP	NO
Myh10	Myosin, heavy polypeptide 10, non-muscle	GGGACTTGAGTGAGGAGCTG	GCTTTGAACCTTTTCGCTTG		
Myo6	myosin VI	GGGCTGCACTAGATTCTTCG	ATTTCCAAGGTGCAGGACAC		
Neurog2	neurogenin 2	CTGTGGGAATTTACCTGTC	CTAAATTTCCACGCTTGCAT		
Ngf	nerve growth factor	AAGCTCACCTCAGTGTCTGG	TTTAGTCCAGTGGGCTTCAG	DOWN	NO
Ngfr	nerve growth factor receptor (TNFR superfamily, member 16)	AGAAGCTGCTCAATGGTGAC	AATGTCAGCTCTCTGGATGC		
Nlgn1	neuroligin 1	CATCTCCCTGGTCTGACATC	TTGTAAGGGGACCATCTTCA		
Nos1	nitric oxide synthase 1, neuronal	TACACACCTGGAGACCACCT	GACCTGGGACCCTGTCTACT		
Nos2	nitric oxide synthase 2, inducible	CTTTGTGCGAAGTGTCAGTG	CACCTGGAACAGCACTCTCT	DOWN	NO
Nr4A1	nuclear receptor subfamily 4, group A, member 1	AAAAGCGCCAAGTACATCTG	TGCTTGGGTTTTGAAGGTAG		
Nrg1	Neuregulin 1	ATGGTGAAAGGACCTGTCAAA	TTCTTGGTTTTGCAGTAGGC		
Nrgn	neurogranin	CGCCCAAATACTCTCAAAAA	AGGCAGGTATGGGATAGGAC		
Pak1	p21 protein (Cdc42/Rac)-activated kinase 1	AGGAGGTGGCCATTAAACAG	CCTCCAGCCAAGTATTCCAT		
Pak3	p21 protein (Cdc42/Rac)-activated kinase 3	CTTTTGTGGCTTGAGGAAAA	GTTGGCTTGTCAAAGGCTTA		
Pak6	p21 protein (Cdc42/Rac)-activated kinase 6	ACCCACAGAGAGCCTCAGAA	CCCCCAGCATGTGTTAGACT		
Pak7	p21 protein (Cdc42/Rac)-activated kinase 7	GCTCAAGAACTCCTTGGACA	GGGTTTCCTCATGTTCTCCT		
Pfn1	profilin 1	GGGAAGACCTTCGTTAGCAT	CATCAGCAGGACTAGCGTCT		
Pmaip1	phorbol-12-myristate-13-acetate-induced protein 1	AGTCGTGGAGCTAGGGAAGT	ACATTGCTCTGCAGTTGTCA	DOWN	NO
Pml	promyelocytic leukemia	TAAAGAAGGTGTGGCCTCTG	CTGCTGGTATAGCGGTCAGT		
Pten	phosphatase and tensin homolog	ACAAAGGATCTCCTCCCAAC	TGGCGTTCTGCCTAATCTAC		
Rab3A	RAB3A, member RAS oncogene family	CAGAAGGAGTCCTCAGACCA	CTCTTGTCGTTGCGGTAGAT		
Rgs2	regulator of G-protein signaling 2	CTGGTTGGCTTGTGAAGACT	ACACCCTCTTCTGAGCTGTG		
Rheb	Ras homolog enriched in brain	CAAGATGCCTCAGTCCAAGT	CGCTGTGTCTACAAGCTGAA		
Rock1	Rho-associated coiled-coil containing protein kinase 1	GGAAAGCAAGTCAGACCTCA	TGTCTGCTTGTGACTTGGA		
Snap25	synaptosomal-associated protein 25	CAGGCTCTGAATCTCTCCAA	CATGCGTAGTTGTTGCTTTG		
Snca	synuclein, alpha	AGATTGGGGAAAACAGGAAG	CCACTGTTGTCACTCCATGA		
Sncaip	synuclein, alpha interacting protein (synphilin)	CAGAAGCCACTCAGTCCAGT	CATTGTCTCCGGATTACAC		
Sncb	synuclein, beta	TTCTACCTTTTCCCCCAAAC	GCTACATCCGAGCAGACACT		
Srf	serum response factor	AAGATAGAGCCTGGGCAAGT	ACGGATATAACCACACGCACT		
Syn1	synapsin I	ATGCTCAGCAGCACAAACATA	TCCAGTTACCCGACACTGAT	DOWN	YES
Syn2	synapsin II	TCCTCTGTTCTTTGTGCTC	CTGCCAGGAGTCCTACGTTA		
Syngap1	synaptic Ras GTPase activating protein 1 homolog (rat)	CTATGCACCGAACCCAATAC	CCCAAGTGGTATTCATGCTC		
Synj1	Synaptojanin 1	CTGGAAGTTTGCGTGTTTCT	GTCTGTGAGCGTCTGGTTCT		
Synpo2	synaptopodin 2	GGACAAGATGGAAATGTTGC	GTCCCATCTGGAAGGAACTT		
Syp	synaptophysin	GGAGTGGGTCGATGTGACTT	TTGGCTGACTGGTCCTCTCT		
Syt1	synaptotagmin I	ACTCCAACCCCTACGTCAAG	CTTTCCCAATCACACAGTGG		
Th	tyrosine hydroxylase	CTTCAGAAGAGCCGTCTCAG	GAATACCACAGCCTCCAATG		
Tnf	tumor necrosis factor	CCCACTCTGACCCCTTTACT	TTTGAGTCCTTGATGGTGGT		
Tnfrsf21	tumor necrosis factor receptor superfamily, member 21	CCACCACAGACACATTCTGA	TGGAGCTCTTCGGATACTG		
Tnfsf10	tumor necrosis factor (ligand) superfamily, member 10	ATTGGGAAGTCAGACCTGGA	TCATCCGTCTTTGAGAAGCA		
Trp53	transformation related protein 53	AGCTTTGAGGTTTCGTGTTTG	GGAACATCTCGAAGCGTTTA		
Tubb4	tubulin beta 4A class IVa	CAGCCTCCAAGTCCTCTCAC	TTCCTCGTCCTTCAGCACTT	DOWN	YES
Vamp1	vesicle-associated membrane protein 1	AATGTCTGCTCCAGCTCAAC	CCAAGACCTTGTCACATTC		
Vamp2	vesicle-associated membrane protein 2	TGAGGTTCCCATCACCTCTC	CTGTGGGGTTTGCTTTTGTT		
Xiap	X-linked inhibitor of apoptosis	TGTGGACATCTGGTCACTTG	CTTAAAGTTCGCTCCCATCA	DOWN	NO

Gene Abbreviation		Gene Name	FORWARD PRIMER	REVERSE PRIMER
Constitutive Genes	Mvpa1	Genomic DNA	GGAGCCCAGTGTAGAAGAGCA	AGCCAGCGAACCATATCCTGA
	Ubc	ubiquitin C	ACACAAAGCCCCTCAATCTC	CCTCCTTGTCTGGATCTTT
	Gapdh	Glyceraldehyde-3-phosphate dehydrogenase	CTGGAGAAACCTGCCAAGTA	TGTTGCTGTAGCCGTATTCA
	Pgk1	phosphoglycerate kinase 1	GCAGATTGTTTGAATGGTC	TGCTCACATGGCTGACTTTA
	Hprt1	Hypoxanthine phosphoribosyltransferase 1	GCTGACCTGCTGGATTACAT	TTGGGGCTGTACTGCTTAAC

Table S2:

		# Conserved NFAT Biding Sites per Species			
		GENES	Homo X Mus X Chimp X Rhes X Rat	Homo X Mus	Chromosome / Promoter Region in Human Genome
NFAT Responsive Gene (3000pb)	Syn1	2	2	chrX:47479256-47482256	
	Xiap	0	0	chrX:122987662- 122993662	
	Pmaip1	0	0	chr18:57561192- 57567192	
	Map2k4	0	0	chr17:11918135- 11924035	

In order to further analyze the involvement of NFAT regulation in the genes discovered to be responsive to this pathway in qPCR we made a multiple-sequence alignment analysis to detect evolutionarily conserved NFAT transcription factor binding sites. We used Mulan server together with multiTF program for comparing multiple finished-quality sequences to identify functional elements conserved over evolutionary time (Ovcharenko I Loots GG Genome Res. 2005). We conducted two comparative genome sequence analysis in five mammalian species including, humans, mouse, chimps, rhesus and rat or only in human and mouse. SYN 1 gene has at least two well conserved putative NFAT biding site in their promoter region in all five species (Species: Homo X Mouse X Chimp X Rhesus X Rat and position from the transcription start, respectively: 1 V\$NFAT_Q4_01 + 643-652 gtGGACAActt + 631-640 gtGGACAActt + 643-652 gtGGACAActt + 643-652 gtGGACAActt + 625-634 gtGGACAActt 2 V\$NFAT_Q4_01 + 953-962 atGGAGAAaac + 907-916 aaGGAAAActc + 951-960 atGGAGAAaac + 955-964 atGGAGAAaac + 873-882 aaGGAAAActc). Consistently, the NFAT non-responsive genes promoters displayed no conserved putative NFAT biding site even when only human and mouse promoter were aligned. We considered promoter region for SYN 1 gene a -3000bp and for non-regulated genes a -6000bp in relation to the transcription start. The larger promoter region considered for NFAT non-regulated regions was to further demonstrate the inexistence of a conserved putative NFAT biding site in these genes.