

Table S1 Complete list of included clinical trials investigating neurotransmitter-targeted drugs in oncology (n=76)

NCT Number	Drug(s)	Drug Class	Cancer Type	Phase	Year	Country	Sponsor	N
NCT02596867	Propranolol	β-Blocker	Breast Cancer	Phase II	2015	USA	Texas Tech University	2
NCT00502684	Propranolol + Etodolac	β-blocker + COX-2 inhibitor	Breast Cancer	N/A	2014	Israel	Hebrew University	32
NCT02013492	Propranolol	β-Blocker	Locally recurrent or metastatic solid tumors	N/A	2014	USA	Ohio State University	1
NCT02962947	Propranolol	β-Blocker	Melanoma	Phase II/III	2016	Italy	University of Florence	546
NCT01988831	Propranolol	β-Blocker	Melanoma	Phase II	2016	Switzerland	University Hospital Geneva	450
NCT03384836	propranolol hydrochloride + Pembrolizumab	β-Blocker	Melanoma	Phase Ib/II	2018	USA	Roswell Park	47
NCT04518124	Propranolol	β-Blocker	Angiosarcoma	Phase II	2020	Netherlands	Netherlands Cancer Institute	14
NCT03245554	Propranolol	β-Blocker	Gastrointestinal Cancer	Early Phase I	2017	China	Central South University	80
NCT04005365	Propranolol	β-Blocker	Gastric Cancer	Phase II	2019	China	Xiangya Hospital Central South University	78
NCT04848519	Propranolol + Immune checkpoint inhibitors	β-Blocker	Urothelial Cancer	Phase II	2021	USA	Emory University Hospital/Winship Cancer Institute	24
NCT02420223	Propranolol	β-Blocker	Multiple Myeloma	Phase II	2015	USA	Medical College of Wisconsin	25
NCT05979818	Propranolol hydrochloride + Sintilimab + Platinum-based chemotherapy	β-Blocker	Non-Small Cell Lung Cancer	Phase I	2024	China	Second Xiangya Hospital of Central South University	6
NCT01504126	Propranolol with standard chemotherapy	β-Blocker	Epithelial ovarian cancer, primary peritoneal cancer, and fallopian tube cancer	Early Phase I	2012	USA	University of Texas Health Science Center at Houston	32
NCT04682158	Propranolol + Standard-of-care chemoradiation	β-Blocker	Esophageal adenocarcinoma	Phase II	2021	USA	Roswell Park Cancer Institute	106
NCT04493489	Propranolol + BCG	β-Blocker	Non-muscle invasive bladder cancer	Phase II	2020	China	Central South University	242
NCT05741164	Propranolol + Pembrolizumab	β-Blocker	Triple negative breast cancer	Phase II	2023	USA	Roswell Park Cancer Institute	40
NCT05651594	Propranolol + Pembrolizumab	β-Blocker	Digestive Adenocarcinoma	Phase II	2023	USA	Roswell Park Cancer Institute	40
NCT05451043	Durvalumab + Tremelimumab + Propranolol ± chemotherapy	β-Blocker	Advanced hepatopancreatobiliary cancers	Phase II	2023	Canada	AHS Cancer Control Alberta	62
NCT01847001	Propranolol+ Chemotherapy	β-Blocker	Breast cancer	Phase II	2012	USA	Columbia University Irving Medical Center	20
NCT02944201	Carvedilol	β-Blocker	Prostate Cancer	Phase II	2017	USA	Montefiore Medical Center	22
NCT00888797	Propranolol + Etodolac	β-Blocker + COX2 Inhibitor	Colorectal Cancer	Phase III	2010	Israel	Sheba Medical Center	400
NCT06775080	Propranolol	β-Blocker	Gastrointestinal Tumor	Phase II	2024	China	Huashan Hospital	40
NCT03838029	Propranolol + Etodolac	β-Blocker + COX-2 Inhibitor	Pancreatic Cancer	Phase II	2019	Israel	Assaf-Harofeh Medical Center	210
NCT07125391	Propranolol + Chemotherapy	β-Blocker	Ovarian Cancer	Phase II	2025	China	Anhui Provincial Cancer Hospital	40
NCT06145074	Propranolol + Placebo	β-Blocker	Pancreatic Cancer	Phase II	2024	Denmark	Zealand University Hospital	30
NCT02770378	Sertraline (CUSP9v3)	Multi-drug repurposing strategy, with sertraline (SSRI) included	Glioblastoma	Phase Ib/IIa	2016	Germany	University of Ulm	10
NCT02891278	Sertraline + Cytarabine	SSRI	Acute Myeloid Leukemia	Phase I	2016	USA	Columbia University	6
NCT05634707	Fluoxetine + Temozolomide	SSRI	Recurrent malignant glioma	Early Phase I	2023	USA	Duke University	10
NCT06225011	Fluoxetine	SSRI	Colorectal Cancer	Phase I	2025	USA	Jonsson Comprehensive Cancer Center	10
NCT07174947	Escitalopram	SSRI	Head and Neck Cancer	Phase III	2025	China	First Affiliated Hospital of Wenzhou Medical University	240
NCT02452983	Sertraline	SSRI	Low-Risk Myelodysplastic Syndrome, MDS	Phase I	2015	USA	Baylor College of Medicine	14
NCT05289830	Escitalopram + Placebo	SSRI	Localized Pancreatic and Periampullary Cancer	Phase II	2022	USA	Case Comprehensive Cancer Center	4
NCT00387348	Escitalopram	SSRI	Lung or Gastrointestinal Cancer	Phase III	2006	USA	Massachusetts General Hospital	24
NCT05063604	Citalopram	SSRI	Breast Cancer	Phase II	2022	Spain	Hospital Universitari de Bellvitge	40
NCT03728673	Escitalopram	SSRI	Glioma	Phase II	2019	USA	Nebraska Medical Center	20
NCT02246244	Escitalopram + Placebo	SSRI	ENT cancer	Phase III	2009	France	Gustave Roussy, Cancer Campus, Grand Paris	38
NCT00005850	Cisplatin + Fluoxetine + Gemcitabine + Hydrochloride	SSRI	Non-Small Cell Lung Cancer	Phase II	2001	USA	Alliance for Clinical Trials in Oncology	21
NCT00935675	Escitalopram	SSRI	Head and Neck cancer	Phase III	2009	France	Gustave Roussy, Cancer Campus, Grand Paris	100
NCT00536172	Escitalopram + Placebo	SSRI	Head and Neck Cancer	Phase IV	2007	USA	University of Nebraska	160
NCT07015944	Sertraline	SSRI	Breast Cancer	NA	2025	Pakistan	Pakistan Institute of Living and Learning	26376
NCT03122444	Imipramine	TCA	ER+ve AND Triple Negative Breast Cancer	Phase II	2017	USA	Ohio State University	17
NCT04863950	Imipramine	TCA	Glioblastoma	Phase II	2022	USA	The University of Texas Health Science Center at San Antonio	25
NCT00889525	Cabergoline	D2 Agonist	Pituitary Adenoma (ACTH)	Phase II	2009	India	Seth GS Medical College	NA
NCT03271918	Cabergoline	D2 Agonist	Nonfunctioning Pituitary Adenoma	Phase II	2017	Brazil	University of Sao Paulo/Hospital das Clinicas	116
NCT03038308	Ropinirole	D2/D3 Agonist	Hyperprolactinemia/Prolactinoma	Phase II	2017	USA	Columbia University	16
NCT02288962	Cabergoline	D2 Agonist	Pituitary Adenoma	Phase III	2014	Norway	St. Olavs Hospital	60
NCT03457389	Cabergoline	D2 Agonist	Prolactinomas	NA	2018	South Korea	Seoul National University Hospital	68
NCT03400865	Cabergoline + Hydroxychloroquine/Chloroquine	D2 Agonist	Resistant Prolactinomas	Phase II	2018	China	Ruijin Hospital	30
NCT04107480	Cabergoline/Bromocriptine vs Surgery	D2 Agonist	Prolactinoma	Phase IV	2019	Netherlands	Leiden University Medical Center	880
NCT01620138	Pasireotide + Cabergoline	D2 Agonist	Prolactinomas	Phase II/ III	2010	Brazil	Universidade Federal do Rio de Janeiro	21
NCT00697814	Cabergoline/Bromocriptine + Clomiphene	D2 Agonist	Prolactinoma with Hypogonadism	Phase II	2004	Brazil	Federal University of São Paulo	15
NCT01730729	Cabergoline	D2 Agonist	Metastatic Breast Cancer	Phase II	2013	USA	Northwestern University	20
NCT00524667	Valproic Acid	HDAC Inhibitor	CLL	Phase II	2007	Canada	Cancer Care Manitoba	6
NCT00091559	Suberoylanilide Hydroxamic Acid	HDAC Inhibitor	Advanced Cutaneous T-cell Lymphoma	Phase II	2005	USA	Merck	74
NCT00007345	Valproic Acid + ATRA	HDAC Inhibitor	Cutaneous T-Cell Lymphoma and Peripheral T-Cell Lymphoma	Phase II	2001	USA	National Cancer Institute	131
NCT00426764	Romidepsin	HDAC Inhibitor	Progressive or Relapsed peripheral T-cell lymphoma	Phase II	2007	USA	Celgene	131
NCT01796002	Romidepsin	HDAC Inhibitor	Untreated Peripheral T-Cell Lymphoma	Phase III	2013	Belgium	The Lymphoma Academic Research Organisation	421
NCT00865969	Belinostat	HDAC Inhibitor	Relapsed or Refractory Peripheral T-Cell Lymphoma	Phase II	2008	USA	Spectrum Pharmaceuticals, Inc	129
NCT01023308	Panobinostat	HDAC Inhibitor	Relapsed Multiple Myeloma	Phase III	2009	USA	Novartis Pharmaceuticals	767
NCT02482753	Tucidinostat	HDAC Inhibitor	Advanced Breast Cancer	Phase III	2015	China	Chipscreen Biosciences, Ltd.	365
NCT00132028	Vorinostat	HDAC Inhibitor	Advanced Hodgkin's Lymphoma	Phase II	2005	USA	National Cancer Institute	27
NCT00358982	Mocetinostat	HDAC Inhibitor	Hodgkin's Lymphoma	Phase II	2006	USA	Mirati Therapeutics Inc.	27
NCT02717455	Panobinostat	HDAC Inhibitor	Diffuse Intrinsic Pontine Glioma	Phase I	2016	USA	Pediatric Brain Tumor Consortium	53
NCT01897012	Romidepsin + Alisertib	HDAC Inhibitor	B-Cell or T-Cell Lymphomas	Phase I	2013	USA	National Cancer Institute	26
NCT02116530	Olanzapine 10mg + Standard Antiemetics vs Placebo + Standard Antiemetics	Antipsychotic	CINV Prevention (Highly Emetogenic Chemotherapy)	Phase III	2014	USA	Alliance for Clinical Trials in Oncology	380
NCT00532818	Hydralazine + Valproate + Cisplatin/Topotecan	DNMT Inhibitor	Cervical Cancer (Metastatic)	Phase III	2007	Mexico	Psicofarma/INCAN	36
NCT00404326	Hydralazine + Valproate + CRT	DNMT Inhibitor	Cervical Cancer (FIGO IIB)	Phase II	2006	Mexico	National Cancer Institute Mexico	17
NCT00996060	Hydralazine + Valproic Acid	DNMT Inhibitor	Advanced Solid Cancers	Phase I	2009	USA	University of New Mexico (Multicenter)	29
NCT00821301	Fluphenazine	Antipsychotic	Multiple Myeloma	Phase Ib	2009	USA	Immune Control Inc.	24
NCT02096289	Thioridazine + Cytarabine	Antipsychotic	AML (Relapsed/Refractory)	Phase I	2014	Canada	McMaster University	13
NCT04224441	Chlorpromazine + TMZ	Antipsychotic	Glioblastoma	Phase II	2020	Italy	IRCCS Regina Elena National Cancer Institute	41
NCT05190315	Chlorpromazine + Standard Care	Antipsychotic	Glioblastoma	Phase I	2022	USA	University of Iowa	12
NCT05433402	Chlorpromazine + Chemotherapy	Antipsychotic	Colon Cancer (Stage III)	Phase II	2022	Italy	IRCCS Regina Elena National Cancer Institute	100
NCT03153280	Lithium + Oxaliplatin/Capecitabine	Mood Stabilizer	Advanced Oesophago-Gastric or Colorectal Cancer	Phase I	2022	Ireland	Cancer Trials Ireland	2
NCT00501540	Lithium	Mood Stabilizer	Low-Grade Neuroendocrine Tumors	Phase II	2007	USA	University of Wisconsin	15
NCT01669369	Lithium + Neo-adjuvant Chemo	Mood Stabilizer	Osteosarcoma	Phase IV	2013	China	Sun Yat-sen University	400

Table S2 Top 20 globally cited publications showing first author, year, journal, DOI identifiers, total citations (TC), citations per year, and normalized citation scores

Paper	DOI	Total citations	TC per year	Normalized TC
Diamanti-Kandarakis E, 2009, <i>Endocr Rev</i>	10.1210/er.2009-0002	3297	193.94	20.36
Borovikova LV, 2000, <i>Nature</i>	10.1038/35013070	3148	121.08	21.56
Miller Ah, 2009, <i>Biol Psychiat</i>	10.1016/j.biopsych.2008.11.029	2935	172.65	18.13
Kettenmann H, 2011, <i>Physiol Rev</i>	10.1152/physrev.00011.2010	2814	187.60	24.96
Raison CI, 2006, <i>Trends Immunol</i>	10.1016/j.it.2005.11.006	2330	116.50	19.23
Elenkov IJ, 2000, <i>Pharmacol Rev</i>	NA	1763	67.81	12.08
De Coppi P, 2007, <i>Nat Biotechnol</i>	10.1038/nbt1274	1429	75.21	10.45
Rothstein JD, 2005, <i>Nature</i>	10.1038/nature03180	1268	60.38	11.91
Gershon MD, 2007, <i>Gastroenterology</i>	10.1053/j.gastro.2006.11.002	1201	63.21	8.78
Tracey KJ, 2007, <i>J Clin Invest</i>	10.1172/JCI30555	1168	61.47	8.54
Rosas-Ballina M, 2011, <i>Science</i>	10.1126/science.1209985	1105	73.67	9.80
Wang H, 2004, <i>Nat Med</i>	10.1038/nm1124	950	43.18	7.41
Schiepers OJG, 2005, <i>Prog Neuro-Psychoph</i>	10.1016/j.pnpbp.2004.11.003	948	45.14	8.90
Osborne NN, 2004, <i>Prog Retin Eye Res</i>	10.1016/j.preteyeres.2003.12.001	876	39.82	6.83
Hirokawa N, 2010, <i>Neuron</i>	10.1016/j.neuron.2010.09.039	864	54.00	12.69
Felger JC, 2013, <i>Neuroscience</i>	10.1016/j.neuroscience.2013.04.060	846	65.08	10.15
Kögler G, 2004, <i>J Exp Med</i>	10.1084/jem.20040440	809	36.77	6.31
Ben-Jonathan N, 2001, <i>Endocr Rev</i>	10.1210/er.22.6.724	777	31.08	9.19
Lewerenz J, 2013, <i>Antioxid Redox Sign</i>	10.1089/ars.2011.4391	773	59.46	9.27
Ahles Ta, 2007, <i>Nat Rev Cancer</i>	10.1038/nrc2073	716	37.68	5.24

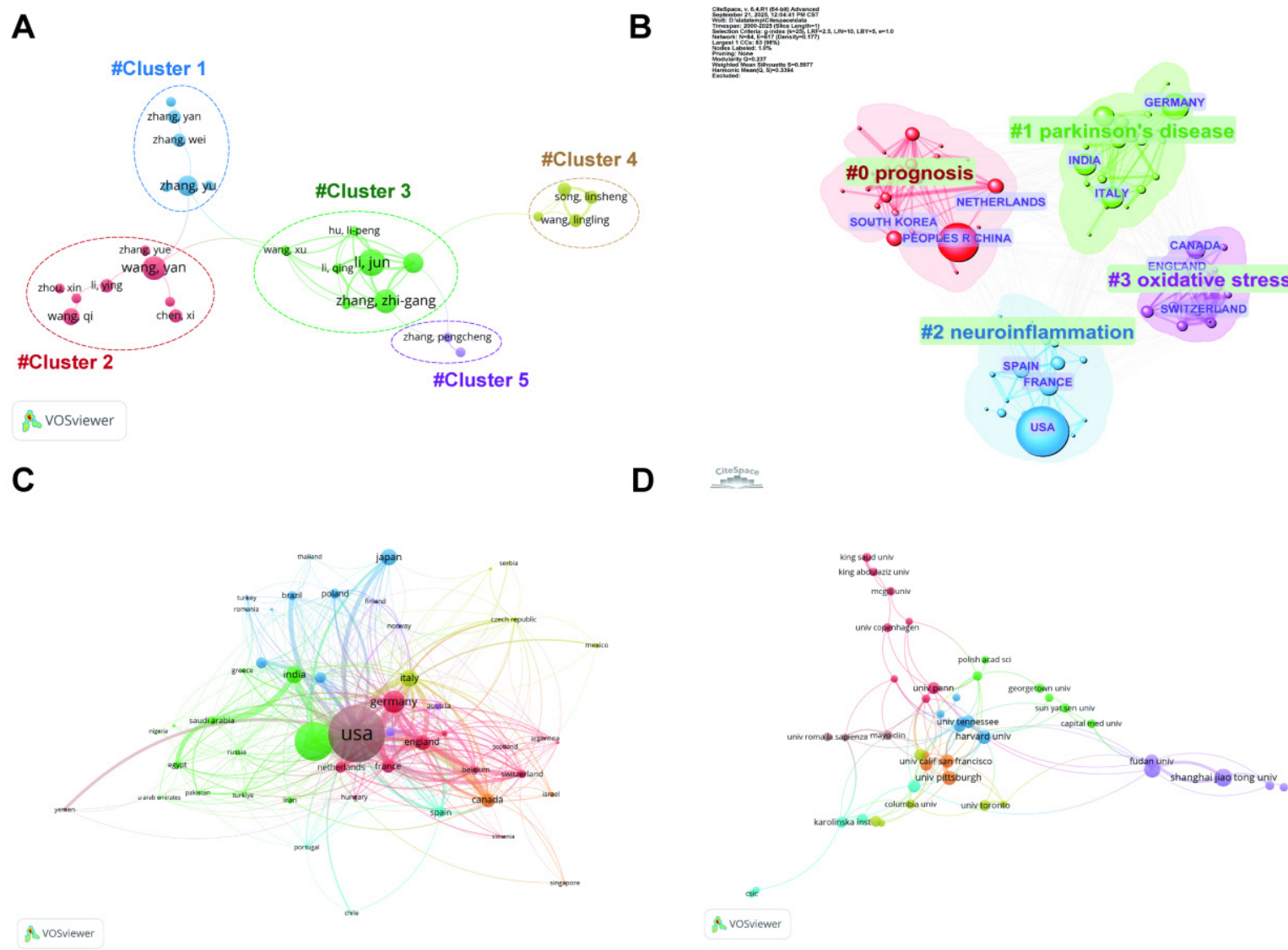


Figure S1 Author, country and institutional collaboration networks. (A) Author collaboration network showing 5 distinct clusters labeled #Cluster 1-5. (B) Country network with clustered regions showing international collaboration patterns. (C) Country collaboration network with USA as the central node. (D) Institutional collaboration network showing distributed connections between research organizations.

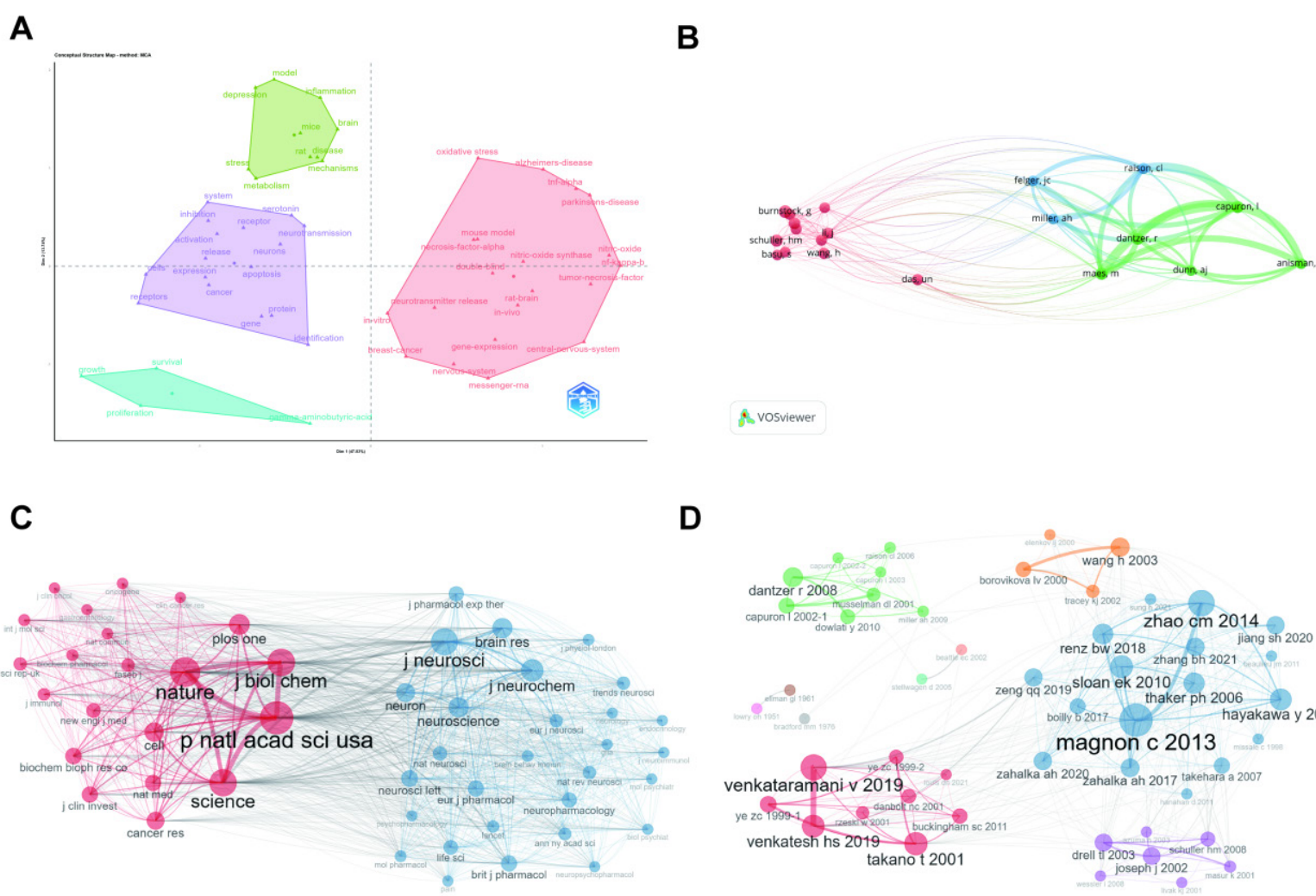


Figure S2 Multiple correspondence analysis and co-citation networks. (A) MCA biplot showing four colored quadrant regions with scattered data points. (B) Author co-citation network with red and green node clusters. (C) Journal co-citation network showing relationships between publication venues including *Nature*, *Science*, and other journals. (D) Document co-citation network with year labels (2013-2019) indicating temporal citation patterns.

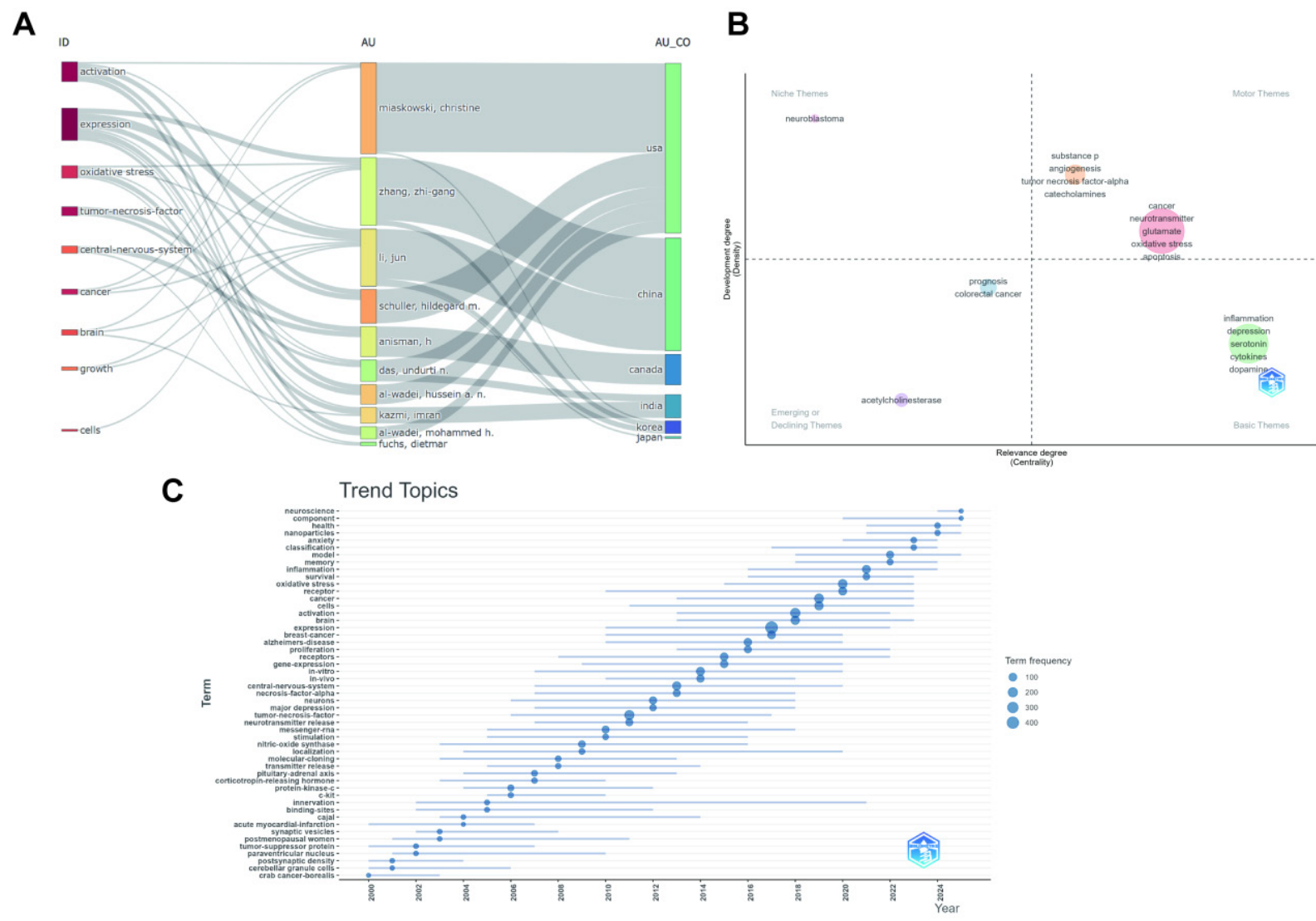


Figure S3 Thematic evolution analysis. (A) Sankey flow diagram showing thematic transitions over three time periods (left to right). (B) Scatter plot with four quadrants showing theme positioning by centrality and development. (C) Trend topics chart showing multiple trend lines over time period.