



Exosomes and other Extracellular Vesicles in Human Health and Disease

Cancer

**Neurodegenerative
Diseases**

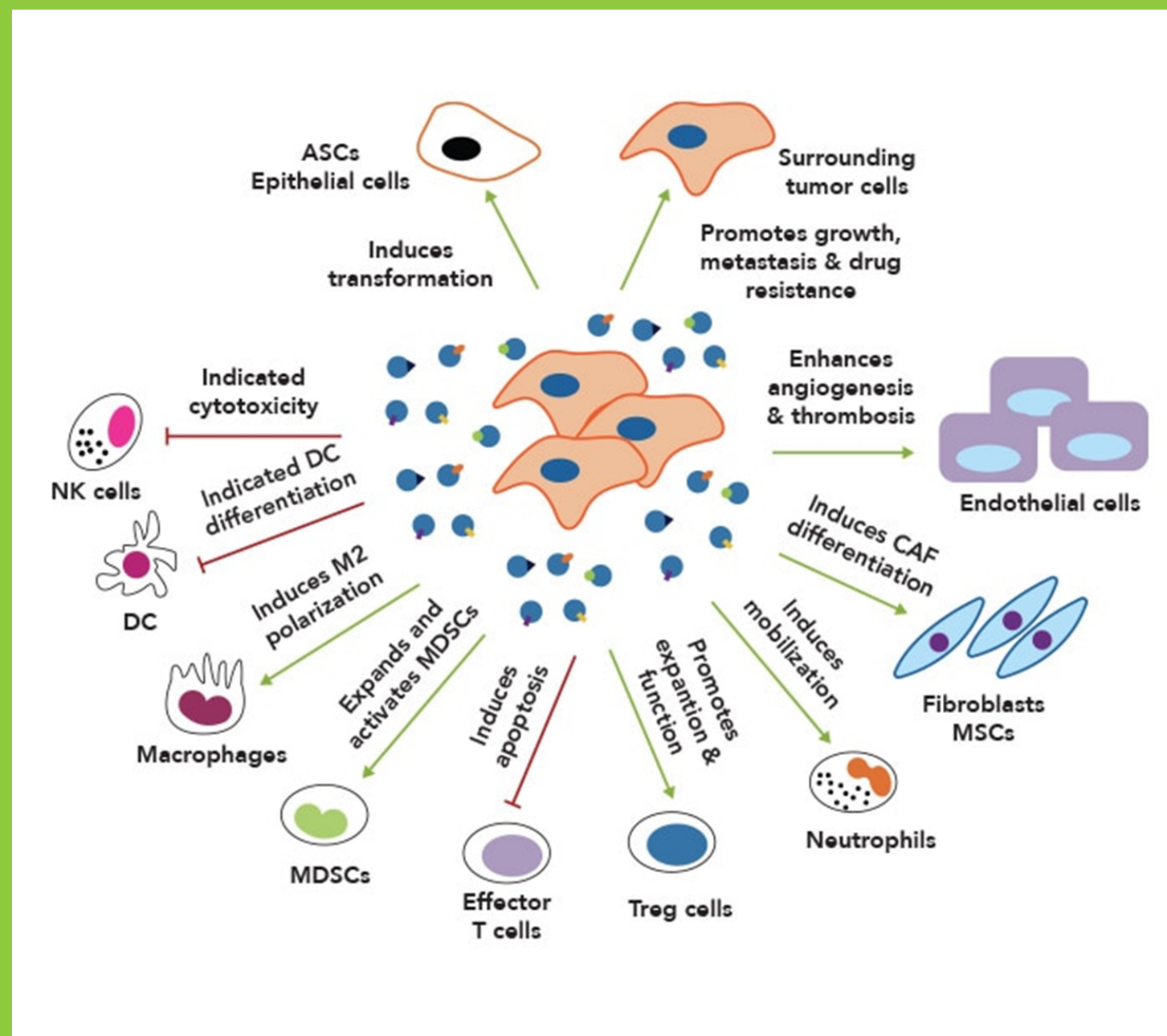
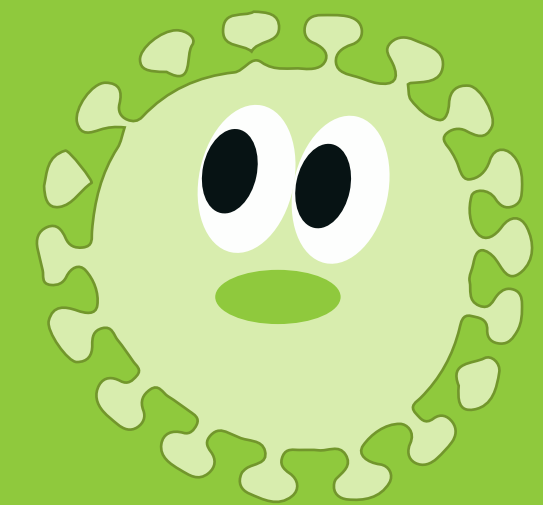
**Other Inflammatory
Diseases**

由於外泌體在細胞間溝通扮演重要角色，其與其他細胞外囊泡(Extracellular Vesicles, EVs)成為疾病致病機制中的重要參與者。EVs與癌症、阿茲海默症(Alzheimer's Disease, AD)和帕金森氏症(Parkinson's Disease, PD)以及許多發炎疾病有關。EVs可以將攜帶的內容物轉移到相同環境中的其他細胞，也可以透過血液、淋巴和腦脊髓液(CSF)的循環，將訊號傳遞到遠端組織。

除了在致病機制中的作用外，外泌體和其他EVs作為疾病生物標誌物(biomarkers)的來源，在疾病診斷及監測的應用也備受關注。從血液、尿液和腦脊髓液中採集樣本以診斷和監測疾病進展的方式，優於傳統的癌症侵入性活檢程序。對於阿茲海默症和帕金森氏症等疾病，臨床診斷很大程度上依賴行為上的症狀，症狀的出現意味著神經元已經大量喪失。而在症狀出現之前檢測疾病的生物標誌物，可以達到早期治療以保護神經元和延遲症狀。

Exosomes are Active Participants in Cancer Progression

外泌體和其他EVs與癌症疾病惡化的許多進程有關。



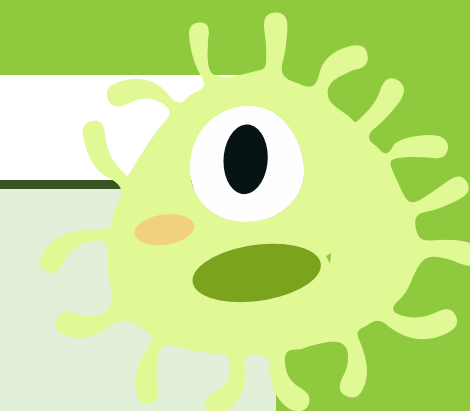
Role of EVs in Cancer. Tumor cells secrete exosomes and other EVs containing urgent messages related to tumor initiation, growth, progression, metastasis, and drug resistance. Figure adapted from Zhang, X., Yuan, X., Shi, H. et al. Exosomes in cancer: small particle, big player. J Hematol Oncol 8, 83 (2015). <https://doi.org/10.1186/s13045-015-0181-x>. License provided by CC License.

從廣義上講，外泌體和其他EVs在癌症中的作用可分為四類：

- Tumor Growth and Metastasis
- Therapy Resistance
- Immunosuppression
- Biomarker

Exosomes Facilitate Tumor Growth and Metastasis

外泌體和其他EVs涉及腫瘤生長和轉移的每個階段。癌細胞可以分泌含有生長因子的EVs，將正常細胞轉化為惡性細胞，直接增加腫瘤中惡性細胞的數量。此外，致癌細胞可以分泌含有抗凋亡因子(如Survivin)的EVs以防止癌細胞死亡，也會分泌含有生長因子(如VEGF)的EVs以增加腫瘤微環境(TME)中的血管生成。



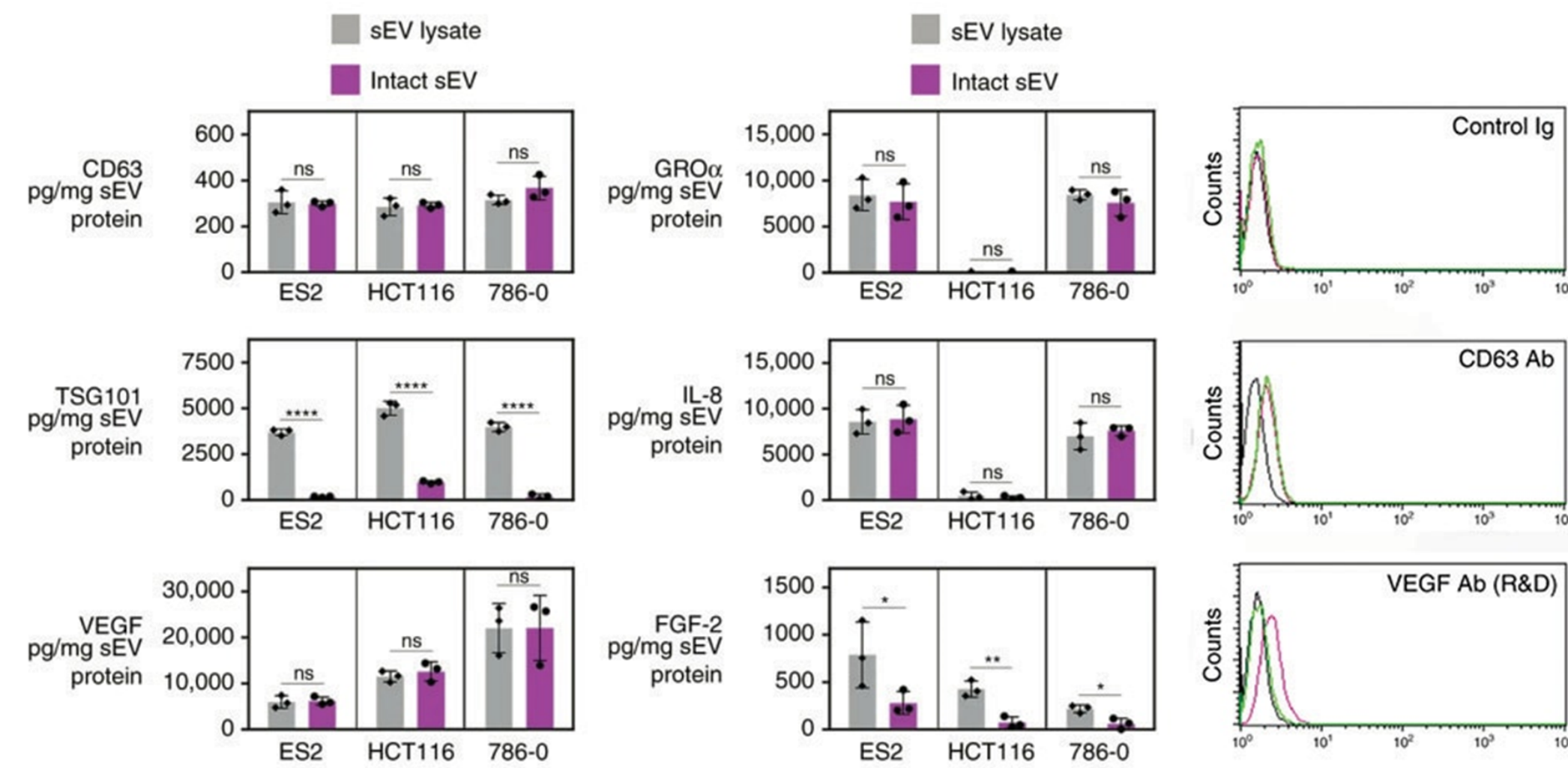
Exosome Cargo	Cancers Reported	Outcome
KRAS c-MET MIF EGFR/EGFRvIII	Colon, Melanoma, Pancreatic, Breast	促進腫瘤生長、轉移
Survivin	Cervical, Breast, Lung	抑制腫瘤細胞凋亡
VEGF Angiogenin	NSCLC, Renal, Colon, Glioblastoma	促進血管生成和血栓形成
Vimentin Rab3D TGF- β	NSCLC, Prostate, Bladder, Colorectal, Breast, Gastric	參與上皮間質轉化 (epithelial to mesenchymal transition, EMT) 誘導肌纖維母細胞分化
TGF- β HIF-1 α c-KIT Wnt3a	NSCLC, NPC, GIST, Diffuse large B cell lymphoma	促進腫瘤細胞轉移和侵襲，建立轉移前微環境(pre-metastatic niche)，重塑細胞外基質

Key: NSCLC-Non small-cell lung cancer; NPC- Nasopharyngeal carcinoma; GIST-Gastrointestinal stromal tumor



Catalog	Product	Reactivity	Applications
NBP2-45536	KRAS Antibody (OTI2C1)	Hu, Mu, Rt, Ca, Pm	WB, IHC, IHC-P
NBP2-44306	HGFR/c-MET Antibody (1G7NB) - BSA Free	Hu, Mu, Rt, Po, Bv, Ca, Eq, Fe, Pm, Rb, Sh	Flow, ICC/IF, IHC, IHC-P
NBP1-81832	MIF Antibody	Hu, Mu, Rt, Ha	WB, ICC/IF, IHC, IHC-P
NBP1-84814	EGFR Antibody	Hu, Mu, Rt	WB, ICC/IF, IHC, IHC-P
NBP2-50599	EGFR Antibody (DH8.3) - EGFRvIII, Mutant - BSA Free	Hu	WB, ELISA, Flow, IHC, IP, CyTOF-ready
NB500-201	Survivin Antibody - BSA Free	Hu, Mu, Rt, Ca, Fe, Gp, Ha	WB, Simple Western, ChIP, ELISA, Flow, ICC/IF, IHC, IHC-Fr, IHC-P, IP, Dual ISH-IHC, KD
NB100-664	VEGF Antibody (VG1) - BSA Free	Hu, Mu, Rt, Po, Ca	WB, Simple Western, ELISA, Flow, ICC/IF, IHC, IHC-Fr, IHC-P, CyTOF-ready
NBP2-41185	Angiogenin Antibody - BSA Free	Hu, Mu, Rt	WB, ELISA, ICC/IF, IHC
NB300-223	Vimentin Antibody	Hu, Mu, Rt, Po, Bv, Ca, Ch, Eq	WB, ICC/IF, IHC, IHC-Fr, IHC-P
NB120-3337	Rab3D Antibody	Hu, Mu	WB, ICC/IF
NBP3-07718	TGF-beta Antibody (1D11.16.8)	Hu, Mu, Rt, Bv, Ca, Ha, Pm	WB, ELISA, ICC/IF, B/N, Func
NB100-105	HIF-1 alpha Antibody (H1alpha67)	Hu, Mu, Rt, Po, Bv, Ca, Fe, Ma, Pm, Pm, Rb, Sh, Xp	WB, Simple Western, ChIP, ELISA, Flow, GS, IA, IB, ICC/IF, IHC, IHC-Fr, IHC-P, In vitro, IP, LA, PLA, TCS, IHC-FrFI, KD, KO
NBP1-43359	CD117/c-kit Antibody (ACK2) - BSA Free	Hu, Mu, Gp	WB, Flow, ICC/IF, IHC, IHC-Fr, IP, IHC-WhMt
NBP2-52588	Wnt-3a Antibody (1E6G4) - BSA Free	Hu	WB, ELISA, Flow, ICC/IF, IHC, IHC-P, CyTOF-ready





Growth factors are expressed on surface of small extracellular vesicles (sEVs). (Left) ELISA quantification of proteins from sEV lysate (grey) and intact sEVs (purple) from ovarian (ES2), colorectal (HCT116), and renal (786-0) cancer cell lines. Proteins CD63, TSG101, VEGF (Catalog # DVE00), GRO α (Catalog # DY275-05), IL-8 (Catalog # D8000C), and FGF-2 (Catalog # DFB50). (Right) Detection of VEGF on surface of sEVs from VEGF+ cells (pink) and VEGF-/- cells (green). Microbeads were coated with Mouse Anti-Human VEGF (Catalog # MAB2391), anti-human CD63, or control IgG as indicated. EVs were labeled with fluorescent dye and detected by flow cytometry. Figures were adapted from Ko, S.Y., Lee, W., Kenny, H.A. et al. Cancer-derived small extracellular vesicles promote angiogenesis by heparin-bound, bevacizumab-insensitive VEGF, independent of vesicle uptake. *Commun Biol* 2, 386 (2019). <https://doi.org/10.1038/s42003-019-0609-x>, licensed by CC License.

Extracellular Vesicle-Mediated Immunosuppression

爲了成功存活，腫瘤需要逃避和抑制宿主的免疫反應。TME中的一些免疫抑制機制包括NK細胞和作用型T細胞(Effector T cell)的細胞毒殺抑制、調節T細胞(Treg)的擴增和活化以及M2巨噬細胞的極化(polarization)。EVs在這些免疫抑制策略中都發揮著重要作用。



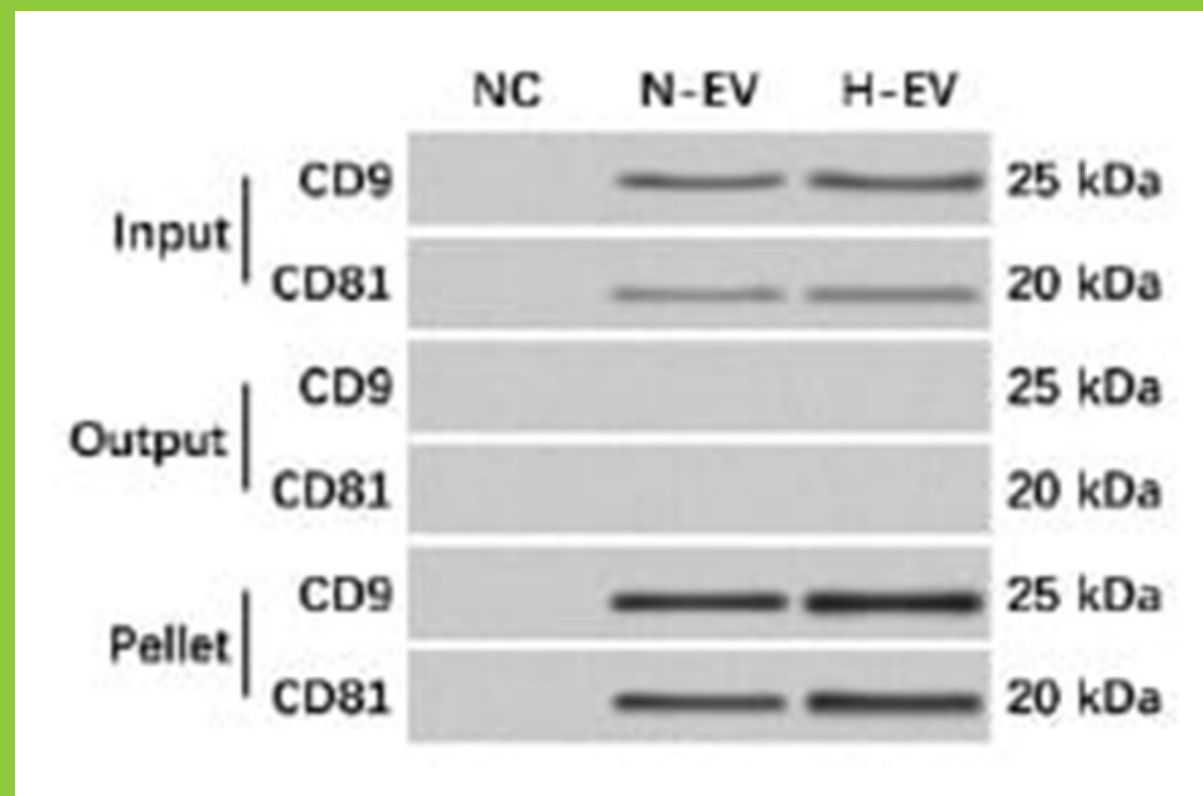
Exosome Cargo	Cancers Reported	Outcome
NKG2D DNAM-1 Galectin-9 PD-L1 FasL CD39,CD73	Ovarian, NPC Melanoma, Bladder, Colorectal, Prostate, Breast	抑制 NK 細胞和作用型 T 細胞的細胞毒性。 促進作用型 T 細胞凋亡。
HSP70	NSCLC, Renal, Breast, Colon	活化和擴增髓源性抑制型細胞 (myeloid-derived suppressor cells, MDSCs)。
EGFR TGF-β CCL20	NSCLC, Melanoma, NPC	促進調節 T 細胞(Treg)的擴增和功能。
EGFR	NSCLC	抑制樹突細胞 (dendritic cell, DC) 分化。



Key: NSCLC-Non small-cell lung cancer; NPC- Nasopharyngeal carcinoma

Catalog	Product	Reactivity	Applications
NB100-65956	NKG2D/CD314 Antibody (1D11) - Low Endotoxin, Azide and BSA Free	Hu	Flow, ICC/IF, IHC, IHC-Fr, IHC-P, IP, CyTOF-ready, Func
NBP1-85001	DNAM-1/CD226 Antibody	Hu	IHC, IHC-P
NBP2-45619	Galectin-9 Antibody (OTI1D12)	Hu, Mu	WB, IHC, IHC-P
NBP1-76769	PD-L1 Antibody - BSA Free	Hu, Mu, Rt	WB, ELISA, Flow, ICC/IF, IHC, IHC-Fr, IHC-P, IP, Dual ISH- IHC, ICC/IF, IHC-WhMt, KD
NBP1-97519	Fas Ligand/TNFSF6 Antibody (A11)	Mu	Flow, IHC, IHC-Fr, IHC-P
NBP1-90071	CD39/ENTPD1 Antibody	Hu, Mu, Po, Eq	WB, Flow, ICC/IF, IHC, IHC-P
NBP2-48480	5'-Nucleotidase/CD73 Antibody (AD2) - BSA Free	Hu	Flow, Flow-CS, IHC, IHC-Fr, IHC-P
NB110-61582	HSP70/HSPA1A Antibody (C92F3A-5)	Hu, Mu, Rt, Po, Bv, Ca, Ce, Ch, Dr, Fi, Gp, Ha, Pm, Rb, Sh	WB, ELISA, EM, Flow, ICC/IF, IHC, IHC-P, IM, MiAr, Binding Activity
NBP1-84814	EGFR Antibody	Hu, Mu, Rt	WB, ICC/IF, IHC, IHC-P
NBP2-45137	TGF-beta Antibody (1D11.16.8) - BSA Free	Hu, Mu, Rt, Bv, Ca, Ha, Pm	ICC/IF, IHC, IHC-P, S-ELISA, ELISA(Cap)
NBP1-45246	CCL20/MIP-3 alpha Antibody	Hu, Po, Bv	IHC, IHC-P, PEP-ELISA





Breast cancer cells treated with paclitaxel (PTX) increase production of Survivin in treated exosomes. Membrane was stained with polyclonal Rabbit Anti-survivin (Catalog #NB500-201). Anti-Flotillin was used as loading control. Blot shows signal in PTX-treated exosomes. Use of siRNA targeting Survivin expression shows antibody is specific. This is evidence for knockdown (KD) genetic validation of antibody. Image adapted from Kreger, B. T., Johansen, E. R., Cerione, R. A., & Antonyak, M. A. (2016). The Enrichment of Survivin in Exosomes from Breast Cancer Cells Treated with Paclitaxel Promotes Cell Survival and Chemoresistance. *Cancers*, 8(12), 111. <https://doi.org/10.3390/cancers8120111>. License provided by CC-license

Exosome-Mediated Resistance to Drug Therapy

除了腫瘤轉移和免疫抑制外，外泌體和其他EVs還可以透過促進癌症治療藥物的抗藥性幫助腫瘤生長和疾病發展。EVs可以將內容物，如多重抗藥性(multi-drug resistant, MDR)相關蛋白和miRNA轉移到可受性細胞(susceptible cells)，將它們轉化為抗治療(therapy-resistant)細胞。此外，藥物和藥物代謝物可以封裝在EVs中，從腫瘤細胞中轉運出來，從而使藥物失效。最後，由於EVs表現的細胞表面標誌物也是治療標靶，例如CD20、Her-2和PD-L1，因此EVs可以作為誘餌標靶，進而限制治療效果。

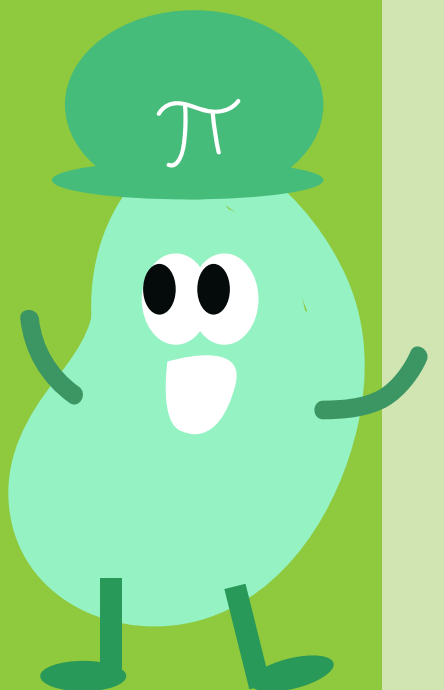
Exosomes and Other Extracellular Vesicles as Biomarkers for Cancer

一般來說，生物標誌物是一種可以測量和監測的生物特徵。當原發腫瘤部位位於大腦或其他難以到達的器官時，生物標誌物是診斷和監測癌症特別有用的工具。

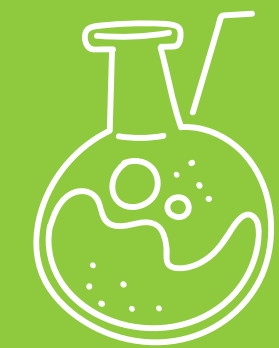
EVs正在被研究作為 (1) 診斷疾病，(2) 確定疾病負擔 (disease burden)，以及 (3) 監測疾病進展和 / 或治療效果的生物標誌物。

Cancer	Exosome Marker(s)
Colon	VSIG3, GPA33, CD147
Ovarian	CD147, EpCAM, CA125/MUC16
Breast	EGFR
Pancreatic	Glypican-1, MIF
Lung	CD151, L1CAM/CD171, Tetraspanin 8, (NSCLC-EGFR, LRG-1)
Glioblastoma	Syndecan-1, EGFRvIII
Prostate	PSA, PSMA, PTEN
Melanoma	TRP2, VLA-4, HSP70, PD-L1

Catalog	Product	Reactivity	Applications
NBP2-46046	VSIG3/IGSF11 Antibody (OTI2H1)	Hu, Mu, Rt	WB, IHC
NBP1-89332	A33/GPA33 Antibody	Hu	WB, IHC, IHC-P
NB500-430	EMMPRIN/CD147 Antibody (MEM-M6/1) - BSA Free	Hu, Eq	WB, ELISA, Flow, IHC, IHC-P, IP, CyTOF-ready
NB600-1182	EpCAM/TROP1 Antibody (AUA1) - BSA Free	Hu	WB, ELISA, Flow, ICC/IF, IHC, IHC-P, CyTOF-ready
NBP2-67709	CA125/MUC16 Antibody (SN69-06)	Hu	WB, Flow, ICC/IF, IHC, IHC-P
NBP1-84814	EGFR Antibody	Hu, Mu, Rt	WB, ICC/IF, IHC, IHC-P
NBP1-33197	Glypican 1 Antibody	Hu, Mu, Rt, RM	WB, ELISA, Flow, ICC/IF, IHC, IHC-P, IP
NBP1-81832	MIF Antibody	Hu, Mu, Rt, Ha	WB, ICC/IF, IHC, IHC-P
NBP3-07476	CD151 Antibody (11G5a)	Hu	WB, Flow, ICC/IF, IHC, IHC-P
NB100-2682	L1CAM Antibody (UJ127.11) - BSA Free	Hu, Mu	WB, ELISA, Flow, Flow-CS, ICC/IF, IHC, IHC-Fr, IHC-P, IP, CyTOF-ready, ICC/IF
NBP2-38529	TSPAN8/TM4SF3 Antibody	Hu	ICC/IF, IHC, IHC-P
NBP1-82823	LRG1 Antibody	Hu, Mu	WB, IHC, IHC-P
NB100-64980	Syndecan-1/CD138 Antibody (B-A38)	Hu	WB, Flow, ICC/IF, IHC, IHC-Fr, IHC-P
NBP2-50599	EGFR Antibody (DH8.3) - EGFRvIII, Mutant - BSA Free	Hu	WB, ELISA, Flow, IHC, IP, CyTOF-ready
NBP1-51541	Kallikrein 3/PSA Antibody (5A11E9) - BSA Free	Hu	WB, ELISA, Flow, IHC, IHC-P
NBP1-45057	PSMA/FOLH1/NAALADase I Antibody (GCP-04) - BSA Free	Hu, Mu, Rt, Po, Ca	WB, ICC/IF, IHC, IHC-P
NBP3-15666	PTEN Antibody (7O6F4)	Hu, Mu, Rt	WB, ICC/IF, IHC, IHC-P, IP, KO
NBP1-86893	TRP2 Antibody	Hu	WB, ICC/IF, IHC, IHC-P
NBP1-77333	Integrin alpha 4/CD49d Antibody - BSA Free	Hu, Mu, Rt, I	WB, ELISA, ICC/IF
NB110-61582	HSP70/HSPA1A Antibody (C92F3A-5)	Hu, Mu, Rt, Po, Bv, Ca, Ce, Ch, Dr, Fi, Gp, Ha, Pm, Rb, Sh	WB, ELISA, EM, Flow, ICC/IF, IHC, IHC-P, IM, MiAr, Binding Activity
NBP1-76769	PD-L1 Antibody - BSA Free	Hu, Mu, Rt	WB, ELISA, Flow, ICC/IF, IHC, IHC-Fr, IHC-P, IP, Dual ISH-IHC, ICC/IF, IHC-WhMt, KD

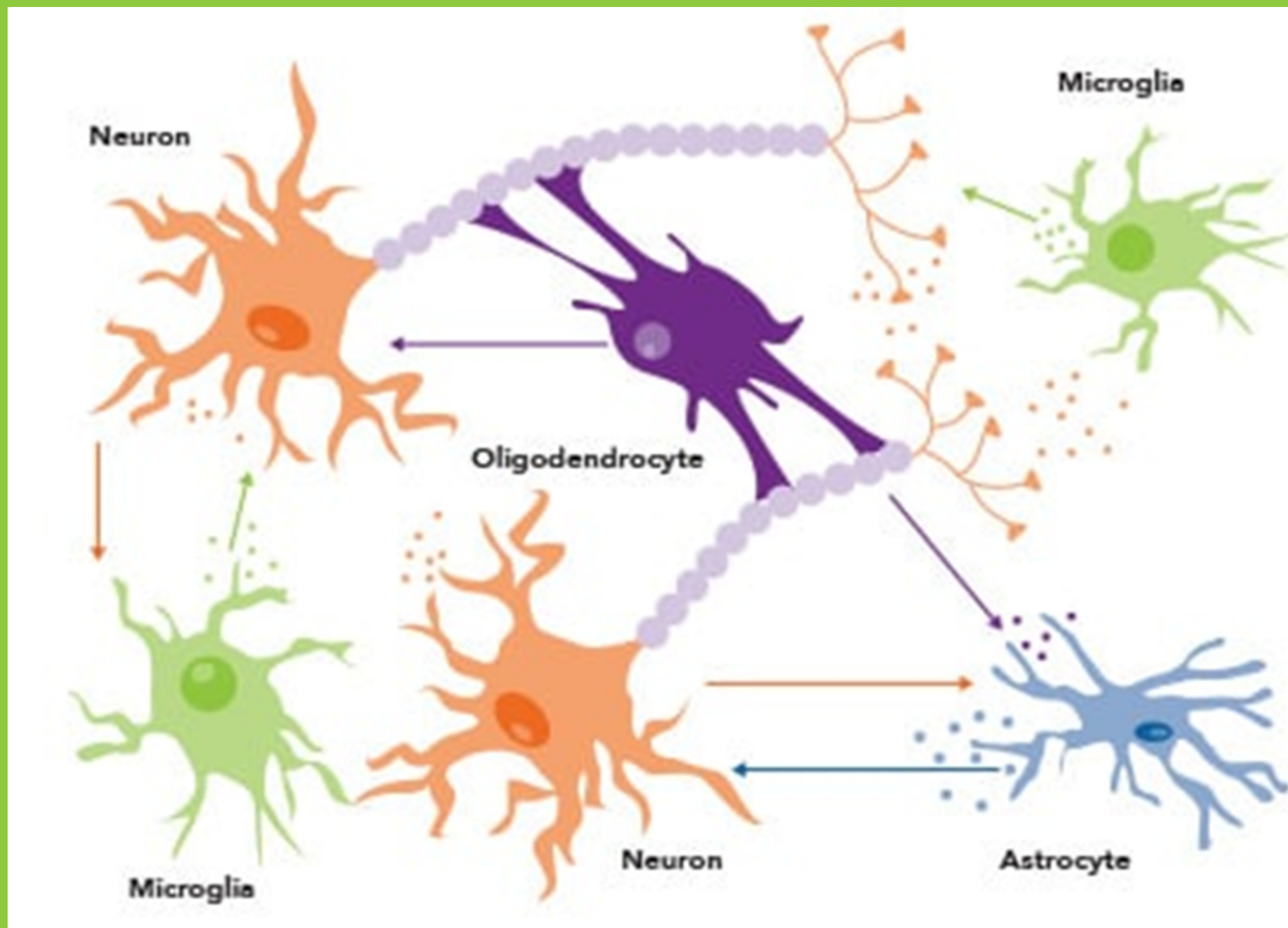


Extracellular Vesicles in Neurodegenerative Diseases



阿茲海默症和帕金森氏症等神經退行性疾病給醫療保健體系帶來沉重負擔，不僅治療選擇有限且無法治癒。目前的診斷方法依賴於行為症狀，如記憶喪失和運動功能喪失。當出現症狀時，神經元和周圍組織已受到無法彌補的損害。有鑑於外泌體和其他EVs在腦脊髓液和血漿中的可達性(Accessibility)，使其有機會成為早期檢測這些疾病的生物標誌物的來源檢體。

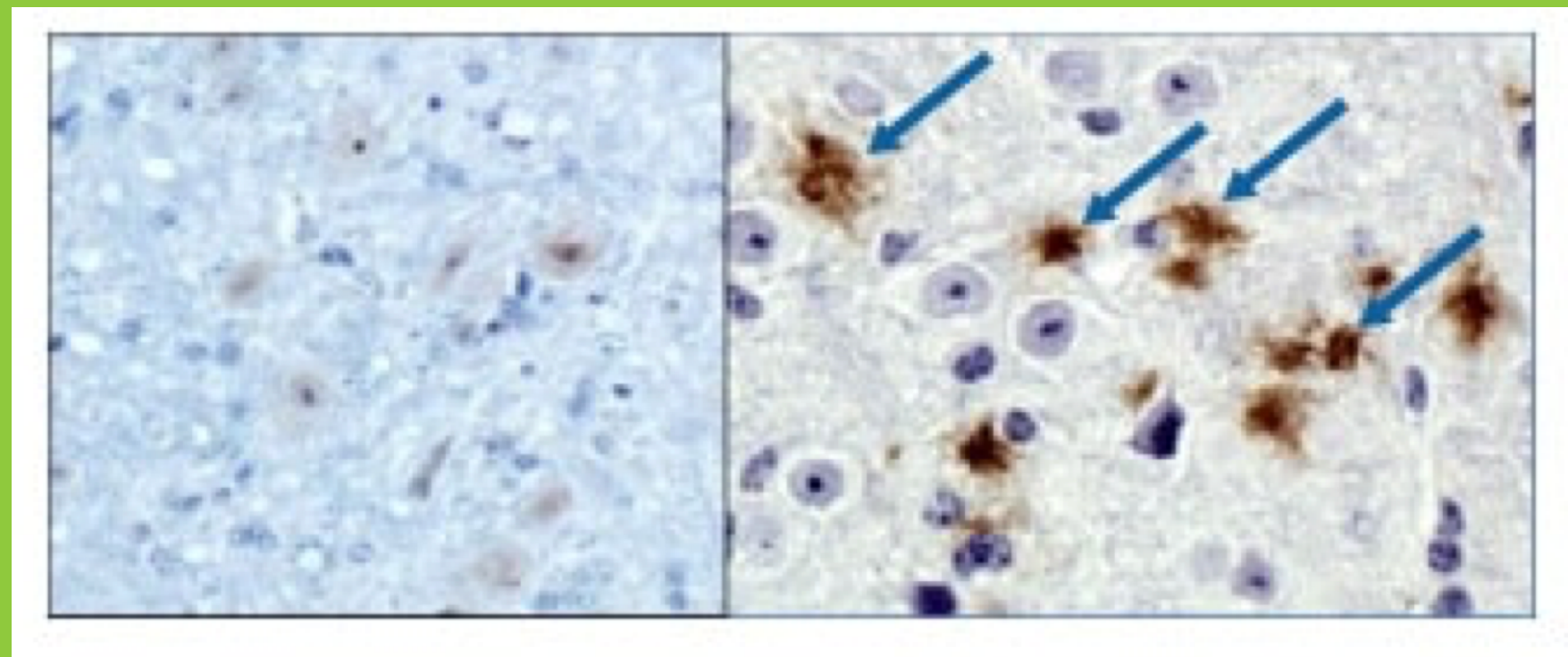
外泌體和其他EVs涉及所有腦細胞(包括神經元、星狀膠質細胞、小膠質細胞和神經前驅細胞)之間的細胞間通訊。EVs參與整個神經系統的許多關鍵過程，包括神經新生(Neurogenesis)、突觸功能、神經可塑性(Plasticity)和神經發炎。



EVs are involved in intercellular communication between all cell types in the nervous system. Arrows show flow of information from each cell type. Adapted from Riva, P.; Battaglia, C.; Venturin, M. Emerging Role of Genetic Alterations Affecting Exosome Biology in Neurodegenerative Diseases. *Int. J. Mol. Sci.* 2019, 20, 4113. <https://doi.org/10.3390/ijms20174113>. Licensed by CC License.

Role of Exosomes in Alzheimer's Disease

阿茲海默症(AD)是最常見的失智症，其特徵是漸進性認知能力下降，包括記憶力衰退和行為改變。據世界衛生組織稱，AD佔失智病例的60-70%。AD的特徵是澱粉樣蛋白(amyloid-beta, A β)在神經組織的細胞外空間積聚，以及由磷酸化tau蛋白組成的細胞內神經纖維纏結(Neurofibrillary tangles)。



Immunohistochemistry (IHC) staining of beta-amyloid in brain of wild-type (left) and 5xFAD (right) mouse using DAB with hematoxylin counterstain. Mouse Anti-Human beta Amyloid (MOAB-2) (Catalog # NBP2-13075) was used at 1:20 dilution in wild-type brain tissue and 1:400 dilution in 5xFAD mouse brain tissue. Beta amyloid plaques indicated by blue arrows.

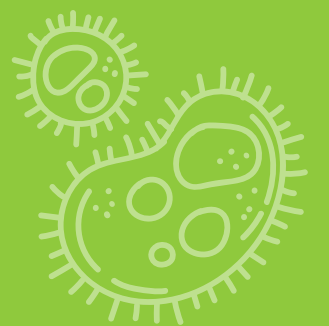
Extracellular Vesicles in AD Pathogenesis: Pathogenic or Protective?

EVs在AD致病機制中的作用尚不明確，但研究學者一致認為外泌體能夠攜帶A β 。然而，關於這種關聯是保護性的還是致病性的，存在相互矛盾的研究報導。一些研究表明，突觸發炎反應的減少和疾病病理增加與EV-associated A β 增加有關。然而，其他研究表明，保護神經元的外泌體將過量的A β 從神經元輸送到小膠質細胞以進行降解。

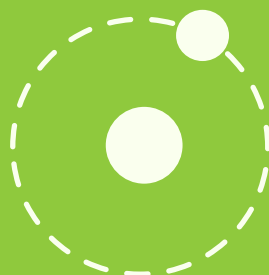
Exosome Markers	Role in AD
Alix	與 AD 患者大腦的 A β 斑塊有關，但與健康對照組沒有相關
TSG101, VPS4A	抑制轉錄以降低 A β 的擴散
Amyloid Precursor Protein (APP)	A β 的前驅蛋白
A β	斑塊的累積與漸進性認知功能衰退有關
Tau, pTau (T181)	神經纖維纏結的主要成分

Catalog	Product	Reactivity	Applications
NBP1-90201	Alix Antibody	Hu, Mu, Rt	WB, ICC/IF, IHC, IHC-P, KD
NB200-112	TSG101 Antibody (4A10)	Hu, Mu, Rt, Po, Ca, Ha, Pm, Pm	WB, ELISA, EM, Flow, ICC/IF, IHC, IHC-P, IP, IHC-FrFI, KD
NBP2-20879	VPS4A Antibody	Hu, Mu, Rt, Po, Bv, RM, Xp, Ze	WB
NBP1-76910	APP Antibody	Hu, Mu, Rt, Po, Gp	WB, DB, ELISA, ICC/IF, IHC, IHC-P
NBP2-13075	beta Amyloid Antibody (MOAB-2) - BSA Free	Hu, Mu, Rt, Ba, Pm	WB, DB, ELISA, IB, ICC/IF, IHC, IHC-Fr, IHC-P, IP, IHC-FrFI
NBP2-67774	Tau Antibody (SD205-09)	Hu, Mu, Rt	WB, Flow, ICC/IF, IHC-P
NB100-82245	Tau [p Thr181] Antibody	Hu, Mu, Rt	WB, Simple Western, IHC, IHC-P, KD

Exosome Biomarkers for Alzheimer's Disease



AD的早期檢測可能對預防或延緩疾病進程的干預措施至關重要。因此，研究學者致力於研究在診斷前識別AD的生物標誌物。除了A β 之外，與神經元突觸功能相關的蛋白質也是生物標誌物研究的重中之重。



Exosome Cargo	Expression compared to healthy controls	Present in preclinical Associated with disease state
Aβ42	Increased in plasma	EVs 的表現狀況可以預測疾病進展的風險
TAR DNA-binding protein 43 (TDP43)	Increased in plasma	與認知功能或其他神經系統症狀沒有關聯性
Synaptophysin	Decreased in plasma	在臨床前狀態時表現量已經減少。與認知能力下降相關
Synaptotagmin	Decreased in plasma	在臨床前狀態時表現量已經減少。與認知能力下降相關
25-kDa synaptosomal-associated protein (SNAP-25)	Decreased in plasma	可以在 AD 發病前幾年偵測到
GAP43	Decreased in Plasma	可以在 AD 發病前幾年偵測到
Neurogranin	Increased in CSF, decreased in plasma	在臨床前期出現，可能可以作為預測疾病惡化的標記

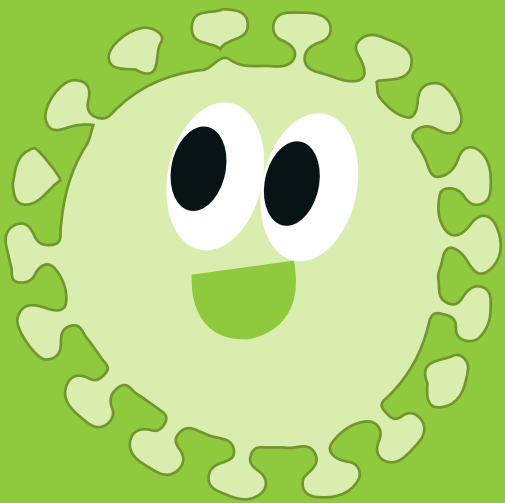
Catalog	Product	Reactivity	Applications
NBP2-44113	beta Amyloid 42 Antibody	Hu, Mu	WB, ELISA, IHC, IHC-P
NB110-55376	TDP-43/TARDBP Antibody - BSA Free	Hu, Mu, Ch, Pm, Xp, Ze	WB, ELISA, ICC/IF, IHC, IHC-P
NB300-653	Synaptophysin Antibody	Hu, Mu, Rt, Ch, Fe, Pm	WB, ELISA, ICC/IF, IHC, IHC-Fr, IHC-P, IP
NBP2-34215	Synaptotagmin 1 Antibody	Hu	WB, IHC, IHC-P
NBP1-88769	SNAP25 Antibody	Hu, Mu, Rt	WB, IHC, IHC-P
NB300-143	GAP-43 Antibody	Hu, Mu, Rt, Po, Bv, Ca, Ch, Dr, Eq, Pm	WB, Flow, ICC/IF, IHC, IHC-Fr, IHC-P
NBP2-32655	Neurogranin Antibody	Hu, Mu, Rt	IHC, IHC-P



Exosomes and Other Extracellular Vesicles in Parkinson's Disease

帕金森氏症(PD)是另一種常見的神經退行性疾病，其特徵是主要發生在黑質中的多巴胺神經元退化。PD的定義是alpha-synuclein聚集體(路易氏體, Lewy bodies)的存在和缺陷粒線體的累積，從而導致神經元死亡。外泌體，特別是表現L1CAM的神經元衍生外泌體(NDE)，與大腦中alpha-synuclein的病理轉運有關。PD的診斷依賴於神經學檢查和症狀表現。PD患者最一致的外泌體生物標誌物是血漿中NDE相關alpha-synuclein表現量增加。在PD中與血漿NDE相關的其他靶標包括Park7/DJ1和clusterin。

Gene	Protein target	Role in disease
LRRK2	Leucine rich repeat kinase 2	PD 最常見的遺傳因素。與突變與異常發炎反應、氧化壓力增加、突觸功能障礙、自噬功能異常等有關。
PINK	PTEN-induced putative kinase 1	一種粒線體絲氨酸 serine/蘇氨酸 threonine 蛋白酶，對壓力誘導的粒線體功能障礙具有保護作用。針對有缺陷的粒線體進行降解。PINK1 的突變導致錯誤折疊的蛋白質在粒線體中累積。
TH	Tyrosine Hydroxylase	催化 L-酪氨酸(L-tyrosine)羥化(hydroxylation)為 L-DOPA(一種關鍵的多巴胺前驅物)的酶。
PARK2	Parkin	在泛素參與的蛋白降解途徑中發揮作用。parkin E4 泛素連接酶功能的喪失導致有毒和/或錯誤折疊蛋白質的累積。
PARK7	Protein deglycase DJ-1	參與轉錄調控、氧化壓力反應和粒線體功能中的各種作用。感知細胞氧化還原代謝並清除自由基。其基因突變與早發性家族遺傳型 PD 相關。
SNCA	Alpha-synuclein	參與突觸傳遞和神經傳導物質(neurotransmitter)釋放的調節。Alpha-synuclein 蛋白的聚集與多巴胺神經元(dopaminergic neurons)的退化相關。路易氏體的主要成分。

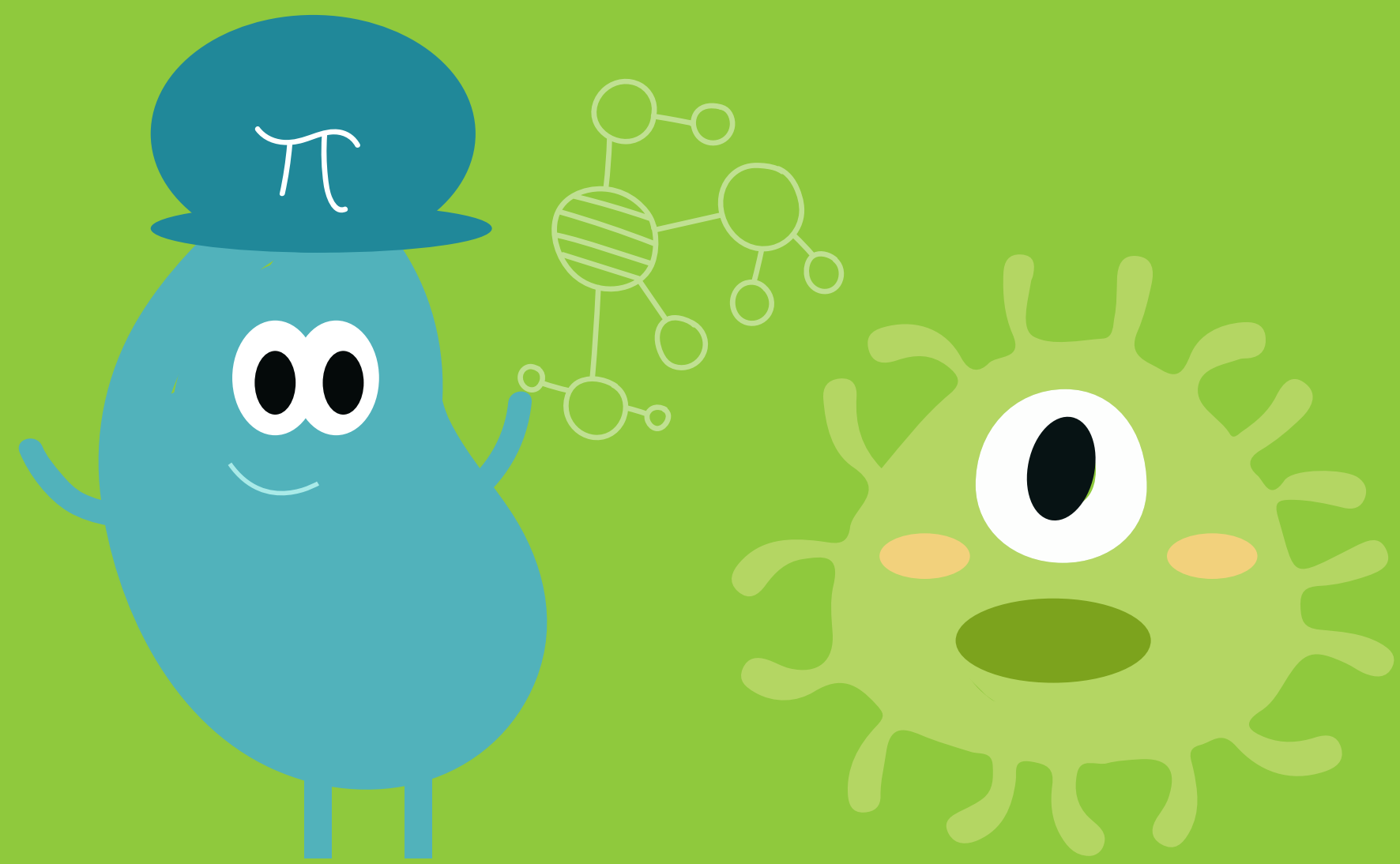


Catalog	Product	Reactivity	Applications
NB300-268	LRRK2 Antibody - BSA Free	Hu, Mu, Bv, Ce, I, Pl	WB, Flow, Flow-IC, ICC/IF, IHC, IHC-Fr, IHC-P, IP, KO
NBP2-36488	PINK1 Antibody (8E10.1D6) - BSA Free	Hu, Mu, Rt, Pm	WB, ICC/IF, IHC, IHC-P, PAGE, KD
NB300-109	Tyrosine Hydroxylase Antibody	Hu, Mu, Rt, Ch, Dr, I, Ma	WB, Simple Western, ICC/IF, IHC, IHC-Fr, IHC-P, Dual ISH-IHC, IHC-FrFl, IHC-WhMt, KO
NB600-1540	Parkin Antibody	Hu, Mu, Rt	WB, IHC, IHC-P, IP
NB300-270	Park7/DJ-1 Antibody	Hu, Mu, Rt, Ch, Bv, SyHa, Ze	WB, Simple Western, Flow, ICC/IF, IHC, IHC-P, In vitro, IP
NBP2-15365	alpha-Synuclein Antibody	Hu, Mu, Rt, Po, Bv, Pm, Sh	WB, ICC/IF, IHC, IHC-Fr, IHC-P, S-ELISA

目前，PD尚無治療方法，但可以透過補充多巴胺暫時緩解症狀。新式療法專注於神經保護和疾病緩解策略，使早期檢測成為關鍵的研究重點。

*Expanding Role of Exosomes
in Inflammatory Diseases*

外泌體和其他EVs與許多發炎疾病的致病機制有關，包括心血管疾病、腎臟疾病、自體免疫性疾病和病毒感染。到目前為止，大部分是研究各種microRNA(miR)的作用，但EVs轉運的蛋白質也越來越受重視。



Disease	Exosome/EV Cargo
Cardiovascular Disease	Cystatin C, Serpin F2, CD14, PolyIg Receptor, C5a, Tissue Factor, CD31, CD62e
Renal Disease	AQP1, AQP2, Aminopeptidase N,
Systemic Lupus Erythematosus (SLE)	IFN- α , TNF- α , C1q, CD54
Type 1 Diabetes	GAD65, Proinsulin
HIV	HMGB1, NF-L, HIV gp120

Catalog	Product	Reactivity	Applications
NBP2-01875	Cystatin C Antibody (OTI2C8)	Hu	WB, IHC, IHC-P
NB100-96916	Serpin F2/alpha 2-Antiplasmin Antibody	Hu	WB, Flow, ICC/IF, IHC, IHC-P, PEP-ELISA
NB100-77758	CD14 Antibody (M5E2) - BSA Free	Hu, Po, Bv, Ca, Pm	Simple Western, Flow, ICC/IF, IHC, IHC-Fr, B/N, CyTOF-ready, Dual ISH-IHC
NBP1-86095	pIgR Antibody	Hu	WB, IHC, IHC-P
NBP2-89578	Complement Component C5a Antibody (215)	Hu	IHC, IHC-P
NBP2-67731	Coagulation Factor III/Tissue Factor Antibody (SN20-16)	Hu, Mu, Rt	WB, ICC/IF, IHC, IHC-P
NB100-2284	CD31/PECAM-1 Antibody	Hu, Mu, Rt, Po, Ca	WB, ICC/IF, IHC, IHC-Fr, IHC-P
NBP1-45545	E-Selectin/CD62E Antibody	Hu, Mu, Rt	WB, Simple Western, ICC/IF, IHC, IHC-P, IP
NB600-749	Aquaporin 1/AQP1 Antibody (1/A5F6)	Hu, Mu, Rt, Rb, Ze	WB, ELISA, ICC/IF, IHC, IHC-Fr, IHC-P
NB110-74682	Aquaporin-2 Antibody - BSA Free	Hu, Mu, Rt, Po, Bv, Sh	WB, ICC/IF, IHC, IHC-Fr, IHC-P
NB100-64843	Aminopeptidase N/CD13 Antibody (ER-BMDM1) - BSA Free	Mu	Flow, IHC, IHC-Fr, IHC-P
NBP1-19532	TNF-alpha Antibody - BSA Free	Hu, Mu, Rt, Ca, Fi, Pm, Fe, Pm, Pm	WB, Flow, ICC/IF, IHC, IHC-Fr, IHC-P, IHC-FrFI
NBP1-87492	C1q Antibody	Hu	WB, IHC, IHC-P
NBP2-22541	ICAM-1/CD54 Antibody (1A29)	Hu, Mu, Rt	WB, EM, Flow, ICC/IF, IHC, IHC-Fr, IHC-P, PLA, B/N, IHC-FrFI
NBP1-33284	GAD2/GAD65 Antibody	Hu, Mu, Rt, Po, Bv, Ca, RM	WB, ICC/IF, IHC, IHC-P
NB100-73013	Proinsulin Antibody (CCI-17)	Hu, Rt	WB, ELISA, S-ELISA
NB100-2322	HMGB1/HMG-1 Antibody	Hu, Mu, Rt, Bv, Ca, Rb, Sh, Po, Eq	WB, Simple Western, ELISA, Flow, Flow-IC, ICC/IF, IHC, IHC-P, KD
NB300-131	NF-L Antibody	Hu, Mu, Rt, Po, Bv	WB, ICC/IF, IHC, IHC-P, KO
NBP1-76371	HIV-1 gp120 Antibody - BSA Free	V-Vi	WB, ELISA



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