

Policy-aligned Research Trajectories in AI-Enabled Clinical Trials: A 2015-2025 Bibliometric Synthesis and Governance Implications for Korea and the UK



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S1. Data collection.

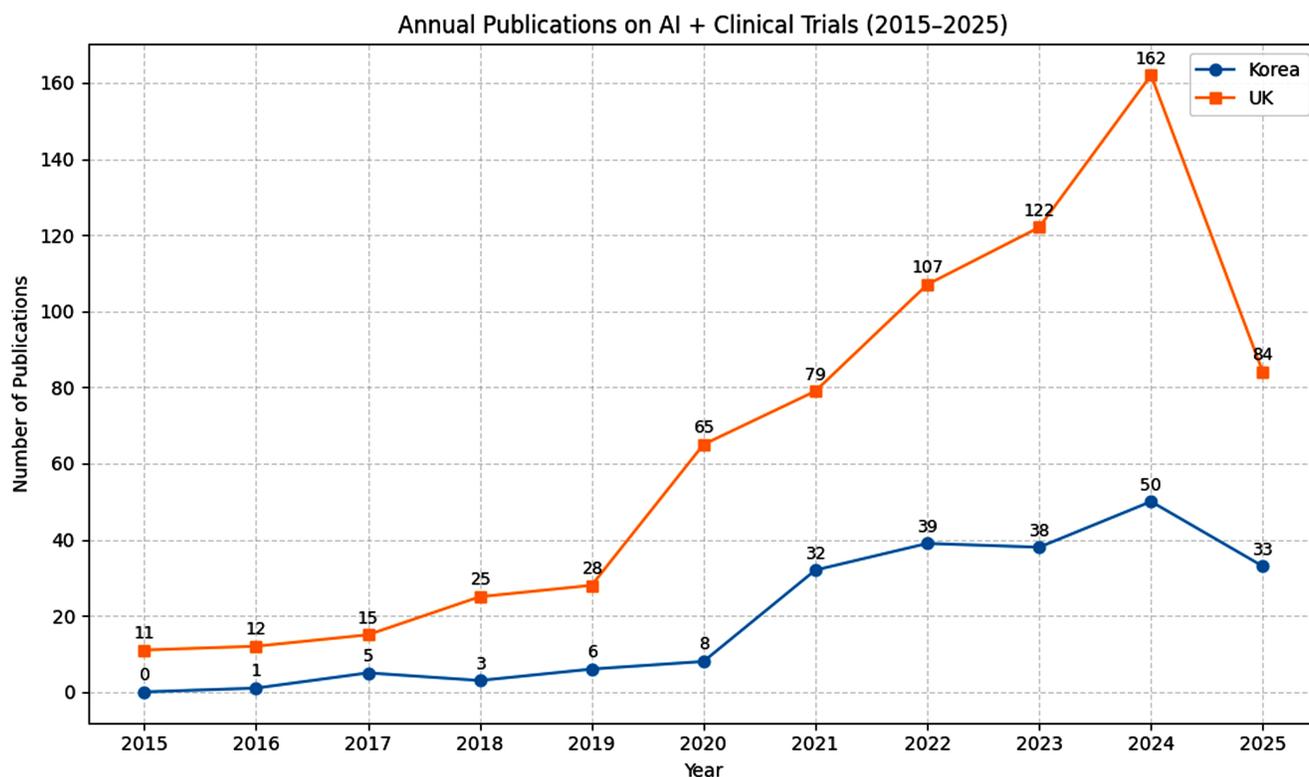
Item	Description
Step	0 - Data Collection
Data source	Web of Science Core Collection (Clarivate Analytics)
Search date	6/30/2025
Query	TS=(“artificial intelligence” OR “AI” OR “machine learning” OR “deep learning” OR “neural network*” OR “reinforcement learning” OR “natural language processing” OR “large language model*” OR “LLM”) AND TS=(“clinical trial*” OR “randomi* trial*” OR “pragmatic trial” OR “adaptive trial” OR “phase I” OR “phase II” OR “phase III” OR “phase 1” OR “phase 2” OR “phase 3”) NOT TS=(preclinical OR “animal model*” OR mouse OR mice OR rat OR rodent)
Filters	Years: 2015-2025; Document types: Article, Review; Language: English
Countries	South Korea, United Kingdom
Records found	Korea: 215; UK: 710
Export format	CSV (Full Record and Cited References)
Export date	6/30/2025

S2-1. Annual trend analysis.

Publication Year	Korea	UK
2015	0	11
2016	1	12
2017	5	15
2018	3	25
2019	6	28
2020	8	65

(Table S2-1) contd....

Publication Year	Korea	UK
2021	32	79
2022	39	107
2023	38	122
2024	50	162
2025.6.	33	84



Item	Description
Step	1-1 Annual Trend Analysis
Data files	wos_ai_trial_KR_2015_2025.csv, wos_ai_trial_UK_2015_2025.csv
Year column	Publication Year
Filters	Years: 2015–2025; Document types: Article, Review; Language: English
Counting method	Full counting (each record counted once per country)
Outputs	table_trend_year_KR_UK.csv, fig_trend_publications.png
Timestamp	9/10/2025 15:00
Software	Python 3.12; pandas 2.0.3; matplotlib 3.8.0

S2-2. Top journals.

Journal	Korea (n)	Korea (%)	UK (n)	UK (%)
BMC MEDICAL INFORMATICS AND DECISION MAKING	5	2.33	0	0
BMJ OPEN	0	0	17	2.39
CANCERS	4	1.86	8	1.13
CMC-COMPUTERS MATERIALS & CONTINUA	4	1.86	0	0
DIAGNOSTICS	4	1.86	0	0

(Table S2-2) contd....

Journal	Korea (n)	Korea (%)	UK (n)	UK (%)
EBIOMEDICINE	0	0	7	0.99
EXPERIMENTAL AND MOLECULAR MEDICINE	4	1.86	0	0
IEEE ACCESS	7	3.26	0	0
IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS	0	0	6	0.85
INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES	4	1.86	0	0
JOURNAL OF CLINICAL MEDICINE	0	0	8	1.13
JOURNAL OF MEDICAL INTERNET RESEARCH	0	0	10	1.41
KOREAN JOURNAL OF RADIOLOGY	5	2.33	0	0
LANCET DIGITAL HEALTH	0	0	12	1.69
NATURE COMMUNICATIONS	0	0	13	1.83
NATURE MEDICINE	0	0	15	2.11
NPJ DIGITAL MEDICINE	5	2.33	0	0
SCIENTIFIC REPORTS	7	3.26	19	2.68

Item	Description
Step	1-2 Top Journals
Data files	wos_ai_trial_KR_2015_2025.csv, wos_ai_trial_UK_2015_2025.csv
Journal column	Source Title
Top N	10
Filters	Years: 2015-2025; Document types: Article, Review; Language: English
Counting method	Full counting (each record counted once)
Outputs	top_journals.csv
Timestamp	9/10/2025 15:30
Software	Python 3.12; pandas 2.0.3; matplotlib 3.8.0

S2-3. Top cited papers. Bibliographic details and citation counts of the 10 most cited papers per country.

Rank	Country	Paper Title	Journal	Year	Times Cited
1	UK	International evaluation of an AI system for breast cancer screening	NATURE	2020	1884
2	UK	Applications of machine learning in drug discovery and development	NATURE REVIEWS DRUG DISCOVERY	2019	1798
3	UK	Artificial intelligence <i>versus</i> clinicians: systematic review of design, reporting standards, and claims of deep learning studies	BMJ-BRITISH MEDICAL JOURNAL	2020	731
4	KR	Methodologic Guide for Evaluating Clinical Performance and Effect of Artificial Intelligence Technology for Medical Diagnosis and Prediction	RADIOLOGY	2018	643
5	UK	Anorexia nervosa: aetiology, assessment, and treatment	LANCET PSYCHIATRY	2015	622
6	UK	Reporting guidelines for clinical trial reports for interventions involving artificial intelligence: the CONSORT-AI extension	LANCET DIGITAL HEALTH	2020	580
7	KR	Neuroimaging standards for research into small vessel disease-advances since 2013	LANCET NEUROLOGY	2023	562
8	UK	Neuroimaging standards for research into small vessel disease-advances since 2013	LANCET NEUROLOGY	2023	562
9	UK	Guidelines for clinical trial protocols for interventions involving artificial intelligence: the SPIRIT-AI extension	LANCET DIGITAL HEALTH	2020	489
10	UK	Deep learning for prediction of colorectal cancer outcome: a discovery and validation study	LANCET	2020	468
11	UK	Reporting guidelines for clinical trial reports for interventions involving artificial intelligence: the CONSORT-AI extension	NATURE MEDICINE	2020	438
12	UK	Wearables in Medicine	ADVANCED MATERIALS	2018	437
13	KR	Design Characteristics of Studies Reporting the Performance of Artificial Intelligence Algorithms for Diagnostic Analysis of Medical Images: Results from Recently Published Papers	KOREAN JOURNAL OF RADIOLOGY	2019	332
14	KR	Predicting Alzheimer's disease progression using multi-modal deep learning approach	SCIENTIFIC REPORTS	2019	305
15	KR	HLPpred-Fuse: improved and robust prediction of hemolytic peptide and its activity by fusing multiple feature representation	BIOINFORMATICS	2020	174

(Table S2-3) contd....

Rank	Country	Paper Title	Journal	Year	Times Cited
16	KR	A novel methodology for modal parameters identification of large smart structures using MUSIC, empirical wavelet transform, and Hilbert transform	ENGINEERING STRUCTURES	2017	163
17	KR	Recent advances in extracellular vesicles for therapeutic cargo delivery	EXPERIMENTAL AND MOLECULAR MEDICINE	2024	143
18	KR	Two-phase deep convolutional neural network for reducing class skewness in histopathological images based breast cancer detection	COMPUTERS IN BIOLOGY AND MEDICINE	2017	128
19	KR	Artificial Intelligence in Drug Toxicity Prediction: Recent Advances, Challenges, and Future Perspectives	JOURNAL OF CHEMICAL INFORMATION AND MODELING	2023	113
20	KR	Update on benign paroxysmal positional vertigo	JOURNAL OF NEUROLOGY	2021	99

Item	Description
Step	1-3 Top Cited Papers
Data files	wos_ai_trial_KR_2015_2025.csv, wos_ai_trial_UK_2015_2025.csv
Title column	Article Title
Journal column	Source Title
Year column	Publication Year
Times cited col.	Times Cited, All Databases
DOI column	DOI
Top N	10
Filters	Years: 2015-2025; Document types: Article, Review; Language: English
Counting method	Full counting (each record counted once)
Outputs	table_top_cited.csv
Timestamp	9/10/2025 16:00
Software	Python 3.12; pandas 2.0.3; matplotlib 3.8.0

S3-1. Keyword dictionary and rule-based classification criteria for AI application areas.

Category	Human-readable Keyword Examples*	Regex Pattern used in the Script	KR_count	UK_count
Design	randomization, randomized/randomised, adaptive design, stratified/stratification, sample size (calculation), study protocol, CONSORT, endpoint(s), treatment allocation, arm design, inclusion criteria, exclusion criteria, trial design, study design	(randomi[sz](ed ation)? adaptive stratif(ied ication)? sample size protocol consort endpoint allocation arm design inclusion criteria exclusion criteria trial design study design)	80	358
Recruitment	eligibility/eligible, screening, e-consent / e consent / electronic consent, virtual consent, online consent, enrolment/enrollment, recruit/recruitment/recruiting, phenotyping/phenotype-based selection, propensity/propensity score, matching, patient accrual, patient outreach	(eligib(le ility)? screening e-?consent virtual consent online consent enrol(l ment) recruit(ing ment) phenotyp(ing e)? propensity matching patient accrual outreach)	57	184
Monitoring	remote monitoring, remote patient monitoring, telemonitoring, telemedicine, telehealth, wearable device(s), biosensor(s), vital sign(s), adverse event(s), pharmacovigilance, safety signal(s), telemetry	(remote (patient)? monitor(ing)? tele(monitor medicine health) wearable(s)? biosensor(s)? vital sign(s)? adverse event(s)? pharmacovigil(ance ance) safety signal(s)? telemetry)	12	61

(Table S3-1) contd....

Category	Human-readable Keyword Examples*	Regex Pattern used in the Script	KR_count	UK_count
Outcome analysis	prediction/predictive model, classifier/classification, regression, survival/survival analysis, time-to-event / time to event, risk model(s), imaging model(s), natural language processing (NLP), large language model(s), LLM(s), causal inference, treatment effect(s), meta-analysis/meta analysis	(predict(ion ive)? classif(y ication) regress(ion)? survival time[-]to[-]event risk model(s)? imaging model(s)? nlp large language model(s)? llm(s)? causal(inference)? treatment effect(s)? meta-?analysis)	142	472

Note: Human-readable examples summarize representative terms captured by each regex pattern; actual classification was performed using the regex expressions in the third column.

Primary label was determined using a predefined priority rule (Design > Recruitment > Monitoring > Outcome analysis); no numeric weighting was applied.

Item	Description
Step	2-1 Classification of AI Application Areas
Data files	wos_ai_trial_KR_2015_2025.csv, wos_ai_trial_UK_2015_2025.csv
Text columns	Article Title, Abstract, Author Keywords, Keywords Plus
Year column	Publication Year
ID column	UT (Unique WOS ID)
Classification rules	Design, Recruitment, Monitoring, Outcome analysis (based on regex rules)
Labeling method	Multi-label allowed; Primary label priority = Design > Recruitment > Monitoring > Outcome analysis
Outputs	classified_records_KR/UK.csv, classified_records_min_KR/UK.csv, summary_category_KR/UK.csv, summary_year_category_KR/UK.csv, fig_categories_KR/UK.png
Timestamp	9/10/2025 16:30
Software	Python 3.12; pandas 2.0.3; matplotlib 3.8.0

S3-2. Validation of rule-based classification for AI application areas.

Category	n	TP	FP	FN	Precision	Recall	F1
Design	33	30	3	0	0.909	1	0.952
Recruitment	9	8	0	1	1	0.889	0.941
Monitoring	4	3	0	1	1	0.75	0.857
Outcome analysis	18	15	1	2	0.938	0.882	0.909

Item	Description
Step	2-2 Validation of Classification
Data files	validation_template.csv (annotated), classified_records_min_KR/UK.csv (Step 2-1 outputs)
Validation size	60 sampled records (≈6% of total corpus)
Annotation	Gold labels were reviewed independently twice to ensure consistency.
Categories	Design, Recruitment, Monitoring, Outcome analysis
Metrics	Micro-average F1 = 0.933, Macro-average F1 = 0.915 Overall, the rule-based classification demonstrated high agreement between predicted and gold labels.
Outputs	validation_metrics_summary.csv
Software	Python 3.12; pandas 2.0.3; matplotlib 3.8.0
Timestamp	11/25/2025 17:00

Supplementary Table S3-3. Chi-square Test for Korea-UK

Differences in AI Application Domain Distribution(Primary Label-Based).

S3-3-1. Contingency table (primary label counts).

Application Domain	Korea_count	UK_count
Design	80	358
Recruitment	29	83
Monitoring	5	26
Outcome analysis	68	143

S3-3-2. Chi-square test results.

Statistic	Value
Chi-square (χ^2)	17.056
Degrees of freedom (df)	3
p-value	0.000688

S3-3-3. Interpretation. The distribution of AI application domains differed significantly between Korea and the UK. ($\chi^2(3) = 17.06, p < 0.001$).

S3-3-4. Expected counts used in χ^2 computation.

Application Domain	Korea_expected	UK_expected
Design	100.6515	337.3485
Recruitment	25.7374	86.2626
Monitoring	7.1237	23.8763
Outcome analysis	48.4874	162.5126

Primary labels were used to satisfy the independence assumption of the chi-square test. (Multi-label counts in S3-1 are descriptive only and unsuitable for inferential testing).

S4. Research network analysis.

KR_Rank	Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
1	seoul national university hospital	23	6	15	0.66	0.57	TRUE
2	korea institute of science & technology kist	9	4	11	0.29	0.31	TRUE
3	yonsei university health system	13	3	8	0.35	0.39	TRUE
4	nih national cancer institute- of cancer epidemiology & genetics	6	2	7	0.00	0.24	TRUE
5	korea institute of radiological & medical sciences	4	2	7	0.00	0.30	TRUE
6	korea advanced institute of science & technology kaist	14	2	7	0.00	0.30	TRUE
7	korea university medicine ku medicine	14	3	6	0.00	0.00	FALSE
8	national cancer center - korea ncc	8	2	5	0.08	0.16	TRUE
9	university of ulsan	7	2	5	0.08	0.14	TRUE
10	pusan national university hospital	6	2	4	0.15	0.24	TRUE

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
seoul national university hospital	23	6	15	0.663636	0.565144	TRUE
korea institute of science & technology kist	9	4	11	0.290909	0.311399	TRUE
yonsei university health system	13	3	8	0.354545	0.388851	TRUE
nih national cancer institute- of cancer epidemiology & genetics	6	2	7	0	0.243179	TRUE
korea institute of radiological & medical sciences	4	2	7	0	0.300678	TRUE
korea advanced institute of science & technology kaist	14	2	7	0	0.300678	TRUE
korea university medicine ku medicine	14	3	6	0		FALSE

(Table S4) contd....

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
national cancer center - korea ncc	8	2	5	0.081818	0.156521	TRUE
university of ulsan	7	2	5	0.081818	0.139313	TRUE
pusan national university hospital	6	2	4	0.145455	0.24464	TRUE
huazhong university of science & technology	3	2	4	0		FALSE
chinese academy of medical sciences - peking union medical college	6	2	4	0		FALSE
gyeongsang national university hospital	7	1	3	0	0.19626	TRUE
sungkyunkwan university skku	6	1	2	0		FALSE
jeonbuk national university	3	1	2	0		FALSE
vietnam national university ho chi minh city vnuhcm system	3	1	2	0		FALSE
pontificia universidad catolica de chile	5	1	2	0	0.19626	TRUE
hospital universitario marques de valdecilla humv	2	1	2	0		FALSE
king saud bin abdulaziz university for health sciences	3	1	2	0		FALSE
ruprecht karls university heidelberg	5	1	2	0	0.108141	TRUE
seoul national university snu	11	0	0	0		FALSE
dongguk university	1	0	0	0		FALSE
ewha womans university	5	0	0	0		FALSE
saveetha institute of medical & technical science	1	0	0	0		FALSE
kyung hee university hospital	6	0	0	0		FALSE
peking university	1	0	0	0		FALSE
catholic university of korea	2	0	0	0		FALSE
korea institute of oriental medicine kiom	3	0	0	0		FALSE
kanagawa prefectural cancer center	2	0	0	0		FALSE
pohang university of science & technology postech	4	0	0	0		FALSE
western university university of western ontario	2	0	0	0		FALSE
southern university of science & technology	1	0	0	0		FALSE
national sun yat sen university	1	0	0	0		FALSE
electronics & telecommunications research institute - korea etri	2	0	0	0		FALSE
kyungpook national university knu	4	0	0	0		FALSE
catholic university of daegu	2	0	0	0		FALSE
konkuk university medical center	2	0	0	0		FALSE
korea basic science institute kbsi	1	0	0	0		FALSE
chonnam national university	2	0	0	0		FALSE
gachon university	4	0	0	0		FALSE
chung ang university hospital	2	0	0	0		FALSE
kumoh national university technology	2	0	0	0		FALSE
chang gung memorial hospital	2	0	0	0		FALSE
catholic university pusan	1	0	0	0		FALSE
kyung hee university	1	0	0	0		FALSE
adama science & technology university	2	0	0	0		FALSE
korea university	2	0	0	0		FALSE
chungnam national university hospital	5	0	0	0		FALSE
university of johannesburg	1	0	0	0		FALSE
university of california los angeles medical center	2	0	0	0		FALSE
post graduate institute of medical education & research pgimer	1	0	0	0		FALSE
jeju national university	1	0	0	0		FALSE
kongju national university	1	0	0	0		FALSE
university of eastern piedmont amedeo avogadro	2	0	0	0		FALSE
daegu gyeongbuk institute of science & technology dgist	2	0	0	0		FALSE
soonchunhyang university	2	0	0	0		FALSE
university of electronic science & technology of china	1	0	0	0		FALSE
kyushu institute of technology	1	0	0	0		FALSE
chungbuk national university hospital	2	0	0	0		FALSE
ajou university	2	0	0	0		FALSE
korea institute of ocean science & technology kiost	1	0	0	0		FALSE
air force medical university	1	0	0	0		FALSE
korea food research institute kfri	1	0	0	0		FALSE

(Table S4) contd....

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
n.g.s.m institute of pharmaceutical sciences ngsmips	1	0	0	0		FALSE
international center for diarrhoeal disease research icddr	1	0	0	0		FALSE
beijing university of technology	2	0	0	0		FALSE
center hospitalier universitaire vaudois chuv	1	0	0	0		FALSE
center for addiction & mental health - canada	1	0	0	0		FALSE
korea institute of industrial technology kitech	1	0	0	0		FALSE
gwangju institute of science & technology gist	4	0	0	0		FALSE
honam university	1	0	0	0		FALSE
universidade de santiago de compostela	1	0	0	0		FALSE
korea research institute of bioscience & biotechnology kribb	1	0	0	0		FALSE
chung ang university	2	0	0	0		FALSE
dong a university	1	0	0	0		FALSE
kyungpook national university hospital knuh	2	0	0	0		FALSE
university of california system	1	0	0	0		FALSE
konyang university hospital	1	0	0	0		FALSE
korea research institute of chemical technology kRICT	2	0	0	0		FALSE
hospital spedali civili brescia	1	0	0	0		FALSE
harvard university medical affiliates	1	0	0	0		FALSE
institute technology of bandung	1	0	0	0		FALSE
university of michigan dearborn	1	0	0	0		FALSE
korea national university of transportation	1	0	0	0		FALSE
pakistan institute of engineering & applied science	2	0	0	0		FALSE
comsats university islamabad cui	3	0	0	0		FALSE
jonghoon chungnarn natl university	1	0	0	0		FALSE
alikhhanov institute for theoretical & experimental physics	1	0	0	0		FALSE
yonsei university	1	0	0	0		FALSE
universidad autonoma de queretaro	1	0	0	0		FALSE
cnrs - national institute of nuclear and particle physics in2p3	1	0	0	0		FALSE
sejong university	1	0	0	0		FALSE
pukyong national university	1	0	0	0		FALSE
vita-salute san raffaele university	1	0	0	0		FALSE
national university of sciences & technology - pakistan	1	0	0	0		FALSE
national university of singapore	1	0	0	0		FALSE
agency for science technology & research a star	1	0	0	0		FALSE
korea institute of science & technology information kisti	1	0	0	0		FALSE
national cancer center - japan	1	0	0	0		FALSE
high energy accelerator research organization kek	1	0	0	0		FALSE
state university system of florida	1	0	0	0		FALSE
university of oulu	1	0	0	0		FALSE
korea astronomy & space science institute kasi	1	0	0	0		FALSE
european center for medium-range weather forecasts ecmwf	1	0	0	0		FALSE

Source	Target	Weight
korea institute of science & technology kist	nih national cancer institute- of cancer epidemiology & genetics	4
korea advanced institute of science & technology kaist	korea institute of radiological & medical sciences	4
nih national cancer institute- of cancer epidemiology & genetics	yonsei university health system	3
korea institute of science & technology kist	yonsei university health system	3
gyeongsang national university hospital	seoul national university hospital	3
korea institute of radiological & medical sciences	seoul national university hospital	3
korea advanced institute of science & technology kaist	seoul national university hospital	3
national cancer center - korea ncc	university of ulsan	3
huazhong university of science & technology	korea university medicine ku medicine	2
korea university medicine ku medicine	sungkyunkwan university skku	2
chinese academy of medical sciences - peking union medical college	huazhong university of science & technology	2
chinese academy of medical sciences - peking union medical college	korea university medicine ku medicine	2

(Table S4) contd....

Source	Target	Weight
pusan national university hospital	seoul national university hospital	2
seoul national university hospital	yonsei university health system	2
jeonbuk national university	vietnam national university ho chi minh city vnuhcm system	2
pontificia universidad catolica de chile	seoul national university hospital	2
pusan national university hospital	university of ulsan	2
hospital universitario marques de valdecilla humv	king saud bin abdulaziz university for health sciences	2
korea institute of science & technology kist	national cancer center - korea ncc	2
korea institute of science & technology kist	ruprecht karls university heidelberg	2

UK_Rank	Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
1	institut national de la sante et de la recherche medicale inserm	74	20	61	0.64	0.46	TRUE
2	moorfields eye hospital nhs foundation trust	28	7	43	0.03	0.28	TRUE
3	university of california los angeles medical center	25	7	40	0.00	0.33	TRUE
4	royal liverpool & broadgreen university hospitals nhs trust	24	7	39	0.04	0.29	TRUE
5	national institute for health & care excellence	16	9	32	0.37	0.34	TRUE
6	oxford university hospitals nhs foundation trust	35	10	28	0.16	0.34	TRUE
7	university hospital birmingham nhs foundation trust	12	6	22	0.00	0.29	TRUE
8	cambridge university hospitals nhs foundation trust	26	8	21	0.09	0.29	TRUE
9	university college london hospitals nhs foundation trust	42	5	15	0.26	0.01	TRUE
10	university hospital southampton nhs foundation trust	9	3	14	0.00	0.15	TRUE

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
institut national de la sante et de la recherche medicale inserm	74	20	61	0.643236	0.455002	TRUE
moorfields eye hospital nhs foundation trust	28	7	43	0.029418	0.279808	TRUE
university of california los angeles medical center	25	7	40	0.003554	0.330394	TRUE
royal liverpool & broadgreen university hospitals nhs trust	24	7	39	0.041287	0.285044	TRUE
national institute for health & care excellence	16	9	32	0.37022	0.343052	TRUE
oxford university hospitals nhs foundation trust	35	10	28	0.163435	0.335892	TRUE
university hospital birmingham nhs foundation trust	12	6	22	0.002641	0.294412	TRUE
cambridge university hospitals nhs foundation trust	26	8	21	0.091446	0.293785	TRUE
university college london hospitals nhs foundation trust	42	5	15	0.25873	0.008061	TRUE
university hospital southampton nhs foundation trust	9	3	14	0	0.147334	TRUE
newcastle upon tyne hospitals nhs foundation trust	21	3	12	0.000794	0.088415	TRUE
maria sklodowska-curie national research institute of oncology	6	2	7	0	0.001361	TRUE
national & kapodistrian university of athens	8	2	7	0	0.001361	TRUE
leiden university medical center lumc	8	3	6	0.055556	0.092906	TRUE
national institutes of health nih - usa	5	2	6	0	0.078505	TRUE
florey institute of neuroscience & mental health	10	2	5	0		FALSE
university college london	19	2	5	0.285714	0.050724	TRUE
university of texas system	7	2	5	0		FALSE
university of california los angeles	7	2	5	0	0.090967	TRUE
guy s & st thomas nhs foundation trust	10	2	4	0.055556	0.067134	TRUE
nottingham university hospital nhs trust	9	2	4	0.055556	0.001189	TRUE
great ormond street hospital for children nhs foundation trust	20	1	4	0	0.065732	TRUE
university hospital of bern	2	2	4	0	0.081602	TRUE
helmholtz-center munich - german research center for environmental health	14	1	4	0	0.065732	TRUE
university of pennsylvania	2	2	4	0		FALSE
german center for neurodegenerative diseases dzne	7	2	4	0.055556	0.067134	TRUE
iuliu hatieganu university of medicine & pharmacy	5	2	4	0	0.090967	TRUE
virginia commonwealth university	2	2	4	0	0.078505	TRUE
queens university belfast	3	1	3	0	0.048525	TRUE
vrije universiteit amsterdam	3	1	2	0		FALSE

(Table S4) contd....

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
griffith university - gold coast campus	3	1	2	0	0.009699	TRUE
university college cork	2	1	2	0	0.065732	TRUE
h lee moffitt cancer center & research institute	5	1	2	0		FALSE
nih national cancer institute- of cancer epidemiology & genetics	7	1	2	0		FALSE
harvard university medical affiliates	12	1	2	0	0.065732	TRUE
chinese academy of medical sciences - peking union medical college	8	1	2	0	0.009699	TRUE
royal marsden nhs foundation trust	10	1	2	0		FALSE
erasmus university rotterdam - excl erasmus mc	3	1	2	0		FALSE
gloucestershire hospitals nhs foundation trust	3	1	2	0	0.065732	TRUE
children s hospital of eastern ontario	5	1	2	0		FALSE
csic - instituto de parasitologia y biomedicina lopez-neyra ipbln	3	1	2	0	0.065732	TRUE
agency for science technology & research a star	4	1	2	0		FALSE
pennsylvania state university - university park	3	1	2	0		FALSE
imperial college london	16	1	2	0	0.049559	TRUE
irccs ca granda ospedale maggiore policlinico	5	1	2	0	0.013422	TRUE
tokyo medical & dental university tmdu	2	1	2	0	0.001165	TRUE
center for addiction & mental health - canada	3	1	2	0		FALSE
medical research council clinical trials	2	1	2	0		FALSE
university medical center hamburg-eppendorf	5	1	2	0	0.000172	TRUE
university of texas health science center at san antonio	2	1	2	0	0.065732	TRUE
magna graecia university of catanzaro	1	0	0	0		FALSE
south australian health & medical research institute sahmri	1	0	0	0		FALSE
university of texas health science center houston	2	0	0	0		FALSE
york university - canada	1	0	0	0		FALSE
nanyang technological university	3	0	0	0		FALSE
chalmers university of technology	1	0	0	0		FALSE
university system of ohio	1	0	0	0		FALSE
chongqing medical university	2	0	0	0		FALSE
birla institute of technology & science pilani bits pilani	1	0	0	0		FALSE
international center for diarrhoeal disease research icddr	2	0	0	0		FALSE
universita degli studi di bari aldo moro	1	0	0	0		FALSE
newcastle university - uk	1	0	0	0		FALSE
university of new mexico s health sciences center	1	0	0	0		FALSE
minneapolis heart institute foundation	1	0	0	0		FALSE
johns hopkins university	2	0	0	0		FALSE
university of arkansas medical sciences	2	0	0	0		FALSE
i3s - instituto de investigacao e inovacao em saude	1	0	0	0		FALSE
fraunhofer institute center schloss birlinghoven	1	0	0	0		FALSE
kharkevich institute for information transmission problems of the ras	1	0	0	0		FALSE
mashhad university of medical sciences	2	0	0	0		FALSE
university of teesside	3	0	0	0		FALSE
lebanese american university	1	0	0	0		FALSE
universidade federal do rio grande do sul	1	0	0	0		FALSE
robert c. university hospital southampton	1	0	0	0		FALSE
university of leeds	3	0	0	0		FALSE
research triangle institute	1	0	0	0		FALSE
university of reading	1	0	0	0		FALSE
isfahan university of medical sciences	1	0	0	0		FALSE
university of rome tor vergata	2	0	0	0		FALSE
hospital clinic de barcelona	2	0	0	0		FALSE
hebrew university of jerusalem	1	0	0	0		FALSE
dow university of health sciences	1	0	0	0		FALSE
university of pretoria	1	0	0	0		FALSE
catholic university of the sacred heart	1	0	0	0		FALSE
university of east anglia	2	0	0	0		FALSE
newyork-presbyterian hospital	2	0	0	0		FALSE

(Table S4) contd....

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
university of liverpool	1	0	0	0		FALSE
university of bristol	1	0	0	0		FALSE
university of western macedonia	1	0	0	0		FALSE
harry perkins institute of medical research	1	0	0	0		FALSE
university of california berkeley	2	0	0	0		FALSE
national cerebral & cardiovascular center - japan	1	0	0	0		FALSE
united arab emirates university	1	0	0	0		FALSE
north carolina state university	1	0	0	0		FALSE
european bioinformatics institute	1	0	0	0		FALSE
universite clermont auvergne uca	1	0	0	0		FALSE
korea university medicine ku medicine	1	0	0	0		FALSE
aristotle university of thessaloniki	1	0	0	0		FALSE
technical university of denmark	1	0	0	0		FALSE
university of california san francisco at fresno	1	0	0	0		FALSE
qatar mobility innovations center qmic	2	0	0	0		FALSE
center suisse de recherches scientifiques en cote d ivoire csrs	1	0	0	0		FALSE
georgia institute of technology	1	0	0	0		FALSE
technical university of crete	2	0	0	0		FALSE
norfolk & norwich university hospitals nhs foundation trust	1	0	0	0		FALSE
universidade federal do abc ufabc	1	0	0	0		FALSE
kennedy institute for rheumatology	1	0	0	0		FALSE
khalifa university of science & technology	1	0	0	0		FALSE
medical university of graz	1	0	0	0		FALSE
ollscoil na gaillimhe-university of galway	2	0	0	0		FALSE
university of groningen	1	0	0	0		FALSE
universite paris-est-creteil-val-de-marne upec	1	0	0	0		FALSE
sir charles gairdner hospital	2	0	0	0		FALSE
victor babes university of medicine & pharmacy	1	0	0	0		FALSE
university of novi sad	1	0	0	0		FALSE
cnrs - national institute of nuclear and particle physics in2p3	2	0	0	0		FALSE
our ladys children hospital crumlin	1	0	0	0		FALSE
ucl institute of education	1	0	0	0		FALSE
stavanger university hospital	2	0	0	0		FALSE
university of birmingham	1	0	0	0		FALSE
mcmaster university	1	0	0	0		FALSE
christie nhs foundation trust	2	0	0	0		FALSE
north khorasan university of medical sciences	2	0	0	0		FALSE
universiti sultan zainal abidin	1	0	0	0		FALSE
national pirogov memorial medical university vinnytsya	1	0	0	0		FALSE
universite libre de bruxelles	1	0	0	0		FALSE
university of auckland	1	0	0	0		FALSE
shenzhen institute of advanced technology	1	0	0	0		FALSE
singapore university of technology & design	1	0	0	0		FALSE
university of newcastle	1	0	0	0		FALSE
armed forces research institute of medical science afrims	1	0	0	0		FALSE
azienda ospedaliera - universita di padova	1	0	0	0		FALSE
instituto universitario de lisboa	1	0	0	0		FALSE
christchurch hospital new zealand	1	0	0	0		FALSE
medical research council uk mrc	1	0	0	0		FALSE
mid essex hospital services nhs trust	1	0	0	0		FALSE
lucerne cantonal hospital	1	0	0	0		FALSE
finnish institute of occupational health	1	0	0	0		FALSE
university of warwick	1	0	0	0		FALSE
university of texas rio grande valley	1	0	0	0		FALSE
university of health science - pakistan	1	0	0	0		FALSE
california polytechnic state university san luis obispo	1	0	0	0		FALSE

(Table S4) contd....

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
university of huddersfield	1	0	0	0		FALSE
university of massachusetts amherst	1	0	0	0		FALSE
tehran university of medical sciences	1	0	0	0		FALSE
shahid beheshti university medical sciences	1	0	0	0		FALSE
istanbul technical university	1	0	0	0		FALSE
queen elizabeth university hospital qeuh	1	0	0	0		FALSE
brunel university	1	0	0	0		FALSE
commonwealth scientific & industrial research organisation csiro	1	0	0	0		FALSE
mediterranean institute of oncology	1	0	0	0		FALSE
instituto de investigacion sanitaria y biomedica de alicante isabial	1	0	0	0		FALSE
hospital spedali civili brescia	1	0	0	0		FALSE
university college dublin	1	0	0	0		FALSE
simon fraser university	1	0	0	0		FALSE
university hospital of heraklion	1	0	0	0		FALSE
state university system of florida	2	0	0	0		FALSE
bharati vidyapeeth deemed university	1	0	0	0		FALSE
swiss institute of allergy & asthma research	1	0	0	0		FALSE
university of texas medical branch galveston	4	0	0	0		FALSE
university of surrey	1	0	0	0		FALSE
azienda ospedaliero-universitaria di cagliari	1	0	0	0		FALSE
weill cornell medical college qatar	2	0	0	0		FALSE
qimr berghofer medical research institute	1	0	0	0		FALSE
queensland university of technology qut	1	0	0	0		FALSE
university of health sciences turkey	1	0	0	0		FALSE
kohat university of science & technology	1	0	0	0		FALSE
mahidol oxford tropical medicine research moru	2	0	0	0		FALSE
universita di modena e reggio emilia hospital	1	0	0	0		FALSE
institute of geographic sciences & natural resources research	1	0	0	0		FALSE
baylor college medical hospital	1	0	0	0		FALSE
german cancer research center dkfz	1	0	0	0		FALSE
wageningen university & research	1	0	0	0		FALSE
university of hertfordshire	1	0	0	0		FALSE
university health network toronto	3	0	0	0		FALSE
kilimanjaro christian medical center	1	0	0	0		FALSE
university of south australia	1	0	0	0		FALSE
wellcome center for human genetics	1	0	0	0		FALSE
rwth aachen university hospital	1	0	0	0		FALSE
cuhk shenzhen research institute	1	0	0	0		FALSE
international center for genetic engineering & biotechnology icgeb	2	0	0	0		FALSE
university of prince mugrin	1	0	0	0		FALSE
research organization of information & systems rois	1	0	0	0		FALSE
cnrs - national institute for mathematical sciences insmi	1	0	0	0		FALSE
flinders university south australia	2	0	0	0		FALSE
nih national institute of arthritis & musculoskeletal & skin diseases niams	2	0	0	0		FALSE
henry m. jackson foundation for the advancement of military medicine	1	0	0	0		FALSE
pusan national university hospital	1	0	0	0		FALSE
cleveland clinic foundation	1	0	0	0		FALSE
st. anna children s cancer research institute ccri	2	0	0	0		FALSE
utmd anderson cancer center	2	0	0	0		FALSE
royal holloway university london	1	0	0	0		FALSE
university of milano-bicocca	1	0	0	0		FALSE
perron institute for neurological & translational science	2	0	0	0		FALSE
university of washington seattle	1	0	0	0		FALSE
university of wisconsin madison	1	0	0	0		FALSE
european center for medium-range weather forecasts ecmwf	1	0	0	0		FALSE
biotechnology and biological sciences research council bbsrc	4	0	0	0		FALSE

(Table S4) contd....

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
norwegian institute of public health niph	1	0	0	0		FALSE
universita della svizzera italiana	2	0	0	0		FALSE
shanghai jiao tong university	2	0	0	0		FALSE
nih national institute of diabetes & digestive & kidney diseases niddk	4	0	0	0		FALSE
state research institute center for innovative medicine	1	0	0	0		FALSE
queen mary university london	2	0	0	0		FALSE
yale university	2	0	0	0		FALSE
university of exeter	1	0	0	0		FALSE
hopital universitaire robert-debre - aphp	1	0	0	0		FALSE
hospital universitari vall d hebron	1	0	0	0		FALSE
saint james s university hospital	4	0	0	0		FALSE
king abdullah university of science & technology	1	0	0	0		FALSE
university of southern california	1	0	0	0		FALSE
a star - institute of molecular & cell biology imcb	3	0	0	0		FALSE
university hospital of the canary islands	1	0	0	0		FALSE
king s college hospital nhs foundation trust	4	0	0	0		FALSE
lublin university of technology	1	0	0	0		FALSE
university of maryland baltimore	2	0	0	0		FALSE
swiss federal institutes of technology domain	4	0	0	0		FALSE
university of eastern piedmont amedeo avogadro	4	0	0	0		FALSE
state university of new york suny system	1	0	0	0		FALSE
university of colorado anschutz medical campus	3	0	0	0		FALSE
hopital universitaire pitie-salpetriere - aphp	1	0	0	0		FALSE
electronics & telecommunications research institute - korea etri	1	0	0	0		FALSE
engineering & physical sciences research council epsrc	1	0	0	0		FALSE
liverpool john moores university	2	0	0	0		FALSE
a star - institute of high performance computing ihpc	3	0	0	0		FALSE
manchester university nhs foundation trust	2	0	0	0		FALSE
central south university	1	0	0	0		FALSE
shenzhen polytechnic university	2	0	0	0		FALSE
university of london	2	0	0	0		FALSE
institut de cancerologie de l ouest ico	1	0	0	0		FALSE
memorial sloan kettering cancer center	2	0	0	0		FALSE
university of sheffield	1	0	0	0		FALSE
western university university of western ontario	12	0	0	0		FALSE
aston university	1	0	0	0		FALSE
university of oxford	8	0	0	0		FALSE
shanghai center for disease control & prevention	1	0	0	0		FALSE
linkoping university	1	0	0	0		FALSE
ircs azienda ospedaliero-universitaria di bologna	2	0	0	0		FALSE
university of california san francisco	6	0	0	0		FALSE
university of maryland college park	1	0	0	0		FALSE
de montfort university	2	0	0	0		FALSE
university of quebec montreal	2	0	0	0		FALSE
nih national institute of allergy & infectious diseases niaid	2	0	0	0		FALSE
university of british columbia	1	0	0	0		FALSE
university of bradford	1	0	0	0		FALSE
eberhard karls university of tubingen	1	0	0	0		FALSE
university of illinois chicago hospital	2	0	0	0		FALSE
paracelsus private medical university	1	0	0	0		FALSE
justus liebig university giessen	2	0	0	0		FALSE
ruprecht karls university heidelberg	2	0	0	0		FALSE
university of nottingham	2	0	0	0		FALSE
university of cambridge	11	0	0	0		FALSE
ingham institute for applied medical research	2	0	0	0		FALSE
barcelona supercomputer center bsc-cns	2	0	0	0		FALSE

(Table S4) contd....

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
university of texas arlington	1	0	0	0		FALSE
massachusetts institute of technology mit	4	0	0	0		FALSE
stanford university	1	0	0	0		FALSE
royal brompton & harefield nhs foundation trust	5	0	0	0		FALSE
cincinnati children s hospital medical center	3	0	0	0		FALSE
maastricht university medical center mumc	4	0	0	0		FALSE
north bristol nhs trust	1	0	0	0		FALSE
universite de montreal	1	0	0	0		FALSE
university of southampton	2	0	0	0		FALSE
weizmann institute of science	1	0	0	0		FALSE
harbin institute of technology	1	0	0	0		FALSE
king s college london	4	0	0	0		FALSE
university of manchester	3	0	0	0		FALSE
seoul national university hospital	1	0	0	0		FALSE
comsats university islamabad cui	2	0	0	0		FALSE
oxford brookes university	1	0	0	0		FALSE
technical university of munich	1	0	0	0		FALSE
institute of tropical medicine itm	2	0	0	0		FALSE
oregon health & science university	1	0	0	0		FALSE
manchester metropolitan university	2	0	0	0		FALSE
university of new south wales sydney	3	0	0	0		FALSE
king faisal university	1	0	0	0		FALSE
universitat politecnica de valencia	1	0	0	0		FALSE
university of sydney	1	0	0	0		FALSE
university of california san diego	2	0	0	0		FALSE
nih national institute of environmental health sciences niehs	2	0	0	0		FALSE
st johns innovation center - uk	1	0	0	0		FALSE
royal prince alfred hospital	1	0	0	0		FALSE
trinity college dublin	1	0	0	0		FALSE
lovely professional university	1	0	0	0		FALSE
geriatric research education & clinical center	2	0	0	0		FALSE
imam mohammad ibn saud islamic university imsiu	3	0	0	0		FALSE
hopital universitaire europeen georges-pompidou - aphp	3	0	0	0		FALSE
utrecht university medical center	2	0	0	0		FALSE
princess nourah bint abdulrahman university	1	0	0	0		FALSE
aintree university hospitals nhs foundation trust	1	0	0	0		FALSE
the national center of excellence in youth mental health	6	0	0	0		FALSE
university of catania	1	0	0	0		FALSE
heart of england nhs foundation trust	1	0	0	0		FALSE
united international university uiu	1	0	0	0		FALSE
leeds biomedical research center	2	0	0	0		FALSE
university of leicester	1	0	0	0		FALSE
universitats herzzentrum freiburg	3	0	0	0		FALSE
salisbury district hospital	2	0	0	0		FALSE
universidade federal da paraiba	2	0	0	0		FALSE
university of york - uk	1	0	0	0		FALSE
oxford health nhs foundation trust	3	0	0	0		FALSE
nih national institute of neurological disorders & stroke ninds	4	0	0	0		FALSE
national scientific center m.d. strazhesko institute of cardiology of the national academy of medical sciences of ukraine	1	0	0	0		FALSE
university of missouri columbia	1	0	0	0		FALSE
hamamatsu university medicine	1	0	0	0		FALSE
london south bank university	2	0	0	0		FALSE
university of electronic science & technology of china	2	0	0	0		FALSE
leiden university - excl lumc	1	0	0	0		FALSE
university of north carolina chapel hill	3	0	0	0		FALSE

(Table S4) contd....

Institution	Papers	Degree	Weighted Degree	Betweenness (GC)	Eigenvector (GC)	In_GC
louis stokes cleveland veterans affairs medical center	2	0	0	0		FALSE
center of postgraduate medical education - poland	3	0	0	0		FALSE
center national de la recherche scientifique cnrs	2	0	0	0		FALSE
ircs humanitas research hospital	2	0	0	0		FALSE
university of michigan system	3	0	0	0		FALSE
medical research institute of new zealand	3	0	0	0		FALSE
royal free london nhs foundation trust	3	0	0	0		FALSE
national university of singapore	2	0	0	0		FALSE
university hospitals of leicester nhs trust	3	0	0	0		FALSE
university of southern queensland	1	0	0	0		FALSE
university of edinburgh	4	0	0	0		FALSE
university of texas southwestern medical center	4	0	0	0		FALSE
universite toulouse iii - paul sabatier	1	0	0	0		FALSE
center hospitalier universitaire vaudois chuv	6	0	0	0		FALSE
hospital universitario marques de valdecilla humv	1	0	0	0		FALSE
datta meghe institute of higher education & research deemed to be university	1	0	0	0		FALSE
universite cote d azur	1	0	0	0		FALSE
alan turing institute	1	0	0	0		FALSE
ivannikov institute for system programming of the ras	1	0	0	0		FALSE
university college hospital	2	0	0	0		FALSE
poznan university of medical sciences	1	0	0	0		FALSE

Source	Target	Weight
moorfields eye hospital nhs foundation trust	royal liverpool & broadgreen university hospitals nhs trust	13
moorfields eye hospital nhs foundation trust	university of california los angeles medical center	11
royal liverpool & broadgreen university hospitals nhs trust	university of california los angeles medical center	8
institut national de la sante et de la recherche medicale inserm	newcastle upon tyne hospitals nhs foundation trust	7
national institute for health & care excellence	university hospital birmingham nhs foundation trust	7
moorfields eye hospital nhs foundation trust	national institute for health & care excellence	6
cambridge university hospitals nhs foundation trust	oxford university hospitals nhs foundation trust	6
national institute for health & care excellence	university of california los angeles medical center	6
royal liverpool & broadgreen university hospitals nhs trust	university hospital southampton nhs foundation trust	5
institut national de la sante et de la recherche medicale inserm	university hospital southampton nhs foundation trust	5
institut national de la sante et de la recherche medicale inserm	royal liverpool & broadgreen university hospitals nhs trust	5
institut national de la sante et de la recherche medicale inserm	university of california los angeles medical center	5
moorfields eye hospital nhs foundation trust	university hospital birmingham nhs foundation trust	4
helmholtz-center munich - german research center for environmental health	institut national de la sante et de la recherche medicale inserm	4
oxford university hospitals nhs foundation trust	university of california los angeles medical center	4
great ormond street hospital for children nhs foundation trust	institut national de la sante et de la recherche medicale inserm	4
maria sklodowska-curie national research institute of oncology	university college london hospitals nhs foundation trust	4
national & kapodistrian university of athens	university college london hospitals nhs foundation trust	4
moorfields eye hospital nhs foundation trust	university hospital southampton nhs foundation trust	4
university hospital birmingham nhs foundation trust	university of california los angeles medical center	4
institut national de la sante et de la recherche medicale inserm	university hospital birmingham nhs foundation trust	3
cambridge university hospitals nhs foundation trust	university of california los angeles	3
university college london	university college london hospitals nhs foundation trust	3
institut national de la sante et de la recherche medicale inserm	moorfields eye hospital nhs foundation trust	3
institut national de la sante et de la recherche medicale inserm	national institutes of health nih - usa	3
maria sklodowska-curie national research institute of oncology	national & kapodistrian university of athens	3
florey institute of neuroscience & mental health	university of texas system	3
oxford university hospitals nhs foundation trust	royal liverpool & broadgreen university hospitals nhs trust	3
oxford university hospitals nhs foundation trust	queens university belfast	3
national institute for health & care excellence	royal liverpool & broadgreen university hospitals nhs trust	3
national institutes of health nih - usa	newcastle upon tyne hospitals nhs foundation trust	3

(Table S4) contd....

Source	Target	Weight
gloucestershire hospitals nhs foundation trust	institut national de la sante et de la recherche medicale inserm	2
erasmus university rotterdam - excl erasmus mc	royal marsden nhs foundation trust	2
csic - instituto de parasitologia y biomedicina lopez-neyra ipbln	institut national de la sante et de la recherche medicale inserm	2
royal liverpool & broadgreen university hospitals nhs trust	university hospital of bern	2
moorfields eye hospital nhs foundation trust	university hospital of bern	2
leiden university medical center lumc	oxford university hospitals nhs foundation trust	2
cambridge university hospitals nhs foundation trust	leiden university medical center lumc	2
university of pennsylvania	university of texas system	2
agency for science technology & research a star	pennsylvania state university - university park	2
imperial college london	national institute for health & care excellence	2
oxford university hospitals nhs foundation trust	university of california los angeles	2
irccs ca granda ospedale maggiore policlinico	leiden university medical center lumc	2
cambridge university hospitals nhs foundation trust	iuliu hatieganu university of medicine & pharmacy	2
iuliu hatieganu university of medicine & pharmacy	oxford university hospitals nhs foundation trust	2
tokyo medical & dental university tmdu	university college london hospitals nhs foundation trust	2
center for addiction & mental health - canada	medical research council clinical trials	2
nottingham university hospital nhs trust	university medical center hamburg-eppendorf	2
institut national de la sante et de la recherche medicale inserm	university of texas health science center at san antonio	2
nottingham university hospital nhs trust	university college london hospitals nhs foundation trust	2
guy s & st thomas nhs foundation trust	institut national de la sante et de la recherche medicale inserm	2
children s hospital of eastern ontario	vrije universiteit amsterdam	2
griffith university - gold coast campus	guy s & st thomas nhs foundation trust	2
institut national de la sante et de la recherche medicale inserm	university college cork	2
german center for neurodegenerative diseases dzne	institut national de la sante et de la recherche medicale inserm	2
national institute for health & care excellence	university college london	2
institut national de la sante et de la recherche medicale inserm	virginia commonwealth university	2
h lee moffitt cancer center & research institute	nih national cancer institute- of cancer epidemiology & genetics	2
harvard university medical affiliates	institut national de la sante et de la recherche medicale inserm	2
florey institute of neuroscience & mental health	university of pennsylvania	2
newcastle upon tyne hospitals nhs foundation trust	virginia commonwealth university	2
chinese academy of medical sciences - peking union medical college	german center for neurodegenerative diseases dzne	2
national institute for health & care excellence	oxford university hospitals nhs foundation trust	2
oxford university hospitals nhs foundation trust	university hospital birmingham nhs foundation trust	2
institut national de la sante et de la recherche medicale inserm	national institute for health & care excellence	2
institut national de la sante et de la recherche medicale inserm	oxford university hospitals nhs foundation trust	2
cambridge university hospitals nhs foundation trust	university of california los angeles medical center	2
cambridge university hospitals nhs foundation trust	university hospital birmingham nhs foundation trust	2
cambridge university hospitals nhs foundation trust	national institute for health & care excellence	2
cambridge university hospitals nhs foundation trust	institut national de la sante et de la recherche medicale inserm	2

Item	Description
Step	3 Research Network Analysis
Data files	wos_ai_trial_KR_2015_2025.csv, wos_ai_trial_UK_2015_2025.csv
Affiliation columns	Authors with affiliations; Affiliations; Addresses
Parsing method	Extracted author-affiliation pairs; fallback to Affiliation/Addresses splitting; normalized organization names by abbreviation expansion and department removal
Edge definition	Two institutions connected if co-occurred in same paper; edge weight = co-occurrences
Threshold	Edges with weight ≥ 2 retained
Centrality	Degree, Weighted degree, Betweenness centrality (approx., GC, k=200), Eigenvector centrality (GC only)
Outputs	edges_institution_KR/UK_w2.csv; nodes_institution_KR/UK_w2.csv; table_top10_institutions_KR/UK.csv; institution_network_KR/UK_GC_w2.gexf
Key findings (KR)	Korean network dominated by Seoul National University Hospital; fragmented structure with only 20 edges across 104 institutions
Key findings (UK)	UK network distributed across multiple NHS trusts plus INSERM and NICE; broader, more diverse collaboration with 330 institutions and 70 edges
Software	Python 3.12; pandas 2.0.3; networkx 3.2; matplotlib 3.8.0
Timestamp	9/11/2025 9:30