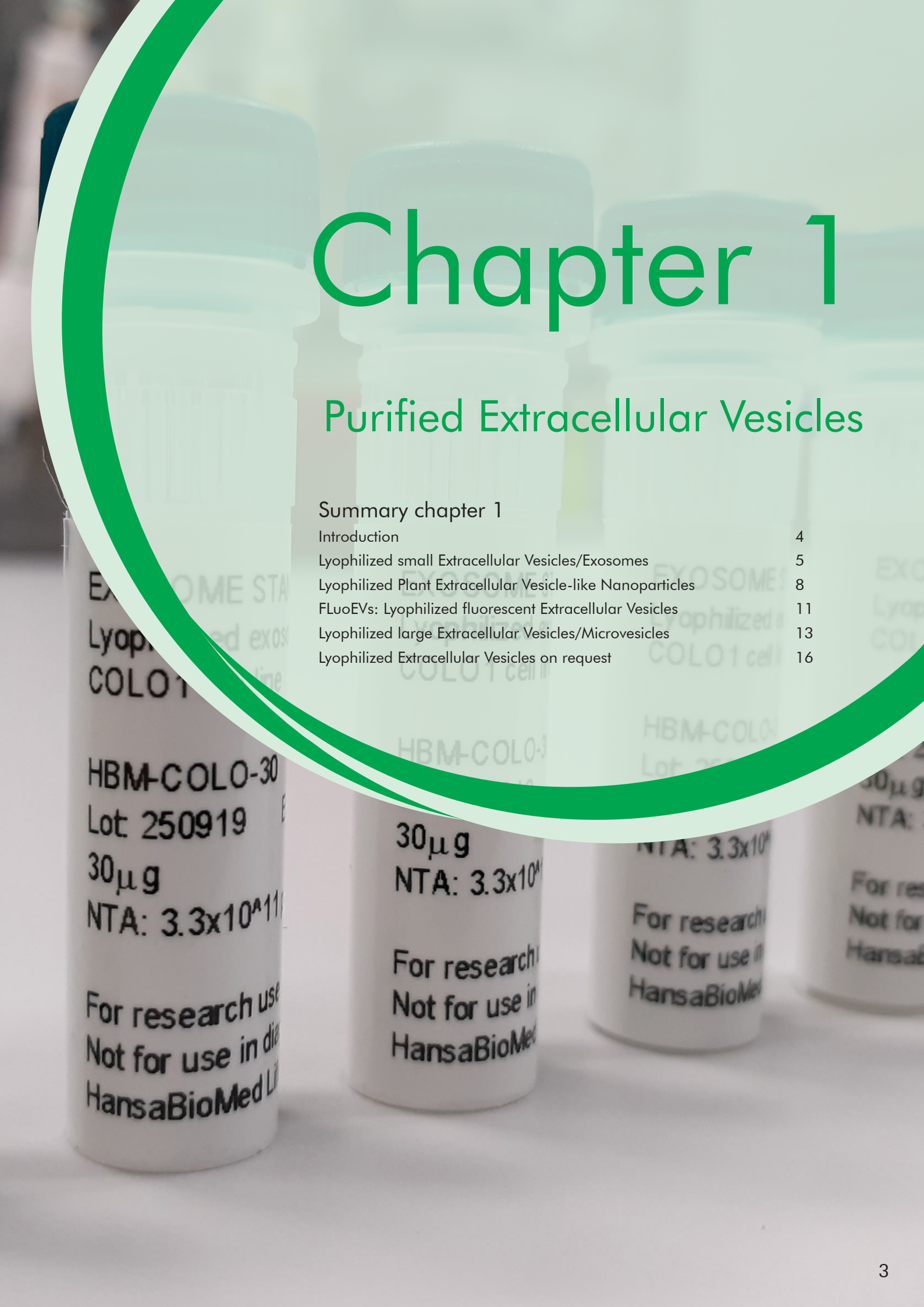
Chapter 1

Purified Extracellular Vesicles

Summary chapter 1

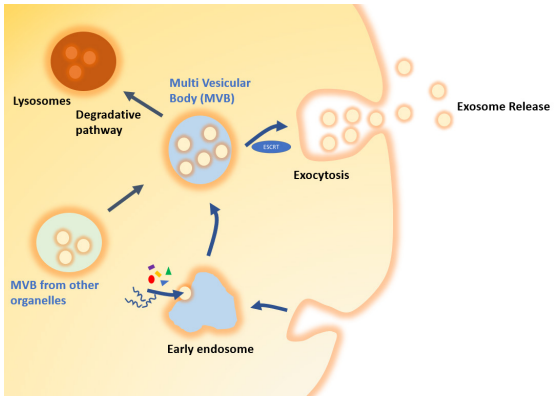


Purified Extracellular Vesicle

Introduction

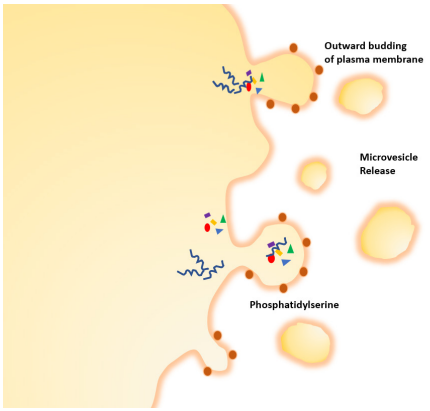
Extracellular vesicles (EVs) are cell-derived nanoparticles, differing in their cellular origin, biogenesis mechanism, size and molecular content. Even though the nomenclature of EVs is still lacking consensus, the most prominent types of EVs are Exosomes, shedding Microvesicles (MVs) and Apoptotic Bodies. Recently, EVs have started to emerge as an important mean of intercellular communication and attract more attention as diagnostic, prognostic and therapeutic tool, due to their biomarker potential, virtue to represent physiological status of parent cell and ability to modulate functions of recipient cells.

Exosomes and Microvesicles, small and large EVs: a note on the nomenclature



Exosomes are EVs with a diameter ranging from 40-120 nm that are secreted by most eukaryotic and prokaryotic cells. Exosome release occurs either constitutively or upon induction, under both normal and pathological conditions. Both quantity and molecular composition of released exosomes depend on the physiological state of the parental cells.

Microvesicles, also Ectosomes, are formed by the outward budding of the plasma membrane. Their dimensions are between 100 and 1000 nm. The release is promoted by the translocation of residues of phosphatidylserine on the external layer of the plasma membrane. During the formation process, MVs accumulate proteins and genetic material of the parental cells.



NOMENCLATURE OF PURIFIED EXTRACELLULAR VESICLES

The ISEV (International Society of Extracellular Vesicles) community defined the minimal information for studies of extracellular vesicles (MISEV guidelines*), calling Small EVs the vesicles with diameter between 30 - 120 nm and Large EVs the largest vesicles (> 120 nm). The current nomenclature was adopted because, although they differ in biogenesis, part of the Exosomes and Microvesicles secreted by the cells overlap in size and all the current available technologies do not allow to efficiently separate the two EV populations. Neverteless a wide part of the scientific community is still using the old nomenclature. In order to be conform with the MISEV guidelines, in this catalog we will use the following terms:

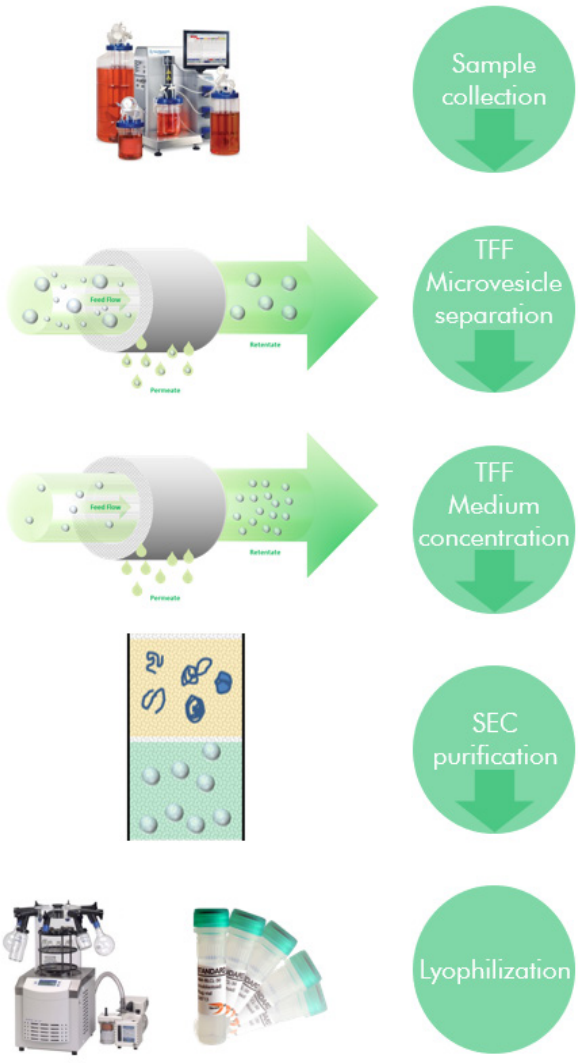
SMALL EVs (s-EVs)/EXOSOMES: vesicles with diameter comprised between 40 and 120 nm, mostly including Exosomes but also small microvesicles originated by the cell membrane.

LARGE EVs (l-EVs)/MICROVESICLES: vesicles larger than 150 nm diameter, mostly microvesicles originated by the cell membrane.

* Witwer, K. W., Soekmadji, C., Hill, A. F., Wauben, M. H., Buzás, E. I., Di Vizio, D., ... & Lötvall, J. (2017). Updating the MISEV minimal requirements for extracellular vesicle studies: building bridges to reproducibility.

Lyophilized small Extracellular Vesicles (s-EVs)/Exosomes

Purified s-EVs are obtained from a variety of biological sources: cell culture supernatant, human plasma, serum, urine. s-Evs are purified following a combination of tangential flow filtration (TFF) and size exclusion chromatography (SEC). Subsequently, isolated vesicles are quantified and validated for overall protein content, size distribution, concentration and EV specific marker expression.



Lyophilization is the ideal technique for long-term storage of EVs at 4° C. Stability of the physical properties, functionality and EV-specific marker expression of s-EVs is verified. s-EVs can be easily reconstituted by adding the appropriate volume of deionized water (MilliQ).

Applications

- Positive control for marker assessment.
- Control (spike-in) for EV quantification.
- OMICS analysis.
- Standardized positive controls for immunocapture performance evaluation.
- Flow cytometry.
- Electron microscopy.

Characteristics

- High purity.
- Size distribution: 50 - 120 nm.
- Long term stabiltiy at 4-8° C.
- Purified from biofluids collected from certified donor pools.
- Purified using combination of TFF and SEC.

Advantages

- Easy to reconstitute.
- Easy to ship and store (+4°C).
- Long term storage stability (36 months).
- Marker characterized
- Available from a large cell line bank (list of available cell line at page 16).

Purified Extracellular Vesicle

Lyophilized Small EVs/Exosomes from Human Biofluids

Cat Code	Contents	Package size (#)	
Lyophilized Small EVs/Exosomes from Human Plasma of healthy donors			
HBM-PEP100/#	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-PEP30/#	30 µg (>1x10^8 particles)	2 vials	5 vials
Lyophilized Small EVs/Exosomes from Human Serum of healthy donors			
HBM-PES100/#	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-PES30/#	30 µg (>1x10^8 particles)	2 vials	5 vials
Lyophilized Small EVs/Exosome from Human Urine of healthy donors			
HBM-PEU100/#	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-PEP30/#	30 µg (>1x10^8 particles)	2 vials	5 vials
Source of human biofluids			
All the HBM-LS Extracellular Vesicles are produced by human biofluids of certified healthy donors with informed consent.			
Lyophilized Extracellular Vesicles from Human Biofluids, Bulk production			
Small EVs/Exosomes can be produced in large bulks, on customer request. For information write to: info@hansabiomed.eu			

Lyophilized Small EVs/Exosomes from Cell Conditioned Media

HBM-LS provides Small EVs/Exosome Standards from 14 different cell line in stock, listed below, and, upon request, purified Exosome Standards from over 200 cell lines (see page 16).

Cat Code	Cell Line	Description	Particle content	Package size (#)	
Lyophilized Small EVs/Exosomes from Human MSC					
HBM-MSC-100/#	Primary cell	human adipose tissue	100 µg (>1x10^10 particles)	2 vials	5 vials
Lyophilized Small EVs/Exosomes from HEK293 cell line					
HBM-HEK-100/#	HEK293	Human embryonic kidney	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-HEK-30/#	HEK293		30 µg (>1x10^8 particles)	2 vials	5 vials
Lyophilized Small EVs/Exosome from Human COLORECTAL cancer cells					
HBM-COLO-100/#	COLO1	Human Colorectal adenocarcinoma	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-COLO-30/#	COLO1	Human Colorectal adenocarcinoma	30 µg (>1x10^8 particles)	2 vials	5 vials
HBM-HCT-100/#	HCT116	Human Colorectal adenocarcinoma	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-HCT-100/#	HCT116	Human Colorectal adenocarcinoma	30 µg (>1x10^8 particles)	2 vials	5 vials
HBM-HT29-30/#	HT29	Human Colorectal adenocarcinoma	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-HT29-100/#	HT29	Human Colorectal adenocarcinoma	30 µg (>1x10^8 particles)	2 vials	5 vials
Lyophilized Small EVs/Exosome from Human PROSTATE cancer cells					
HBM-PC3-100/#	PC3	Human Prostate adenocarcinoma	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-PC3-30/#	PC3	Human Prostate adenocarcinoma	30 µg (>1x10^8 particles)	2 vials	5 vials
HBM-LnCAP-100/#	LnCAP	Human Prostate adenocarcinoma	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-LnCAP-30/#	LnCAP	Human Prostate adenocarcinoma	30 µg (>1x10^8 particles)	2 vials	5 vials

Cat Code	Cell Line	Description	Particle content	Package size (#)	
Lyophilized Small EVs/Exosome from Human LUNG cancer cells					
HBM-A549-100/#	A549	Lung alveolar adenocarcinoma	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-A549-30/#	A549	Lung alveolar adenocarcinoma	30 µg (>1x10^8 particles)	2 vials	5 vials
HBM-NCI-100/#	NCI-H1975	Lung adenocarcinoma non-small cells	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-NCI-30/#	NCI-H1975	Lung adenocarcinoma non-small cells	30 µg (>1x10^8 particles)	2 vials	5 vials
Lyophilized Small EVs/Exosome from human GLIOBLASTOMA and NEUROBLASTOMA cells					
HBM-SK-100/#	SK-BR-3	Neuroblastoma, bone marrow metastasis	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-SK-30/#	SK-BR-3	Neuroblastoma, bone marrow metastasis	30 µg (>1x10^8 particles)	2 vials	5 vials
HBM-U87-100	U87 MG	Glioblastoma-astrocytoma	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-U87-30	U87 MG	Glioblastoma-astrocytoma	30 µg (>1x10^8 particles)	2 vials	5 vials
Lyophilized Small EVs/Exosome from human chronic and acute LEUKEMIA					
HBM-K562-100/#	K562	Leukemia, chronic myelogenous	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-K562-30/#	K562	Leukemia, chronic myelogenous	30 µg (>1x10^8 particles)	2 vials	5 vials
Lyophilized Small EVs/Exosome from MELANOMA cancer cells					
HBM-MM1-100/#	MM1	Human melanoma	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-MM1-3-/#	MM1	Human melanoma	30 µg (>1x10^8 particles)	2 vials	5 vials
HBM-B16-100/#	B16F10	Mouse melanoma	100 µg (>1x10^10 particles)	2 vials	5 vials
HBM-B16-30/#	B16F10	mouse melanoma	30 µg (>1x10^8 particles)	2 vials	5 vials
Cell line bank information					
Cell line source: All HBM-LS Extracellular Veiscles are produced using Cell Lines from the Cell Bank of the Interlab Cell Line Collection of the IRCCS AUO S.Martino IST, Istituto Nazionale per la Ricerca sul Cancro, Genova, Italy. To order Cell Lines refer directly to: www.iclc.it/indexpi.html.					
Lyophilized Extracellular Vesicles storage					
Lyophilized EVs can be stored at 4°C for up to 36 months. After reconstitution EVs can be stored at -20°C for up to one month or at -80°C for up to six months. Avoid freeze and thaw cycles.					
Lyophilized Extracellular Vesicles from Cell Conditioned Media, Bulk production					
Small EVs/Exosomes can be produced in large bulks, on customer request. For information write to: info@hansabiomed.eu					

Purified Extracellular Vesicle

Green-Fluorescent labeled Small-EVs/Exosomes

Upon request all the listed EVs in catalog can be labeled with green fluorescent probes. For information about available probes and EV quantity contact us at info@hansabiomed.eu or visit our website (www.hansabiomed.eu).

Lyophilized Extracellular Vesicles like Nanoparticles from Plants (ELNs)

The presence of EV-like nanoparticles (ELNs) in plants was suggested around the late 1960s. However, only in the last decade began a growing interest on ELNs, in particular from food and cosmetic industry. HansaBioMed Life Sciences provides purified ELNs from different plant extracts, ELNs are purified by tangential flow filtration and characterized by particle size distribution and concentration, expression of TET8 marker (corresponding of mammalian CD63). Certificate of analysis reports the origin of the material.

Cat Code	Origin	Particle content	Package size (#)
Lyophilized Plant derived Extracellular Vesicles like Nanoparticles (ELNs)			
HBM-GIN-100	Ginger root	100 μg (>1x10^10 particles)	1 vial
HBM-POT-100	Potato	100 μg (>1x10^10 particles)	1 vial
HBM-ONI-100	Onion	100 μg (>1x10^10 particles)	1 vial
HBM-GAR-100	Garlic	100 μg (>1x10^10 particles)	1 vial
HBM-SEA-100	Seaberries	100 μg (>1x10^10 particles)	1 vial
Custom production			
Plant EVs can be produced on customer request from different plants, roots, stems, leaves. For information write to info@hansabiomed.eu			

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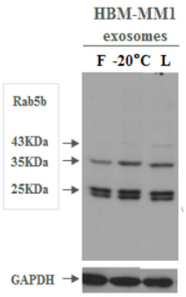
Purified Extracellular Vesicle

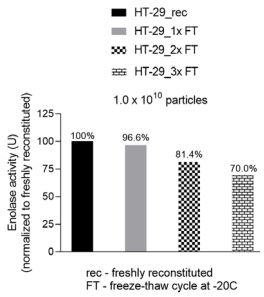
Lyophilization is the ideal method for preserving Extracellular Vesicles stability

A- MARKER EXPRESSION



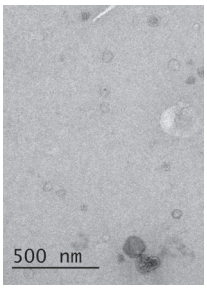
1. Fresh (F), frozen (-20ºC) and lyophilized s-EVs/

B- FUNCTIONAL PROPERTIES



2. Stability of enolase activity in lyophilized HT29 EVs (HBM-HT29).

C- MORPHOLOGY

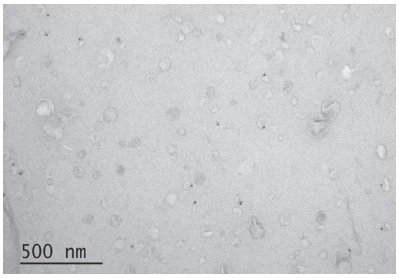


3. TEM image of lyophilized HCT116 EVS (HBM-HCT).

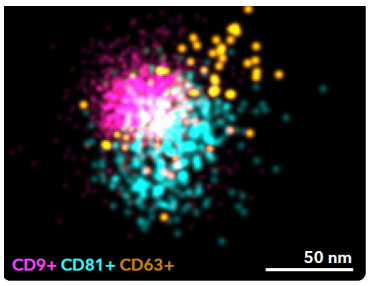
Lyophilization does not substantially affect EV particle size distribution or biomarker expression compared to other storage methods (Fig 1, 2, 3). Exosomes stored for over 3 months at -20° C or over 1 year at -80° C showed a complete different size distribution profile, probably due to EV aggregation.

Applications of lyophilized Extracellular Vesicles

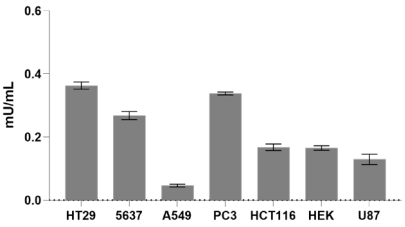
Electron Microscopy (EM) and Immuno Electron Microscopy (IEM)



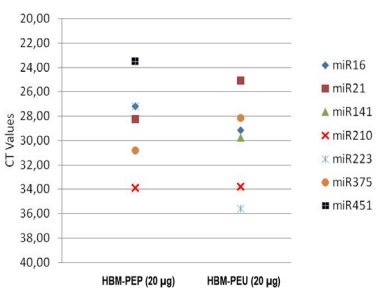
EV phenotyping by super resolution fluorescence microscopy



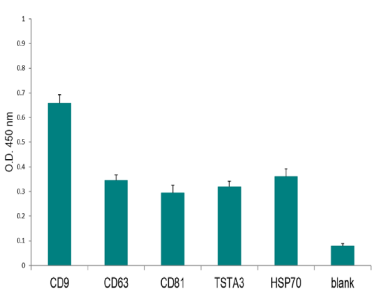
Activity assays: Acetylcholinesterase activity in lyophilized EVs



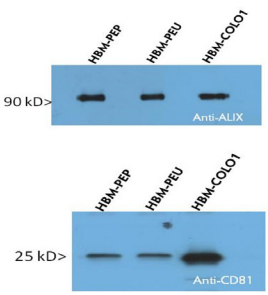
Profiling of EV associated RNAs



EV phenotyping by ELISA

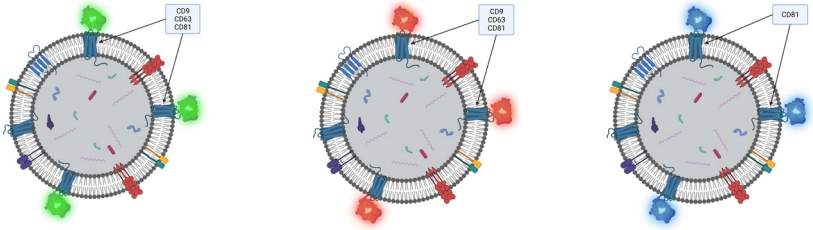


EV marker analysis by WB



FLuoEVs: Purified EVs expressing fluorescent proteins

FLuoEVs are stably-fluorescent EVs expressing the flourescent protein EGFP (green), BFP (blue) or mCherry (Red) as fusion protein with tetraspanins CD9, CD81 and CD63. FLuoEVs demonstrated high stability of the fluorophores, they can be used for *in vitro* tracking studies or as reference material for analyzers of nanoparticles or for assay calibration.



FLuoEVs are extracellular vesicles purified by combination of Tangential Flow Filtration (TFF) and Size Exclusion Chromatography (SEC) from engineered cells able to express the fluorescent proteins as fusion protein with the tetraspanin CD9, CD63 or CD81.

Cat Code	Cell origin	Fluorescent protein	Fluorescent particles/vial
FLuoEVs: Purified EVs expressing fluorescent proteins			
HBM-HEK-EFGP63	HEK293	EGFP-CD63	> 1x10^9 / 1 vial
HBM-HEK-EGFP9	HEK293	EGFP-CD9	> 1x10^9 / 1 vial
HBM-HEK-EFGP81	HEK293	EGFP-CD81	> 1x10^9 / 1 vial
Custom production			
FLuoEVs can be produced on customer request from different cell lines and different fluorescent proteins (mCHERRY/Red and BFP/Blue). For information write to info@hansabiomed.eu			

Applications

- Cell spike-in and *in vitro* tracking
- Control (spike-in) for EV quantification.
- Monitoring of EV uptake
- Standardized positive controls for EV analyzers.
- Flow cytometry.
- Fluorescence NTA.

Characteristics

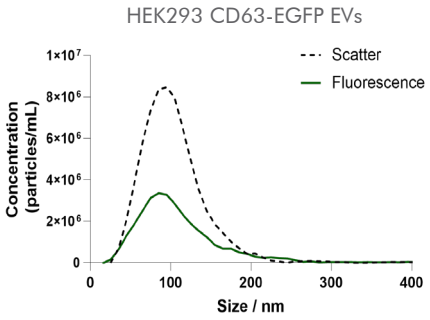
- Particle size distribution 50 - 120 nm.
- CD9, CD63, CD81 conjugated with EGFP (green) or mCHERRY (red). CD81 conjugated with BFP (blue).
- Store: 4 - 8 °C.
- Lyophilized. Reconstitution by addind deionized water.

Advantages

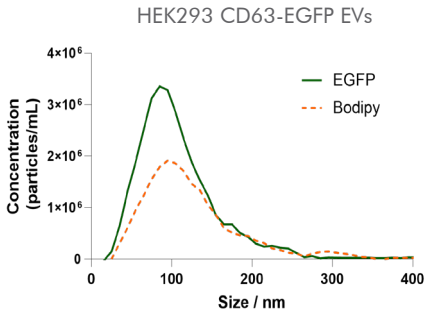
- Increrased fluorophore stability over membrane dyes.
- Easy storage and transport (4 - 8 °C).
- Custom fluorescent EVs on request.

Purified Extracellular Vesicle

Performance for FLuoEVs in fluorescence-NTA (Zetaview analyzer, Particle Metrix)

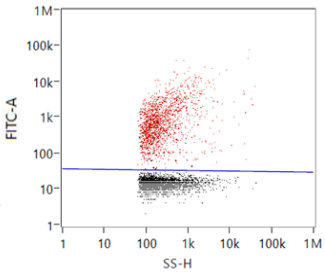


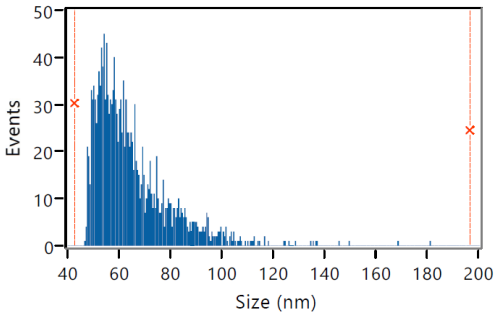
FLuoEVs HEK293-CD63-EGFP analysis in scattered vs fluorescence mode (percentage of fluorescent partilces 40 - 60 %)



Comparison of FLuoEVs HEK293-CD63-EGFP and HEK293 EVs lebeled with the lipidic dye Bodipy.

Performance for FLuoEVs in flow cytometry (NanoAnalyzer, NanoFCM)





FLuoEVs HEK293-CD63-EGFP analysis by NanoAnalyzer NanoFCM (percentage of fluorescent partilces 60 - 80 %)

Applications

- Protein marker analysis using multiple techniques.
- Extraction and analysis of MV-associated nucleic acids.
- Positive controls for NTA performance evaluation.
- Flow cytometry.
- Electron microscopy.

Characteristics

- Highly pure.
- Size distribution: 150 - 300 nm.
- Isolated by tangential flow filtration.

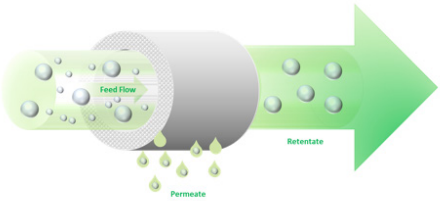
Advantages

- Easy to reconstitute.
- Easy to ship and store (+4°C).
- Long-term storage stability (36 months).
- Available on request from a large cell line bank (cell line list at page 13).

Lyophilized Large EVs/Microvesicles

Purified large EVS (l-EVs) are obtained from cell conditioned media. EVs larger than 150 nm are separated by using tangential flow filtration (TFF). Isolated vesicles are quantified and validated for overall protein content, size distribution and particle number by NTA (Nanoparticles Tracking Analysis) with Zetaview analyzer (Particle Metrix).

Sample collection



TFF Microvesicle separation

Lyophilization

Purified Extracellular Vesicle

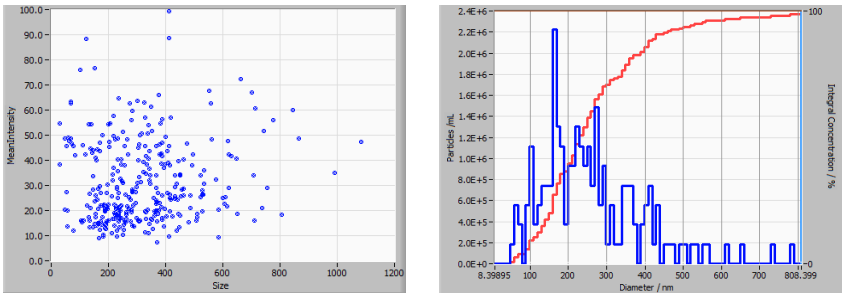
Large EVs/Microvesicles from Cell Conditioned Media

HBM-LS provides lyophilized Microvesicles from 13 different cell line in stock, listed below, and, upon request, from over 200 cell lines (see pag 12).

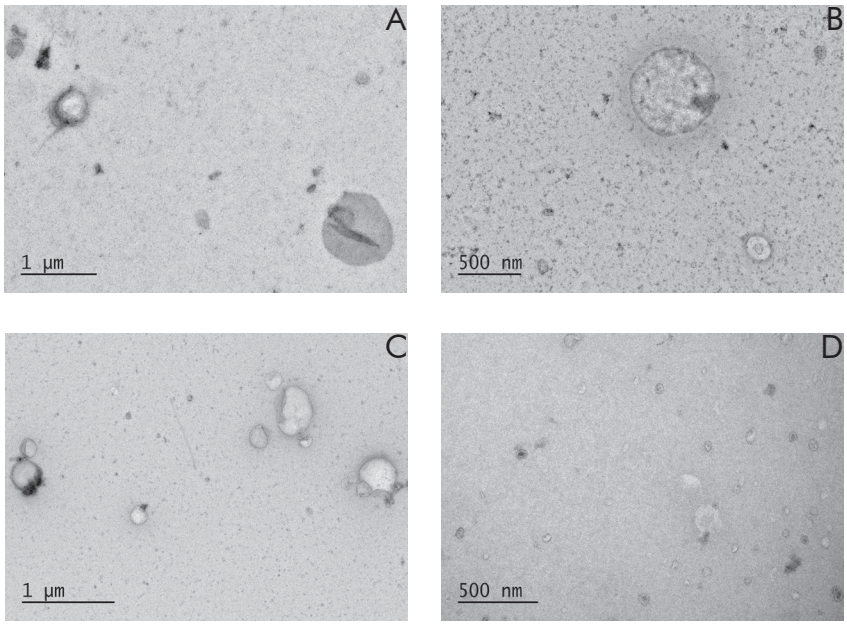
Cell Line	Code	Size
Lyophilized Large EVs/Microvesicles		
COLO1 Human colon carcinoma	HBM-mvCOLO-50	1 vials 50 µl
MM1 Human melanoma	HBM-mvMM1-50	1 vials 50 µl
U87 MG Human glioblastoma astrocytoma	HBM-mvU87-50	1 vials 50 µl
SK-N-SH Human neuroblastoma	HBM-mvSK-50	1 vials 50 µl
HCT116 Human colon carcinoma	HBM-mvHCT-50	1 vials 50 µl
PC3 Human prostate adenocarcinoma grade IV	HBM-mvPC3-50	1 vials 50 µl
A549 Human lung carcinoma	HBM-mvA549-50	1 vials 50 µl
K562 Human pleural effusion, chronic leukemia	HBM-mvK562-50	1 vials 50 µl
HEK293 Human embryonic kidney	HBM-mvHEK293-50	1 vials 50 µl
B16F10 Mouse melanoma	HBM-mvB16-50	1 vials 50 µl
Human Adipose Tissue MSC	HBM-mvMSC-50	1 vials 50 µl
Lyophilized Extracellular Vesicles storage		
Lyophilized large EVs can be stored at 4°C for up to 36 months. After reconstitution EVs can be stored at -20°C for up to one month or at -80°C for up to six months. Avoid freeze and thaw cycles.		

Application of lyophilized large EVs/Microvesicles

Lyophilized Large EVs/Microvesicles have the same versatility of small EVs, being suitable for multiple applications and techniques. Compared to the s-EVs, l-EVs show bigger dimentions and different size distribution, as revealed by NTA analysis and electron microscopy (Fig 4 and 5).



4. Size distribution profiling and scattered plot of l-EVs, performed with the Zetaview (Particle Metrix).



5. Electron microscopy images of the Lyophilized l-EVs (A,B,C) and s-EVs (D).

Purified Extracellular Vesicle

Lyophilized Extracellular Vesicles on request

Small and large EVs from the cell lines listed below upon costomer request.

List of available Cell Lines for Extracellular Vesicle purification on request		
Cell line bank information		
Cell line source: All HBM-LS Extracellular Veiscles are produced using Cell Lines from the Cell Bank of the Interlab Cell Line Collection of the IRCCS AUO S.Martino IST, Istituto Nazionale per la Ricerca sul Cancro, Genova, Italy. To order Cell Lines refer directly to: www.iclc.it/indexpi.html.		
Ordering information		
Order by email to: orders@hansabiomed.eu		
Cell Line Name	Tissue	Tumor/Pathology Description
380	peripheral blood	leukemia, pre-B cell
1301	blood	leukemia, acute lymphoblastic, T cell
5637	bladder	carcinoma
8305C	thyroid	carcinoma, undifferentiated
A 2058	skin	melanoma, metastatic
A-172	-	glioblastoma
A-204	muscle	rhabdomyosarcoma
A2780	ovary	adenocarcinoma
A-498	kidney	adenocarcinoma
A-704	kidney	adenocarcinoma
ACHN	kidney	adenocarcinoma
ACN	-	neuroblastoma
BICR 18	larynx	squamous cell carcinoma
BT-549	breast	carcinoma, ductal
BV-173*	peripheral blood	leukemia, pre-B cell
BxPC-3	pancreas	adenocarcinoma
C33A	cervix	carcinoma
CA46	ascitic fluid	lymphoma, Burkitt
Caco-2	colon	adenocarcinoma
Caki-2	kidney	carcinoma
Calu-1	lung	carcinoma, epidermoid, grade III
CaSki	cervix	cervix carcinoma, epidermoid
CFPAC-1	pancreas	adenocarcinoma
CM-S/Tum	bone marrow	monocyte tumor
CM-S/un	bone marrow	monocyte tumor
COLO 205	colon	colorectal adenocarcinoma
COLO 320DMF	colon	adenocarcinoma
COLO 699N	lung, derived from pleural fluid	adenocarcinoma
COLO 741	colon	carcinoma, pelvic wall metastasis
COLO 800	subcutaneous nodule	melanoma
COLO 853	lymph node	melanoma
COLO 858	lymph node	melanoma
* Epstein-Barr virus ** Transformed by Epstein-Barr virus *** type C, type B viruses		

Cell Line Name	Tissue	Tumor/Pathology Description
COR-L23	lung	carcinoma, large cell
DBTRG.05MG	brain	glioblastoma
DLD-1	colon	adenocarcinoma
DMS-79	lung, pleural effusion	carcinoma, small cell
DOHH2*	-	lymphoma, follicular, B cell
DU-145	prostate	carcinoma
FTC-133	thyroid	carcinoma, follicular
FTC-238	thyroid	carcinoma, follicular
G-361	skin	melanoma
GDM-1	peripheral blood	leukemia, acute myelomonocytic
GF-D8	peripheral blood	leukemia, acute myeloid
H9	lymphocyte	lymphoma
HCT-15	colon	colorectal adenocarcinoma
HCT-8	intestine, ileocecal	ileocecal adenocarcinoma
HECV	umbilical cord	-
HEL 92.1.7	-	erythroleukemia
HeLa	cervix	carcinoma, epitheloid
HeLa S3	cervix	carcinoma, epitheloid
H-EMC-SS	-	chondrosarcoma
Hep G2	liver	hepatocellular carcinoma
HFFF2	foreskin, fetal	fibroblast, fetal
HGC-27	stomach	carcinoma, undifferentiated
HL-60	peripheral blood	leukemia, promyelocytic
HOS	bone	osteosarcoma
Hs578T	breast	carcinoma
Hs913T	derived from metastasis to lung	fibrosarcoma
HT 1197	bladder	carcinoma
HT-1080	acetabulum	fibrosarcoma
HT-29	colon	adenocarcinoma, grade II
HuP-T3	pancreas	adenocarcinoma, ascitic fluid
HuP-T4	pancreas	adenocarcinoma, ascitic fluid
Hs913T	derived from metastasis to lung	fibrosarcoma
HT 1197	bladder	carcinoma
HT-1080	acetabulum	fibrosarcoma
HT-29	colon	adenocarcinoma, grade II
HuP-T3	pancreas	adenocarcinoma, ascitic fluid
HuP-T4	pancreas	adenocarcinoma, ascitic fluid
HUVEC	endothelium	umbelical vein endothelial cells
IMR-32	-	neuroblastoma
IMR-5	-	neuroblastoma
IST-MEL1	skin	melanoma
IST-MEL2	skin	melanoma
IST-MEL3	skin	melanoma

* Epstein-Barr virus
** Transformed by Epstein-Barr virus
*** type C, type B viruses

Purified Extracellular Vesicle

Cell Line Name	Tissue	Tumor/Pathology Description
IST-MELA 16	subcutaneous metastasis	melanoma, metastatic
IST-MES1	pleural effusion	mesothelioma
IST-MES2	pleural effusion	mesothelioma
IST-SL1	lung	carcinoma, small cell
KARPAS-422*	-	lymphoma, follicular, B cell
KYSE-30	oesophagus	carcinoma,squamous cell
LB4**	lymphocyte, B	paroxysmal nocturnal hemoglobinuria
LB-B7**	lymphocyte, B	paroxysmal nocturnal hemoglobinuria
LB-F9**	lymphocyte, B	paroxysmal nocturnal hemoglobinuria
LNCap.FGC	prostate	adenocarcinoma
LoVo	colon	adenocarcinoma
LS 180	colon	colorectal adenocarcinoma
M07e	peripheral blood	leukemia, acute megakaryoblastic
MCF7***	breast	adenocarcinoma
MDA-MB-415	breast	adenocarcinoma
MDA-MB-435S	breast	carcinoma, ductal
MDA-MB-436	mammary gland	adenocarcinoma
MDA-MB-453	breast	adenocarcinoma
MDA-MB-468	breast	adenocarcinoma
MeCo 05	skin	melanoma
MEG-01	bone marrow	leukemia, megakaryoblastic
MEGR 07	metastatic cutaneous nodule	melanoma
MeMo 05	lymph node, metastasis	melanoma
MEMOR 06	subcutaneous metastasis	malignant melanoma
MES-SA	uterus	sarcoma
MEWO	-	malignant melanoma
MG-63	-	osteosarcoma
MOLT-4	peripheral blood	leukemia, T cell
MONO-MAC-6	peripheral blood	leukemia,acute monocytic
MPP 89	pleural effusion	mesothelioma
MRC-5	lung, fetal	-
MSTO-211H	-	mesothelioma
NCI-H1650	lung	adenocarcinoma, bronchioalveolar carcnoma (smoker patient)
NCI-H1975	lung	adenocarcinoma, non-small cell (non-smoker patient)
NCI-H292	lung	carcinoma, mucoepidermoid
NCI-H727	lung	carcinoma, non-small cell
NT2-D1	testis	carcinoma, embryonal pluripotent
OCI-AML2	peripheral blood	leukemia, acute myeloid
PA-1	ovary	teratocarcinoma
PF-382	pleural effusion	leukemia, T cell
PSN1	pancreas	adenocarcinoma
RAJI	-	lymphoma, Burkitt
Rj2.2.5	-	lymphoma, Burkitt

* Epstein-Barr virus
** Transformed by Epstein-Barr virus
*** type C, type B viruses

Cell Line Name	Tissue	Tumor/Pathology Description
RO82-W-1	thyroid	carcinoma, follicular
ROV-S**	bone marrow	lymphoblastoid, EBV transformed
RPMI 7932	skin	melanoma
Saos-2	bone	osteosarcoma
SH-SY5Y	bone marrow metastasis	neuroblastoma
SiHa	cervix	carcinoma, squamous cell
SK-BR-3	breast	adenocarcinoma
SK-HEP-1	liver	adenocarcinoma
SK-LU-1	lung	adenocarcinoma, grade III, poorly differentiated
SK-MEL-24	skin	melanoma
SK-MEL-28	skin	melanoma
SK-MEL-5	skin	melanoma
SK-MES-1	lung	carcinoma, squamous cell
SK-N-AS	-	neuroblastoma
SK-N-BE(2)	bone marrow	neuroblastoma
SK-N-BE(2)-C	bone marrow	neuroblastoma
SK-N-F1	bone marrow metastasis	neuroblastoma
SUP-T1	pleural effusion	lymphoma, lymphoblastic, T cell
SW1353	bone	chondrosarcoma
SW48	colon	adenocarcinoma, grade IV
SW480	colon	adenocarcinoma, grade III-IV
SW620	colon	adenocarcinoma, metastasis to lymph node
SW837	rectum	adenocarcinoma, grade IV
T47D	breast	carcinoma, ductal
T84	colon	carcinoma, metastasis to lung
TE671 Subline 2	-	rhabdomyosarcoma
TF-1	bone marrow	erythroleukemia
THP-1	peripheral blood	leukemia, acute monocytic
THP-1h	peripheral blood	leukemia, acute monocytic
THP-1l	peripheral blood	leukemia, acute monocytic
U251 MG	-	glioblastoma-astrocytoma, grade III
U87 MG	brain	glioblastoma-astrocytoma
U87/DK	brain	glioblastoma, transfected with binase (ATP binding site 721), mutated de 2-7 EGFR
U87/WT	brain	glioblastoma, transfected with EGFR
U-937	pleural effusion	lymphoma, histiocytic
VA-ES-BJ	skin	sarcoma, epitheloid
WiDr	colon	colorectal adenocarcinoma
Y79	-	retinoblastoma

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