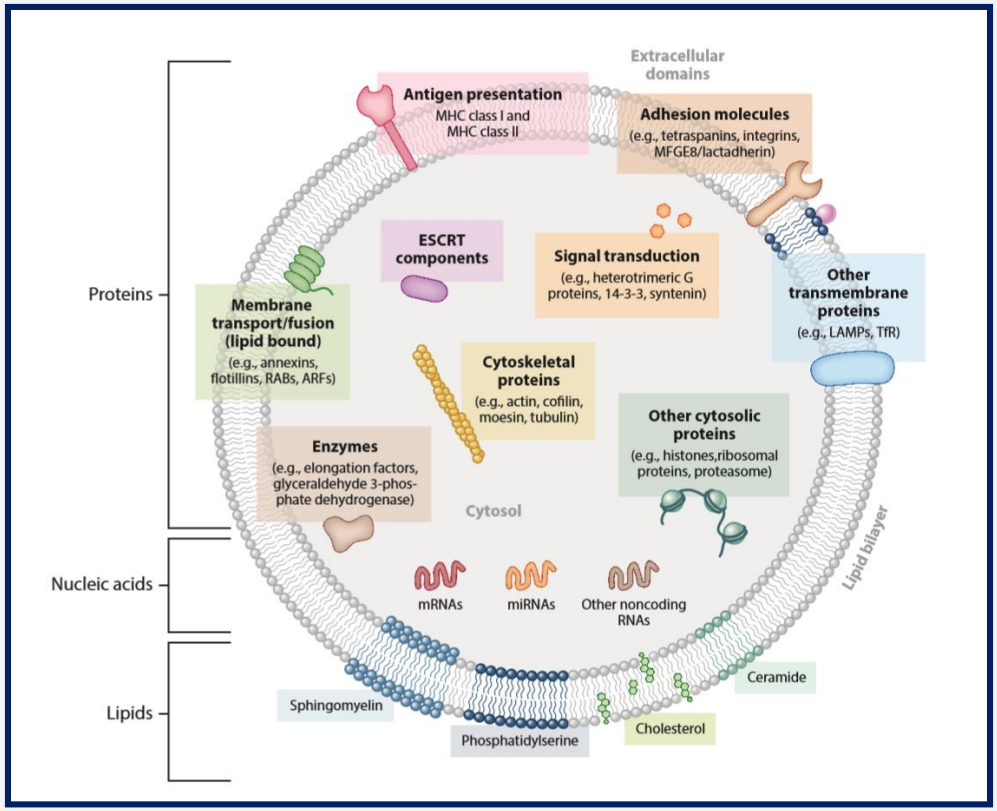
Extracelluláris vezikula cargo vizsgálata

Vékey Károly- Buzás Edit

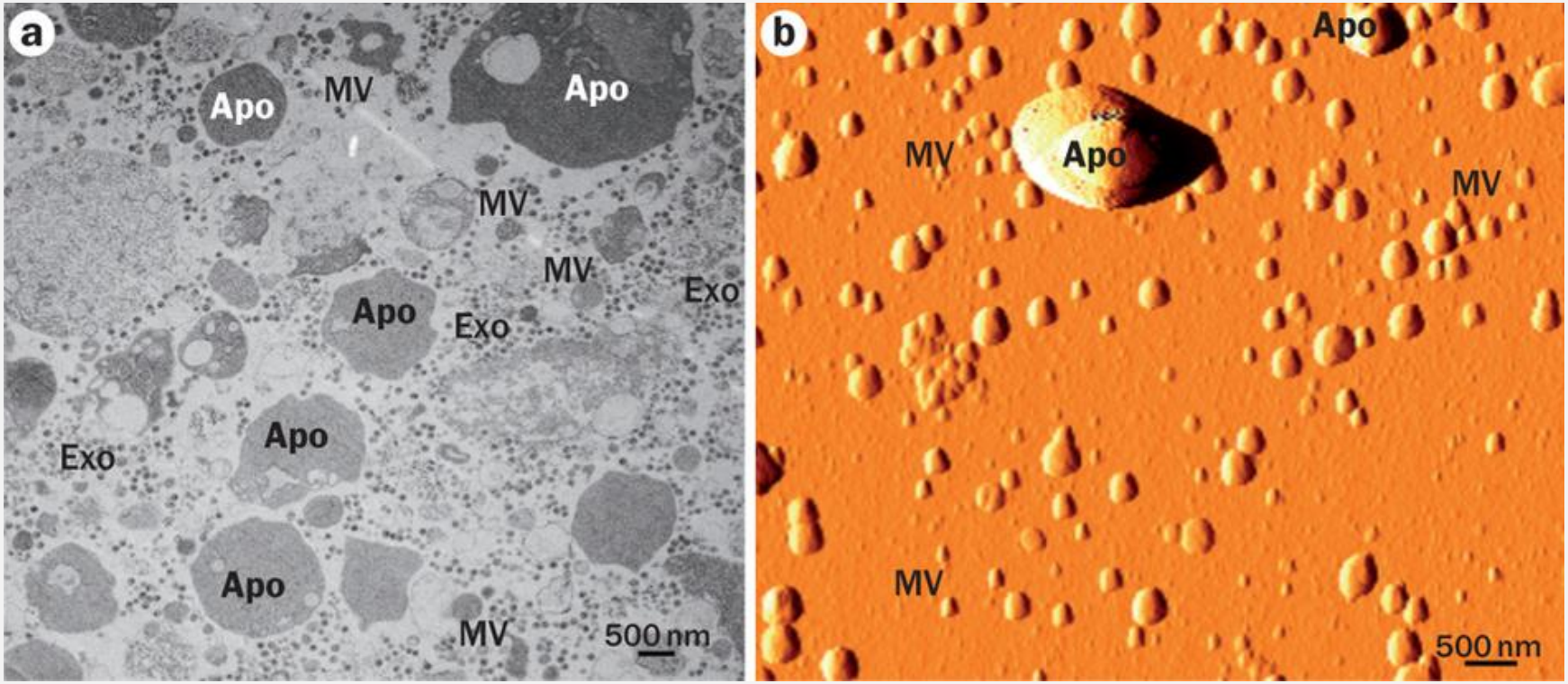
Semmelweis Egyetem Genetikai, Sejt- és Immunbiológiai Intézet
MTA TTK

Extracelluláris vezikulák

Foszfolipid kettősréteggel határolt képletek, melyeket a sejtek evolúciósan konzervált módon, aktívan termelnek.

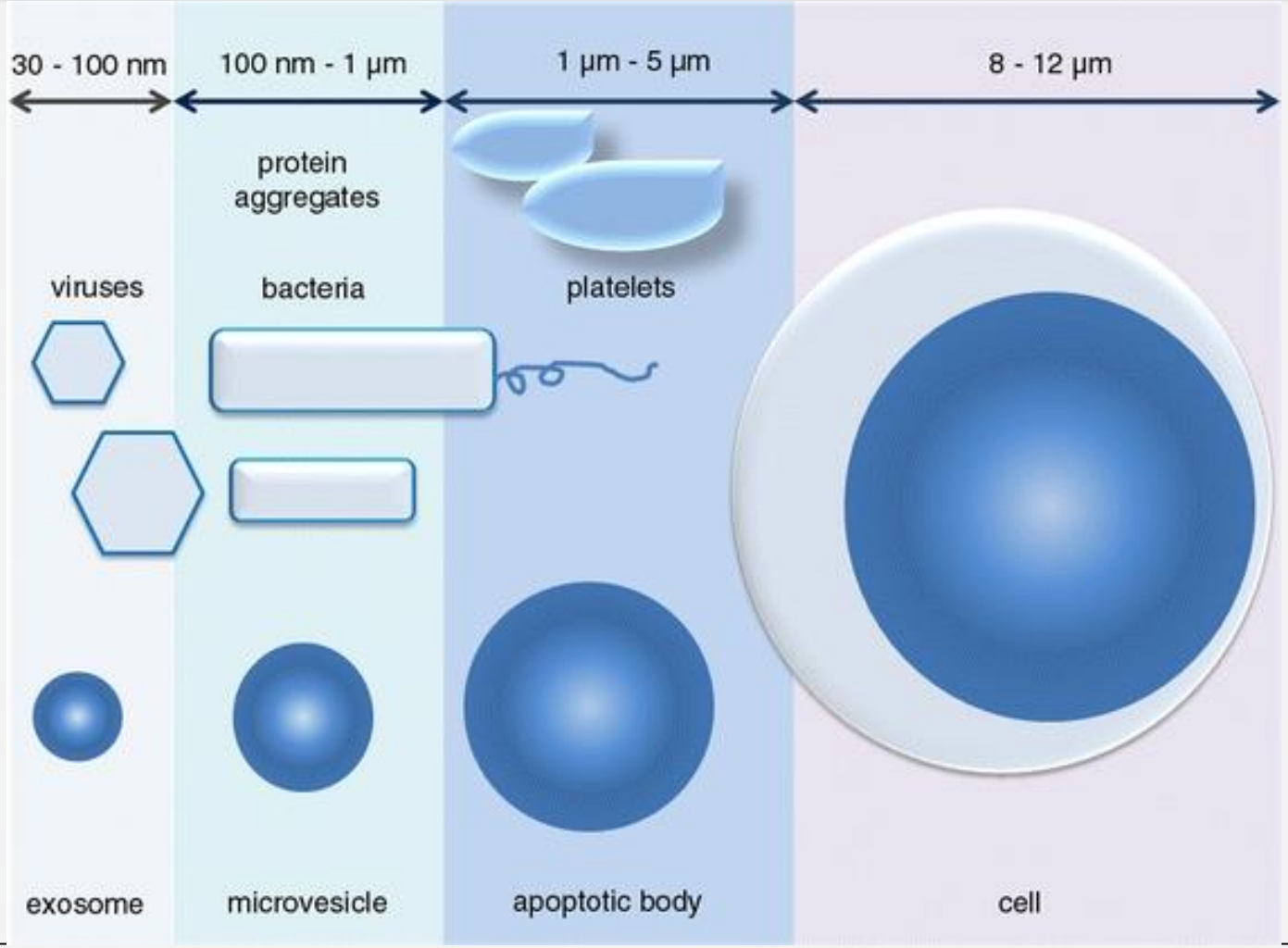


Extracelluláris vezikulák



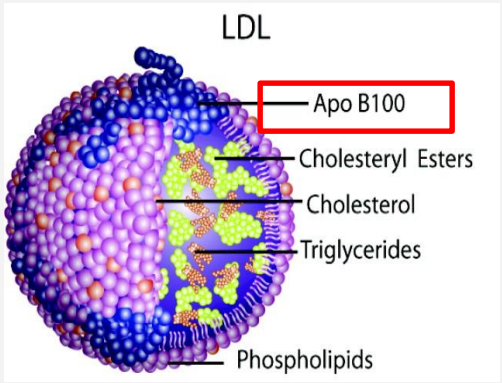
Buzás et al. Nat Rev Rheumatol, 2014.

Extracelluláris vezikulák



György-Szabó et al. Cell Mol Life Sci. 2011;68::2667-88.

Extracelluláris vezikula korona I.



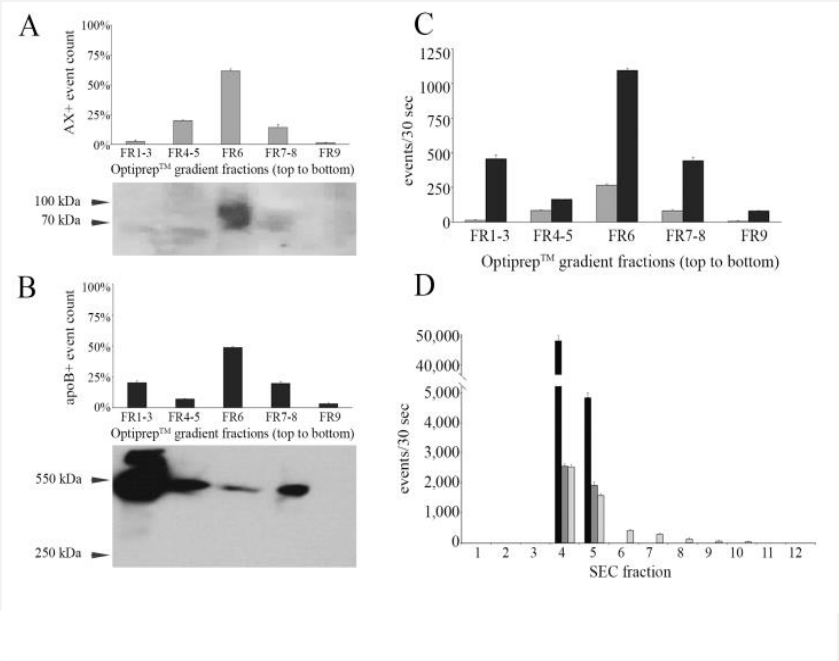
Vérplazmából izolált extracelluláris vezikulák (MS)

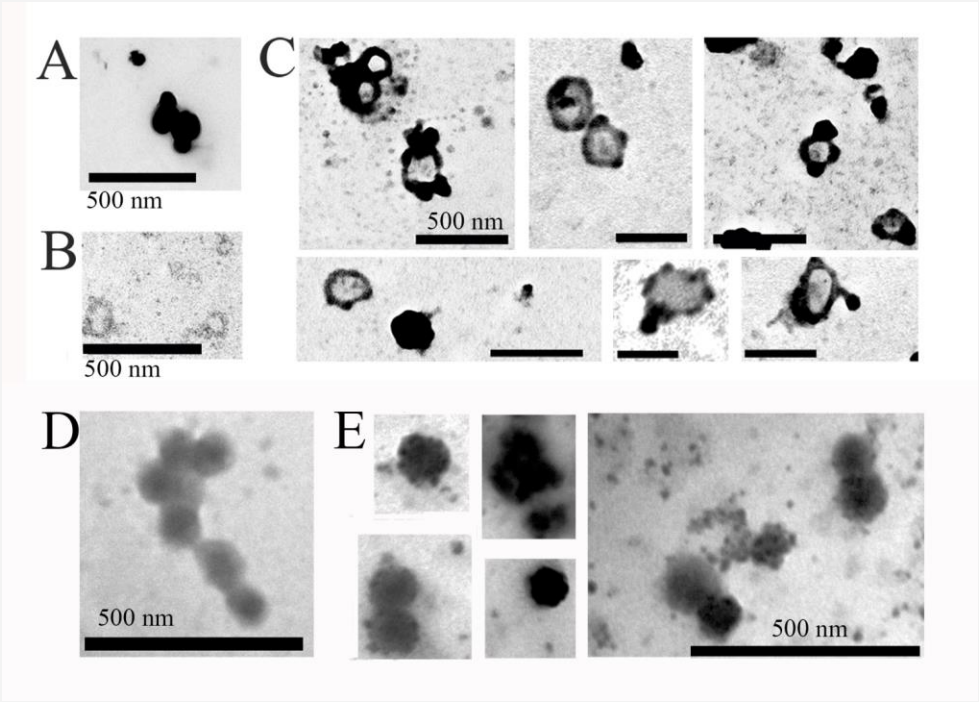
Fasting MVs		Postprandial MVs	
Acces	Protein	Acces	Protein
ALBU_HUMAN	Serum albumin	ALBU_HUMAN	Serum albumin
APOB_HUMAN	**Apolipoprotein B-100**	CO3_HUMAN	Complement C3
CO3_HUMAN	Complement C3	**APOB_HUMAN**	**Apolipoprotein B-100**
A2MG_HUMAN	Alpha-2-macroglobulin	A2MG_HUMAN	Alpha-2-macroglobulin
TRFE_HUMAN	Serotransferrin	TRFE_HUMAN	Serotransferrin
CO4B_HUMAN	Complement C4-B	CO4B_HUMAN	Complement C4-B
CO4A_HUMAN	Complement C4-A	CO4A_HUMAN	Complement C4-A
FIBB_HUMAN	Fibrinogen beta chain	FIBB_HUMAN	Fibrinogen beta chain
FINC_HUMAN	Fibronectin	APOE_HUMAN	Apolipoprotein E
IGHM_HUMAN	Ig mu chain C region	CERU_HUMAN	Ceruloplasmin
APOA1_HUMAN	Apolipoprotein A-I	APOA1_HUMAN	Apolipoprotein A-I
FIBA_HUMAN	Fibrinogen alpha chain	IGHM_HUMAN	Ig mu chain C region
CERU_HUMAN	Ceruloplasmin	FIBA_HUMAN	Fibrinogen alpha chain
CFAH_HUMAN	Complement factor H	FINC_HUMAN	Fibronectin
FIBG_HUMAN	Fibrinogen gamma chain	FIBG_HUMAN	Fibrinogen gamma chain
IGHG3_HUMAN	Ig gamma-3 chain C region	IGHG3_HUMAN	Ig gamma-3 chain C region
APOE_HUMAN	Apolipoprotein E	HPT_HUMAN	Haptoglobin
APOA4_HUMAN	Apolipoprotein A-IV	ACTB_HUMAN	Actin, cytoplasmic 1
MUCB_HUMAN	Ig mu heavy chain disease protein	MUCB_HUMAN	Ig mu heavy chain disease protein
IGHG1_HUMAN	Ig gamma-1 chain C region	A1AT_HUMAN	Alpha-1-antitrypsin

Wernerné Sódar Barbara, Scientific Reports, In Press

Extracelluláris vezikula korona I.

Humán vérplazma eredetű extracelluláris vezikulák

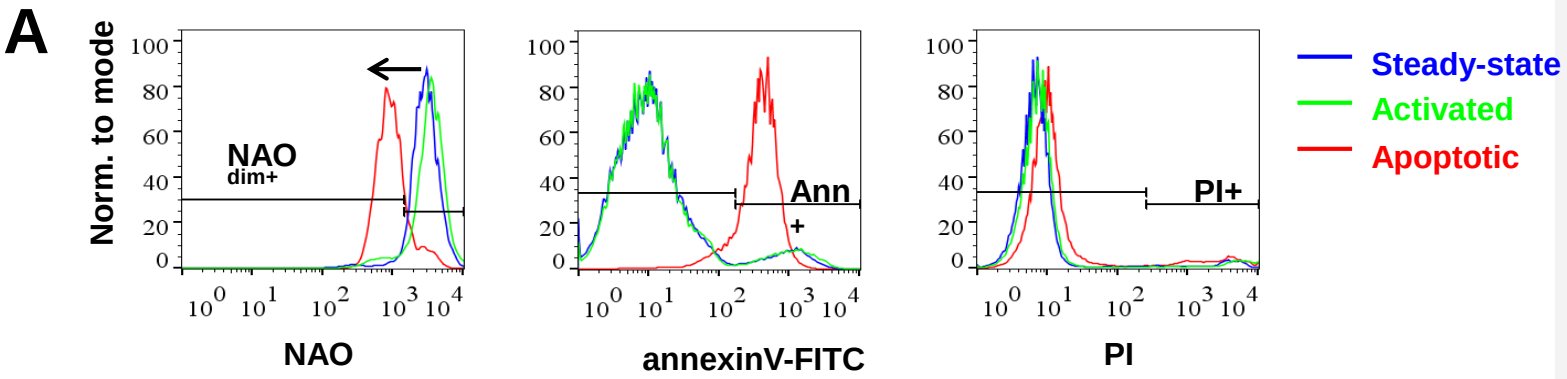


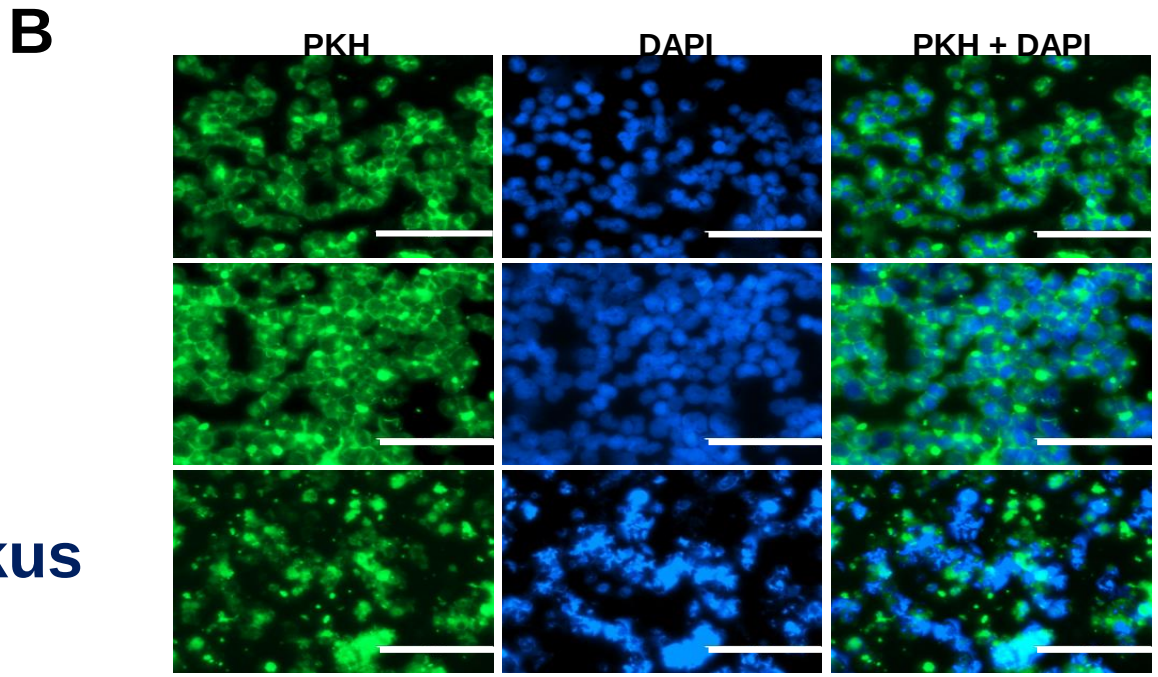


MEDINPROT

Wernerné Sódar Barbara, Scientific Reports, In Press

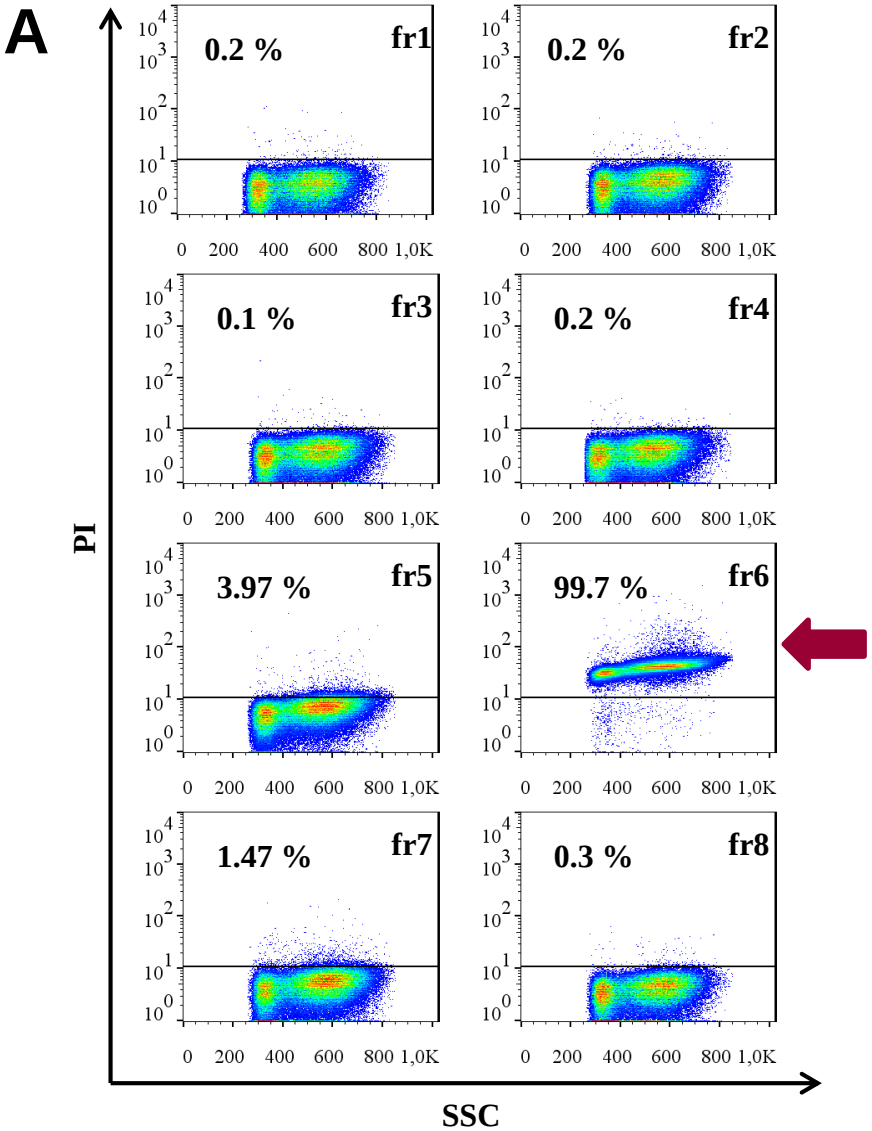
Extracelluláris vezikula korona II.

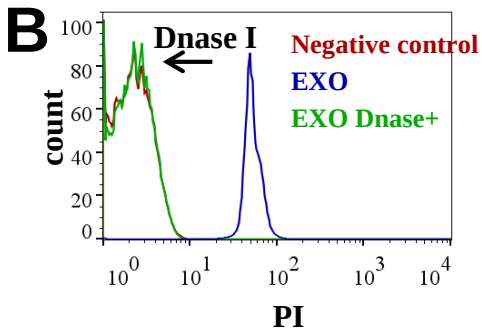


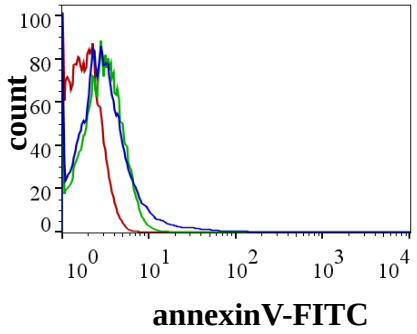


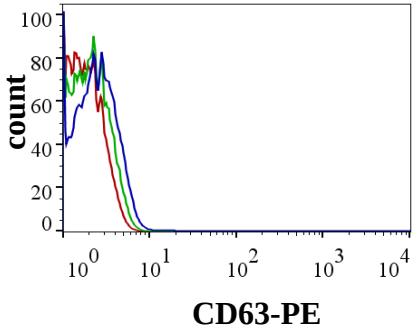
Extracelluláris vezikula korona II.

Optiprep denzitás grádiens









Extracelluláris vezikula korona II.

exoszómák

Row	OK	Accession	MW [kDa]	pI	#Alt. P	Scores	#Peptides	SC [%]	RMS90 [pp	Rank	Protein
1	true	CLH1_HUM	191.5	5.5	2	711.1 (M:7	14	11.2	1.16	1	Clathrin heavy chain 1 OS=Homo sapiens GN=CLTC PE=1 SV=5
2	true	ACTB_HUM	41.7	5.3	8	711.0 (M:7	14	53.6	0.97	2	Actin, cytoplasmic 1 OS=Homo sapiens GN=ACTB PE=1 SV=1
3	true	H2B1L_HU	13.9	10.3	2	564.7 (M:5	11	46.8	0.88	4	Histone H2B type 1-L OS=Homo sapiens GN=HIST1H2BL PE=1 SV=3
4	true	H2B1N_HU	13.9	10.3	8	562.3 (M:5	11	46.8	0.95	5	Histone H2B type 1-N OS=Homo sapiens GN=HIST1H2BN PE=1 SV=3
5	true	K2C1_HUM	66.0	8.2	2	574.0 (M:5	10	22.8	1.00	3	Keratin, type II cytoskeletal 1 OS=Homo sapiens GN=KRT1 PE=1 SV=6
6	true	H2B1J_HU	13.9	10.3	4	533.4 (M:5	10	46.0	1.03	6	Histone H2B type 1-J OS=Homo sapiens GN=HIST1H2BJ PE=1 SV=3
7	true	H2B3B_HU	13.9	10.3	1	528.4 (M:5	10	46.0	0.96	7	Histone H2B type 3-B OS=Homo sapiens GN=HIST3H2BB PE=1 SV=3
8	true	K1C10_HU	58.8	5.1	19	393.7 (M:3	8	17.1	0.92	10	Keratin, type I cytoskeletal 10 OS=Homo sapiens GN=KRT10 PE=1 SV=6
9	true	ANXA6_HU	75.8	5.4	1	383.7 (M:3	8	14.1	0.95	12	Annexin A6 OS=Homo sapiens GN=ANXA6 PE=1 SV=3
10	true	ACTA_HUM	42.0	5.2	4	382.1 (M:3	8	30.5	0.98	13	Actin, aortic smooth muscle OS=Homo sapiens GN=ACTA2 PE=1 SV=1
11	true	PARP1_HU	113.0	9.0	1	360.4 (M:3	8	9.7	0.68	15	Poly [ADP-ribose] polymerase 1 OS=Homo sapiens GN=PARP1 PE=1 SV=4
12	true	H4_HUMA	11.4	11.4	1	388.7 (M:3	7	51.5	1.20	11	Histone H4 OS=Homo sapiens GN=HIST1H4A PE=1 SV=2
13	true	TBA1B_HU	50.1	4.9	9	353.2 (M:3	7	24.8	0.53	16	Tubulin alpha-1B chain OS=Homo sapiens GN=TUBA1B PE=1 SV=1
14	true	K1C9_HUM	62.0	5.1	1	331.8 (M:3	7	16.1	1.65	17	Keratin, type I cytoskeletal 9 OS=Homo sapiens GN=KRT9 PE=1 SV=3
15	true	4F2_HUM	68.0	4.9	1	306.5 (M:3	7	14.8	1.28	20	4F2 cell-surface antigen heavy chain OS=Homo sapiens GN=SLC3A2 PE=1 SV=3
16	true	H2AX_HU	15.1	10.7	3	406.2 (M:4	6	58.0	0.80	9	Histone H2AX OS=Homo sapiens GN=H2AFX PE=1 SV=2
17	true	PDC6I_HU	96.0	6.1	1	323.1 (M:3	6	11.8	0.60	18	Programmed cell death 6-interacting protein OS=Homo sapiens GN=PDCD6IP PE=1 SV=1
18	true	H2A1H_HU	13.9	10.9	8	411.1 (M:4	5	55.5	1.17	8	Histone H2A type 1-H OS=Homo sapiens GN=HIST1H2AH PE=1 SV=3
19	true	H2A2C_HU	14.0	10.9	2	360.7 (M:3	5	55.0	0.92	14	Histone H2A type 2-C OS=Homo sapiens GN=HIST2H2AC PE=1 SV=4
20	true	ENOA_HU	47.1	7.0	3	316.1 (M:3	5	17.5	0.96	19	Alpha-enolase OS=Homo sapiens GN=ENO1 PE=1 SV=2
21	true	PRKDC_H	468.8	6.7	1	288.9 (M:2	5	1.6	1.00	21	DNA-dependent protein kinase catalytic subunit OS=Homo sapiens GN=PRKDC PE=1 SV=3
22	true	TBB5_HUM	49.6	4.8	7	238.0 (M:2	5	13.1	0.75	24	Tubulin beta chain OS=Homo sapiens GN=TUBB PE=1 SV=2
23	true	RAP1B_HU	20.8	5.6	3	230.3 (M:2	5	40.2	1.18	26	Ras-related protein Rap-1b OS=Homo sapiens GN=RAP1B PE=1 SV=1
24	true	IGSF8_HU	65.0	8.2	1	230.2 (M:2	5	15.3	1.24	27	Immunoglobulin superfamily member 8 OS=Homo sapiens GN=IGSF8 PE=1 SV=1
25	true	H15_HUM	22.6	10.9	1	226.3 (M:2	5	25.2	0.96	28	Histone H1.5 OS=Homo sapiens GN=HIST1H1B PE=1 SV=3
26	true	TBB4B_HU	49.8	4.8	3	209.2 (M:2	5	13.0	0.75	29	Tubulin beta-4B chain OS=Homo sapiens GN=TUBB4B PE=1 SV=1
27	true	H12_HUM	21.4	10.9	5	207.0 (M:2	5	26.8	0.75	30	Histone H1.2 OS=Homo sapiens GN=HIST1H1C PE=1 SV=2
28	true	1433E_HU	29.2	4.6	3	206.4 (M:2	5	20.4	0.99	31	14-3-3 protein epsilon OS=Homo sapiens GN=YWHAE PE=1 SV=1
29	true	A1AG1_HU	23.5	4.9	1	205.9 (M:2	5	24.9	0.87	32	Alpha-1-acid glycoprotein 1 OS=Homo sapiens GN=ORM1 PE=1 SV=1
30	true	H32_HUM	15.4	11.3	4	198.4 (M:1	5	47.1	1.49	33	Histone H3.2 OS=Homo sapiens GN=HIST2H3A PE=1 SV=3
31	true	HS90A_HU	84.6	4.9	5	190.3 (M:1	5	8.6	1.60	35	Heat shock protein HSP 90-alpha OS=Homo sapiens GN=HSP90AA1 PE=1 SV=5
32	true	G3P_HUM	36.0	8.6	2	278.2 (M:2	4	17.6	1.26	22	Glyceraldehyde-3-phosphate dehydrogenase OS=Homo sapiens GN=GAPDH PE=1 SV=3
33	true	MOES_HU	67.8	6.1	2	244.9 (M:2	4	9.2	1.12	23	Moesin OS=Homo sapiens GN=MSN PE=1 SV=3
34	true	H31_HUM	15.4	11.1	1	190.4 (M:1	4	23.5	1.13	34	Histone H3.1 OS=Homo sapiens GN=HIST1H3A PE=1 SV=2
35	true	AT1A1_HU	112.8	5.3	5	179.5 (M:1	4	6.2	1.88	37	Sodium/potassium-transporting ATPase subunit alpha-1 OS=Homo sapiens GN=ATP1A1 PE=1 SV=1
36	true	HS90B_HU	83.2	5.0	3	179.3 (M:1	4	6.9	1.42	38	Heat shock protein HSP 90-beta OS=Homo sapiens GN=HSP90AB1 PE=1 SV=4
37	true	RL18_HUM	21.6	11.7	1	179.3 (M:1	4	25.5	0.61	39	60S ribosomal protein L18 OS=Homo sapiens GN=RPL18 PE=1 SV=2

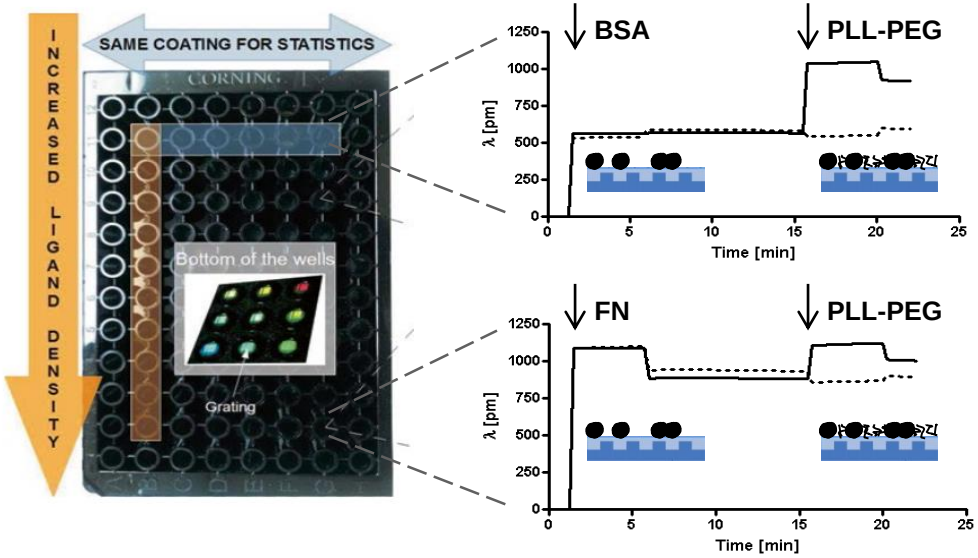
Németh Andrea (kézirat előkészületben)

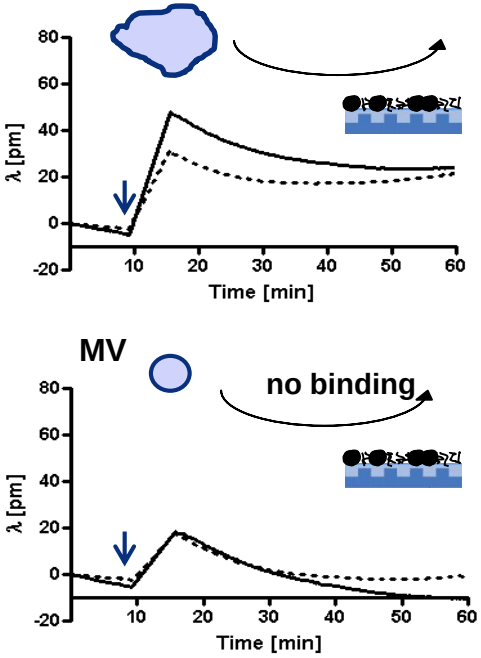
Extracelluláris vezikula korona II.

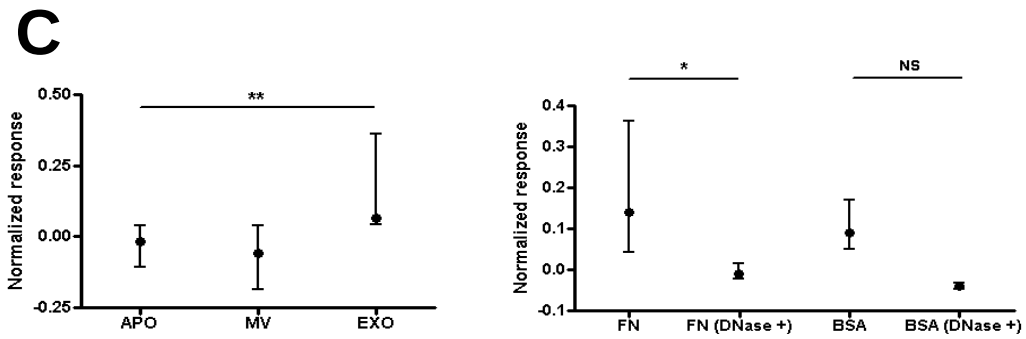
mikrovezikulák

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Row	User Flag	OK	Accessio	MW [kDa]	pI	#Alt. Prot	Scores	#Peptides	SC [%]	RMS90 [p	Rank	Protein
2	1		true	K1C10_HU	58.8	5.1	15	1883.8 (M	29	53.8	0.65	2	Keratin, type I cytoskeletal 10 OS=Homo sapiens GN=KRT10 PE=1 SV=6
3	2		true	K2C1_HUI	66.0	8.2	2	1532.4 (M	24	45.8	0.49	3	Keratin, type II cytoskeletal 1 OS=Homo sapiens GN=KRT1 PE=1 SV=6
4	3		true	ACTB_HU	41.7	5.3	8	2397.9 (M	22	69.3	0.69	1	Actin, cytoplasmic 1 OS=Homo sapiens GN=ACTB PE=1 SV=1
5	4		true	K22E_HU	65.4	8.1	5	1144.0 (M:	19	44.8	0.72	6	Keratin, type II cytoskeletal 2 epidermal OS=Homo sapiens GN=KRT2 PE=1 SV=2
6	5		true	MOES_HU	67.8	6.1	2	1039.6 (M	19	41.8	0.59	7	Moesin OS=Homo sapiens GN=MSN PE=1 SV=3
7	6		true	K1C9_HU	62.0	5.1	1	1161.0 (M:	18	49.3	0.72	5	Keratin, type I cytoskeletal 9 OS=Homo sapiens GN=KRT9 PE=1 SV=3
8	7		true	TBB5_HU	49.6	4.8	7	821.5 (M:	15	57.7	0.67	10	Tubulin beta chain OS=Homo sapiens GN=TUBB PE=1 SV=2
9	8		true	G3P_HUM	36.0	8.6	2	874.2 (M:	14	67.5	1.06	8	Glyceraldehyde-3-phosphate dehydrogenase OS=Homo sapiens GN=GAPDH PE=1 SV=3
10	9		true	MYO1G_H	116.4	9.0	2	690.6 (M:	14	22.2	0.77	14	Unconventional myosin-Ig OS=Homo sapiens GN=MYO1G PE=1 SV=2
11	10		true	ACTA_HU	42.0	5.2	4	1344.0 (M	13	35.5	1.27	4	Actin, aortic smooth muscle OS=Homo sapiens GN=ACTA2 PE=1 SV=1
12	11		true	ENOA_HU	47.1	7.0	2	821.8 (M:	13	51.4	0.49	9	Alpha-enolase OS=Homo sapiens GN=ENO1 PE=1 SV=2
13	12		true	4F2_HUM	68.0	4.9	1	728.5 (M:	13	33.3	1.04	12	4F2 cell-surface antigen heavy chain OS=Homo sapiens GN=SLC3A2 PE=1 SV=3
14	13		true	TBA1B_H	50.1	4.9	4	739.5 (M:	12	43.7	0.90	11	Tubulin alpha-1B chain OS=Homo sapiens GN=TUBA1B PE=1 SV=1
15	14		true	ANXA6_H	75.8	5.4	1	619.4 (M:	12	29.3	0.61	19	Annexin A6 OS=Homo sapiens GN=ANXA6 PE=1 SV=3
16	15		true	TBA1A_H	50.1	4.9	5	649.9 (M:	11	40.6	0.90	15	Tubulin alpha-1A chain OS=Homo sapiens GN=TUBA1A PE=1 SV=1
17	16		true	TBB4B_H	49.8	4.8	3	596.1 (M:	11	42.0	0.62	21	Tubulin beta-4B chain OS=Homo sapiens GN=TUBB4B PE=1 SV=1
18	17		true	1433Z_HU	27.7	4.7	2	515.9 (M:	11	62.0	0.61	22	14-3-3 protein zeta/delta OS=Homo sapiens GN=YWHAZ PE=1 SV=1
19	18		true	HS90B_H	83.2	5.0	4	495.7 (M:	11	24.9	0.99	25	Heat shock protein HSP 90-beta OS=Homo sapiens GN=HSP90AB1 PE=1 SV=4
20	19		true	AT1A1_HU	112.8	5.3	6	604.4 (M:	10	15.3	0.74	20	Sodium/potassium-transporting ATPase subunit alpha-1 OS=Homo sapiens GN=ATP1A1 PE=1 SV=1
21	20		true	EZRL_HUM	69.4	5.9	1	480.5 (M:	10	22.9	0.58	26	Ezrin OS=Homo sapiens GN=EZR PE=1 SV=4
22	21		true	HS90A_H	84.6	4.9	2	427.9 (M:	10	21.2	0.76	29	Heat shock protein HSP 90-alpha OS=Homo sapiens GN=HSP90AA1 PE=1 SV=5
23	22		true	HSP7C_H	70.9	5.4	6	639.6 (M:	9	31.1	0.97	16	Heat shock cognate 71 kDa protein OS=Homo sapiens GN=HSPA8 PE=1 SV=1
24	23		true	RAP1B_H	20.8	5.6	2	497.8 (M:	9	64.1	0.61	24	Ras-related protein Rap-1b OS=Homo sapiens GN=RAP1B PE=1 SV=1
25	24		true	K1C14_HU	51.5	5.1	7	475.6 (M:	9	16.3	0.87	27	Keratin, type I cytoskeletal 14 OS=Homo sapiens GN=KRT14 PE=1 SV=4
26	25		true	1433E_HU	29.2	4.6	1	351.1 (M:	9	52.9	0.80	34	14-3-3 protein epsilon OS=Homo sapiens GN=YWHAE PE=1 SV=1
27	26		true	1433G_HU	28.3	4.8	1	342.5 (M:	9	43.3	0.51	35	14-3-3 protein gamma OS=Homo sapiens GN=YWHAG PE=1 SV=2
28	27		true	GBB1_HU	37.4	5.6	2	706.1 (M:	8	45.3	0.50	13	Guanine nucleotide-binding protein G(I)/G(S)/G(T) subunit beta-1 OS=Homo sapiens GN=GNB1 PE=1 SV=3
29	28		true	GNAI2_HU	40.4	5.3	7	503.6 (M:	8	32.7	0.40	23	Guanine nucleotide-binding protein G(i) subunit alpha-2 OS=Homo sapiens GN=GNAI2 PE=1 SV=3
30	29		true	K1C16_HU	51.2	5.0	1	425.2 (M:	8	13.3	0.57	30	Keratin, type I cytoskeletal 16 OS=Homo sapiens GN=KRT16 PE=1 SV=4
31	30		true	PLSL_HU	70.2	5.3	3	393.2 (M:	8	18.5	1.41	31	Plastin-2 OS=Homo sapiens GN=LCP1 PE=1 SV=6
32	31		true	RAP1A_H	21.0	6.4	1	379.8 (M:	8	57.1	0.65	33	Ras-related protein Rap-1A OS=Homo sapiens GN=RAP1A PE=1 SV=1

Extracelluláris vezikula korona elősegíti az extracelluláris mátrixhoz való asszociációt





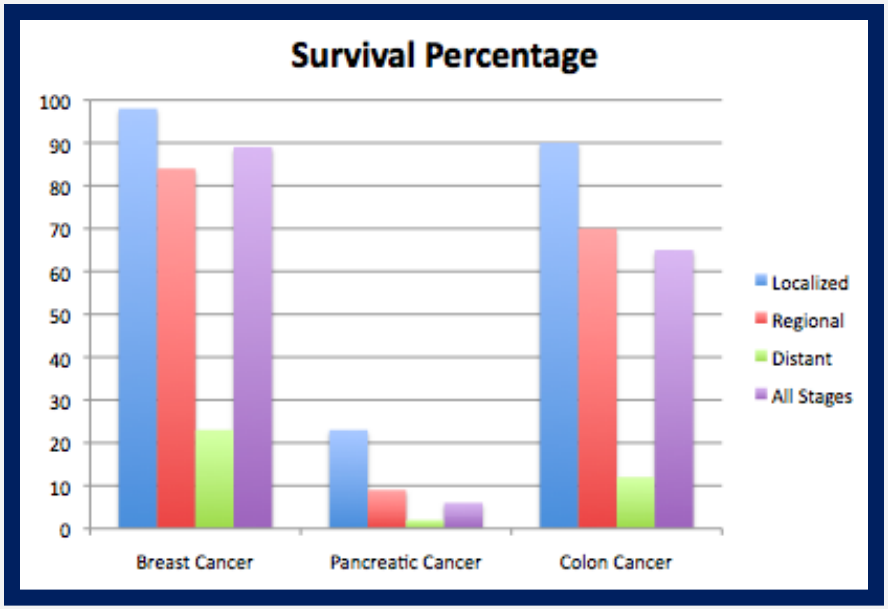


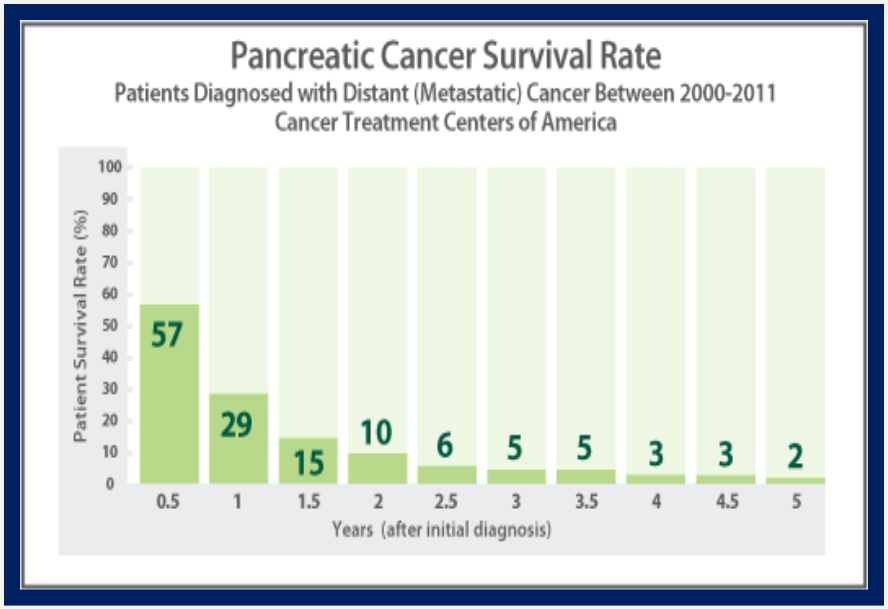
Dr. Horváth Róberttel kollaborációban

Extracelluláris vezikula korona III

Extracelluláris vezikula korona III.

Hasnyálmirigy adenocarcinoma





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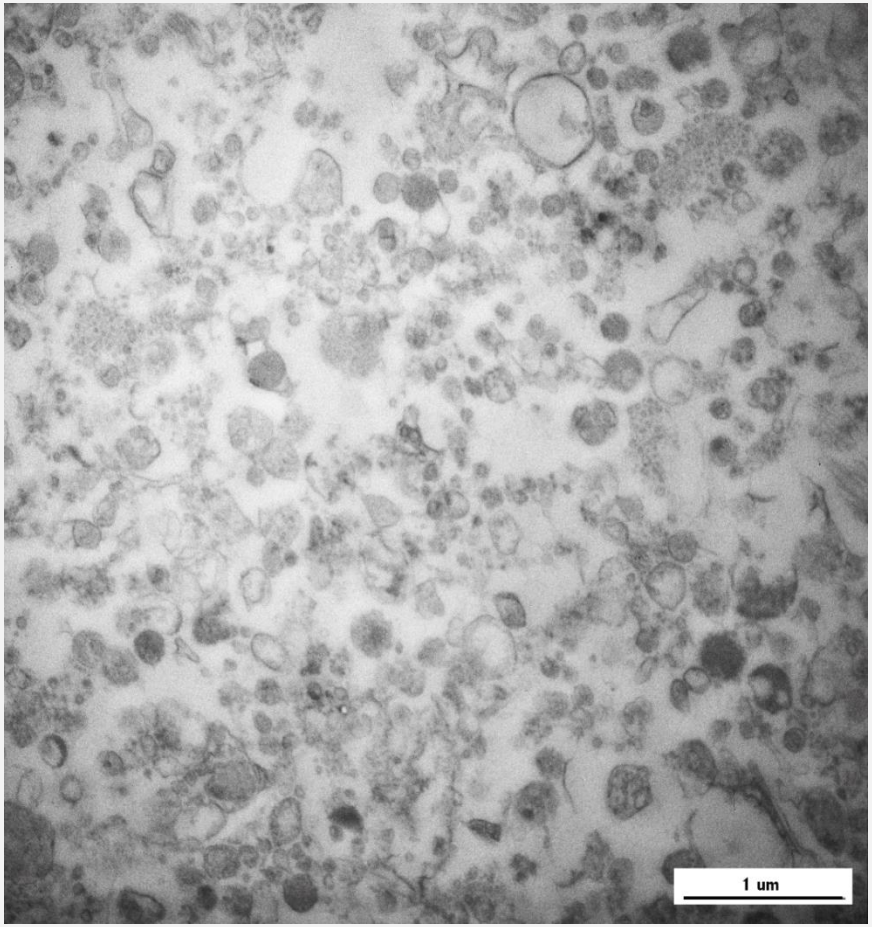
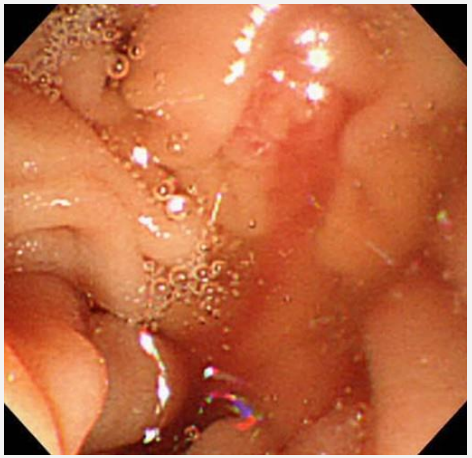
http://www.cancercenter.com/pancreatic-cancer/statistics/tab/pancreatic-cancer-survival-statistics/

Pancreasnedv eredetű extracelluláris vezikulák

pancreasnedv





(unpublished)

Extracelluláris vezikulák a testnedvekben

liquor

könny

orrváladék

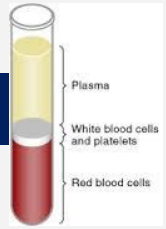
Inyál

anyatej

epe

pancreas nedv

vérplazma

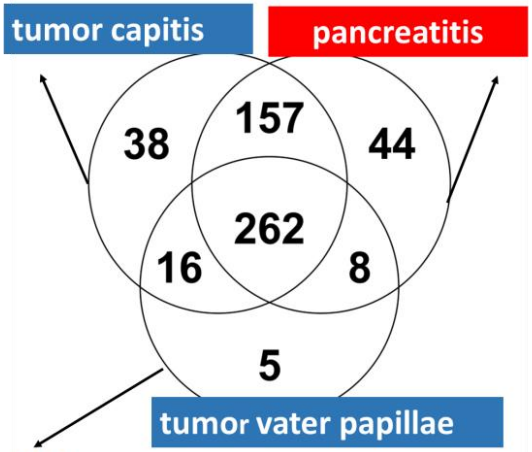


vizelet

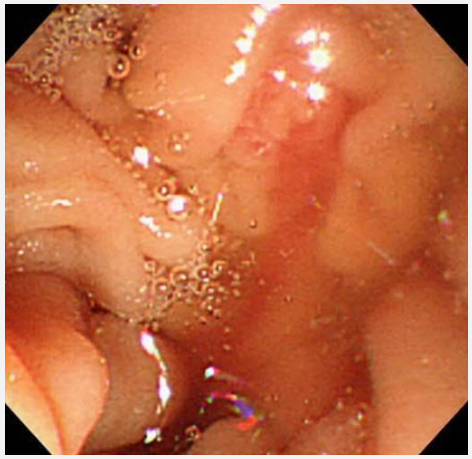
Pancreasnedv exoszómák

Pancreasnedv EXO

- Aldo-keto reductase family 1 member
- Mucin 2
- Mucin 3A
- Mucin 4
- Mucin 16
- Multidrug resistance protein 1
- Prostate stem cell antigen
- Eosinophil peroxidase
- Peroxiredoxin-6
- Protein-arginine deiminase type 2
- Protein-arginine deiminase type 4
- Sulfhydryl Oxidase 1



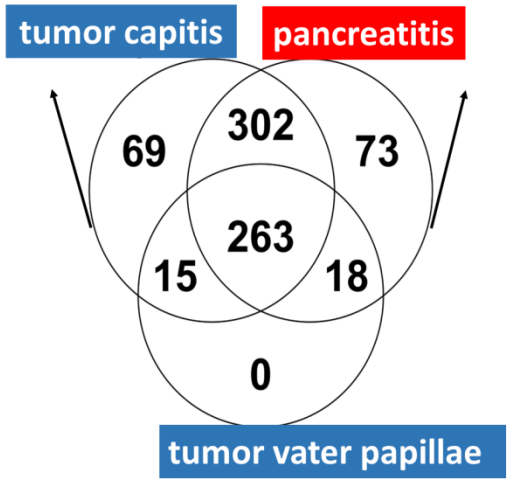
- Catenin alpha-1
- Filaggrin
- Keratin
- Multimerin-1
- Phospholipase A2

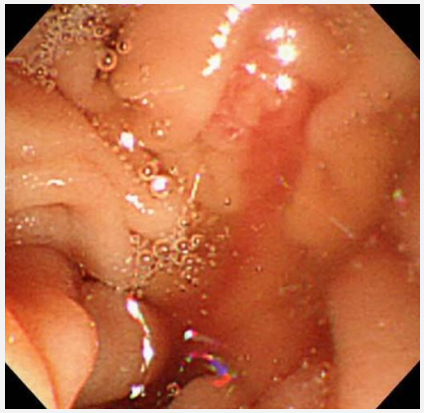


Pancreasnedv mikrovezikulák

Pancreasnedv MV

- Aldo-keto reductase family 1 member C3
- Mucin-3A
- Prostate stem cell antigen
- Protein disulfide-isomerase A2
- Syntaxin-2
- Transmembrane 4 L6 family member 4
- Eosinophil peroxidase
- Lactadherin
- Lysosome membrane protein 2
- Protein S100-A12
- Sulfhydryl oxidase

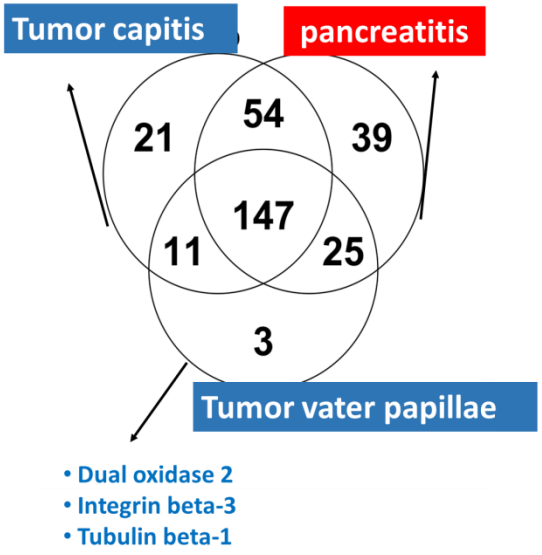




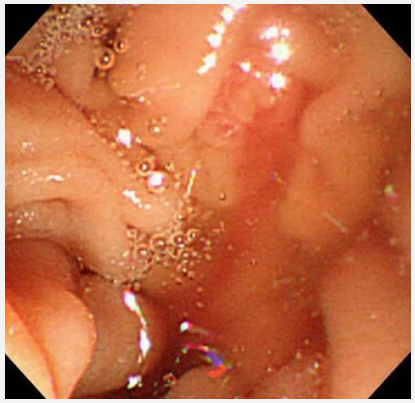
Pancreasnedv apoptotikus testek

Pancreasnedv APO

- Aldo-keto reductase family 1 member B10
- Galectin-7
- Mucin-6
- Macrophage metalloelastase
- Neutrophil elastase
- Protein S100-P

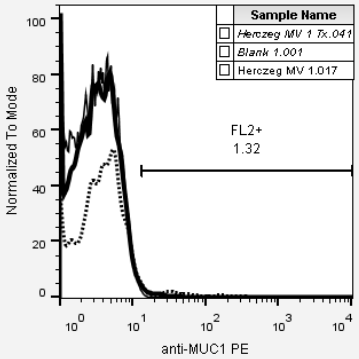


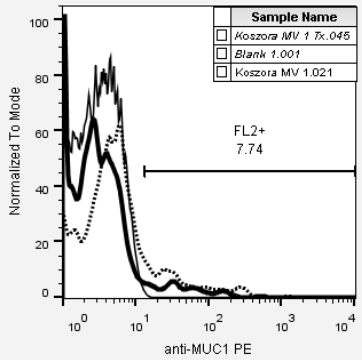
- Dual oxidase 2
- Integrin beta-3
- Tubulin beta-1



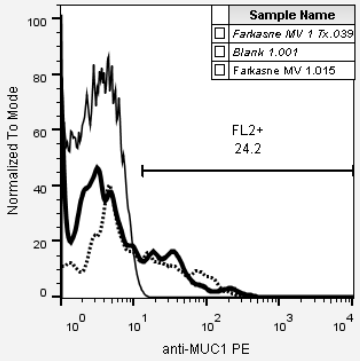
Vérplazma eredetű MUC1+ mikrovezikulák

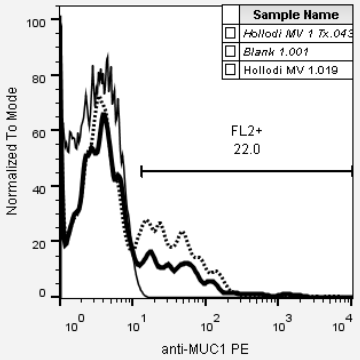
Pancreatitis



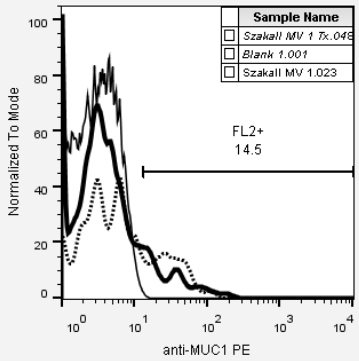


Tu. capitis



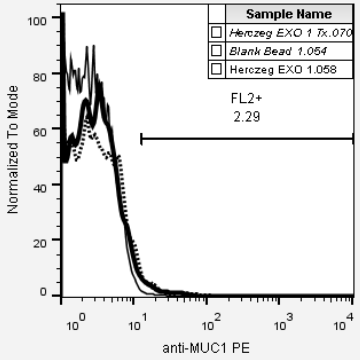


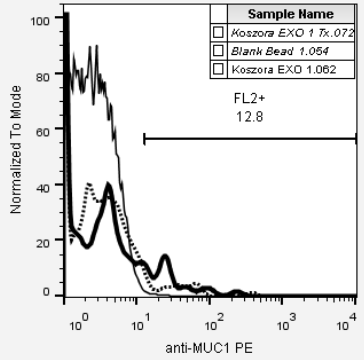
Tu .Vater papillae



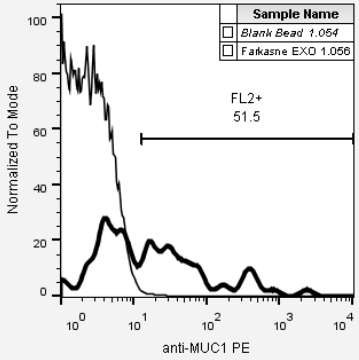
Vérplazma eredetű MUC1+ exoszómák

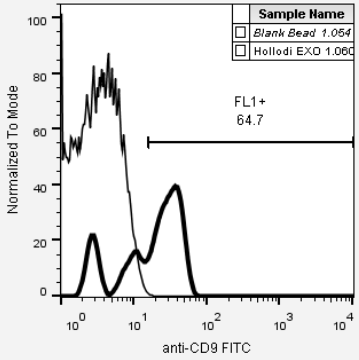
Pancreatitis



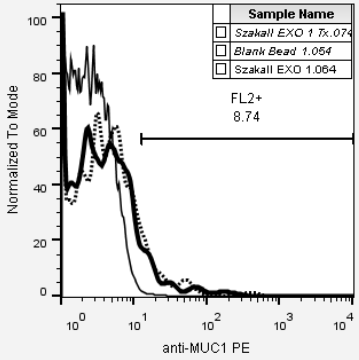


Tu. Capitis



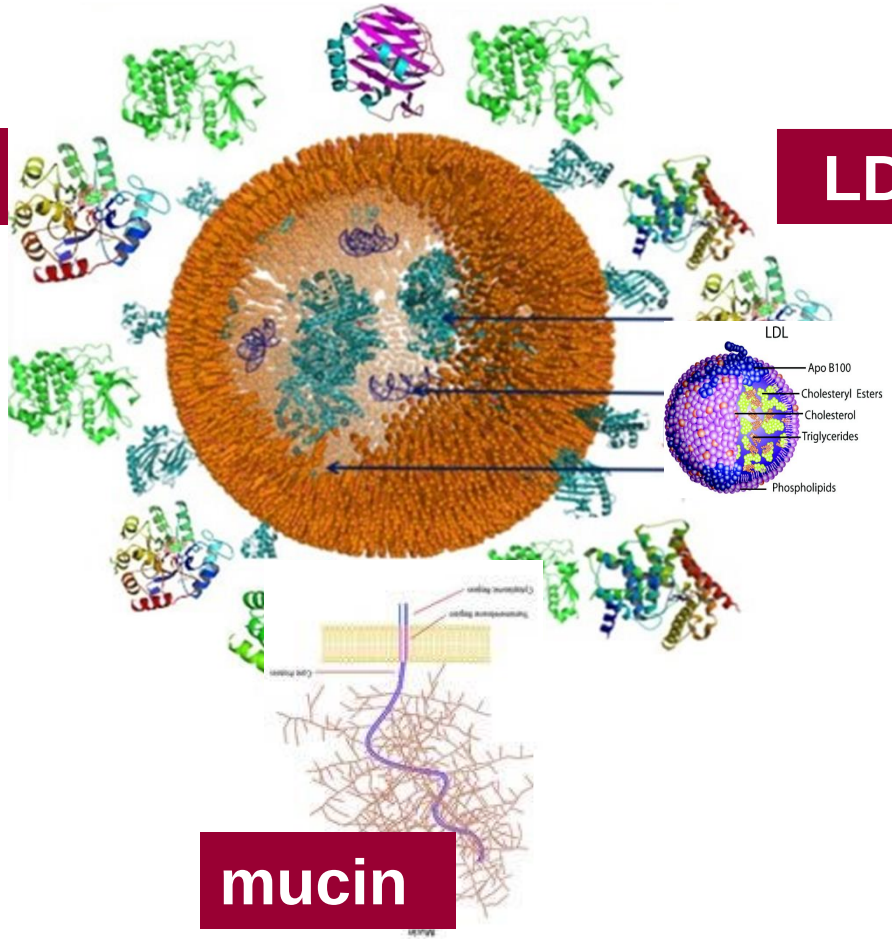


Vater Papilla tu.



Extracelluláris vezikula korona

DNS/hisztonok



LDL/ApoB100

mucin

Köszönetnyilvánítás

Turiák Lilla
Drahos László
Vékey Károly

Xabier Osteikoetxea
Wernerné Sódar Barbara
Németh Andrea
Pállinger Éva
Szabó-Taylor katalin
Pálóczi Krisztina
Kittel Ágnes
Visnovitzné Vukman Krisztina
Wiener Zoltán

Harsányi László
Szűcs Ákos

Horváth Róbert












OTKA K 111958, BMBS COST Action BM1202 ME HAD, Medinprot)

INTERNATIONAL SOCIETY FOR EXTRACELLULAR VESICLES

Annual Meeting – ISEV2016
Rotterdam, The Netherlands
4-7 May 2016

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