The **Brain Science report** can be downloaded at:
http://www.elsevier.com/online-tools/research-intelligence/resource-library/resources/brain-science-mapping-the-landscape-of-brain-and-neuroscience-research

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Elsevier Research Intelligence

Brain Science
Mapping the Landscape of Brain and Neuroscience Research

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Vice President, Global Academic & Research Relations, Elsevier

With support from Georgin Lau, Judith Kamalski (Analytical Services)
& Holly Falk-Kreszensky (GAR)

3 March , 2015

Criteria for success: The future of collaborative brain research

European Brain Council

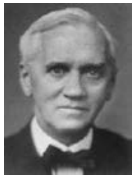
Empowering Knowledge

Lead the way to advance science, technology and health

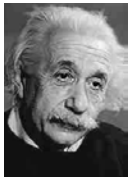
Marie Curie (Physics, Chemistry)

Louis Pasteur (Chemistry)

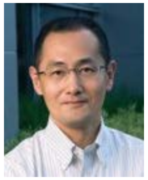
Alexander Fleming (Medicine)



Albert Einstein (Physics)



Shinya Yamanaka (Medicine)



John C. Mather (Physics)

Francoise Barre-Sinoussi (Medicine)

Craig C Mello (Medicine)

The original Non Solus (not alone) mark of Isaac Elzevir was used for the first time in Leyden in 1620

ScienceDirect

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CLINICAL KEY

Scopus

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Analytical Services

Customized analysis and reports to measure research performance *http://www.elsevier.com/online-tools/research-intelligence/resource-library*

Science Europe report
on European research collaboration and researcher mobility, 2013

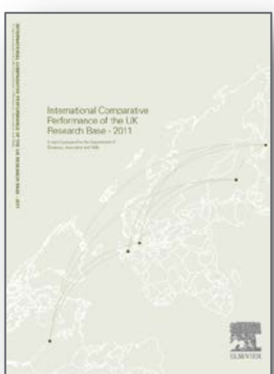
http://www.elsevier.com/online-tools/research-intelligence/resource-library/resources/comparative-benchmarking-of-european-and-us-research-collaboration-and-researcher-mobility

http://www.elsevier.com/online-tools/research-intelligence/resource-library/resources/world-bank-2014

STEM in Africa, World Bank, 2014
Stem Cell Research, 2013

http://www.elsevier.com/online-tools/research-intelligence/resource-library/resources/stem-cell-research-trends-and-perspectives-on-the-evolving-international-landscape

International Comparative Performance of UK Research Base, UK (BIS), 2011 & 2013



http://www.elsevier.com/online-tools/research-intelligence/resource-library/resources/international-comparative-performance-of-the-uk-research-base-2013

Evidence informing collaboration practice

- Increasingly difficult to make scientific discoveries
- More people required to find new things
- Research increasingly done in teams, for virtually all fields
- Teams typically produce more highly cited research than individuals
  - Teams that are more diverse are even more highly impactful
  - Teams are more likely than solo authors to insert novel combinations of science into familiar knowledge domains; Papers of this type are twice as likely to be highly-cited works
  - More team science is done inter-institutionally
  - Virtual communities produce higher impact work
  - International collaboration shows a further boost in citation impact
  - **But**, dispersed teams have a high rate of failure
- Scientists who do not collaborate are less productive

Project background

- The human brain is currently the focus of attention in both a scientific context and in the more mainstream media
- *The Human Brain Project* [EU]
- *BRAIN Initiative* [US]
- *Brain/MINDS (Brain Mapping by Integrated Neurotechnologies for Disease Studies)* [Japan]
- Input from a range of international organizations

Image courtesy of Massachusetts General Hospital and Draper Labs [Public domain], via Wikimedia Commons

Mapping the landscape of brain and neuroscience research

What is the **quantity** and **impact** of this domain's research?

Who **collaborates the most**, and **how impactful** are those collaborations?

What are the **disciplinary histories** of neuroscience researchers?

What are the **most popular and emerging** research topics?

What areas of research are **being funded**?

The countries that the report will focus on are the EU41, Canada, China, Japan and the US.

Defining Brain and Neuroscience Research

Journal-based | Expert inputs | Fingerprinting

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Empowering Knowledge

Select relevant and specific BNR (brain and neurocience research) concepts

TotFreq	MeSH Code	Name
1660	A06.688	Neurosecretory Systems
7128	A07.035	Blood-Brain Barrier
72	A07.037	Blood-Nerve Barrier
11299	A08	Nervous System
440	A09	Sense Organs
197	A13.564	Lateral Line System
450	A13.641	Mushroom Bodies
95	A13.686	Optic Lobe, Nonmammalian
342	C10.114	Autoimmune Diseases of the Nervous System
1125	C10.177	Autonomic Nervous System Diseases
4162	C10.314	Demyelinating Diseases
15816	C10.574	Neurodegenerative Diseases
1329	C10.720	Neurotoxicity Syndromes
1504	C10.803	Restless Legs Syndrome
8574	E02.037	Acoustic Stimulation
3266	E05.723	Physical Stimulation
2480	F02.463	Mental Processes
1911	F02.694	Psycholinguistics
14680	F02.808	Psychomotor Performance
215	F03.087	Delirium, Dementia, Amnestic, Cognitive Disorders
13725	F04.586	Psychiatric Status Rating Scales
4736	F04.824	Schizophrenic Psychology
566	G11.561	Nervous System Physiological Phenomena
18	G14.640	Ocular Physiological Processes

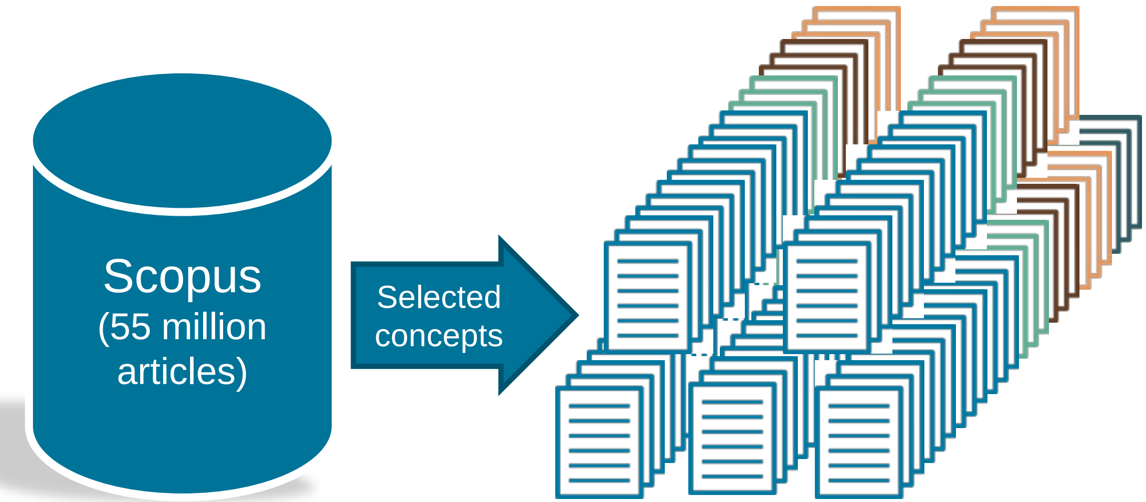
1200+ concepts
2400+ descendants

From all concepts, only those that are relevant and specific enough to the field are included.

Feedback from experts were incorporated:

- European Commission
- FENS
- HBP
- NIH/NIMH
- RIKEN BSI

Use selected concepts as filter on entire Scopus database to generate publication set for analysis



1.79 Million articles (2009-2013) included for analysis (~16% of world output)

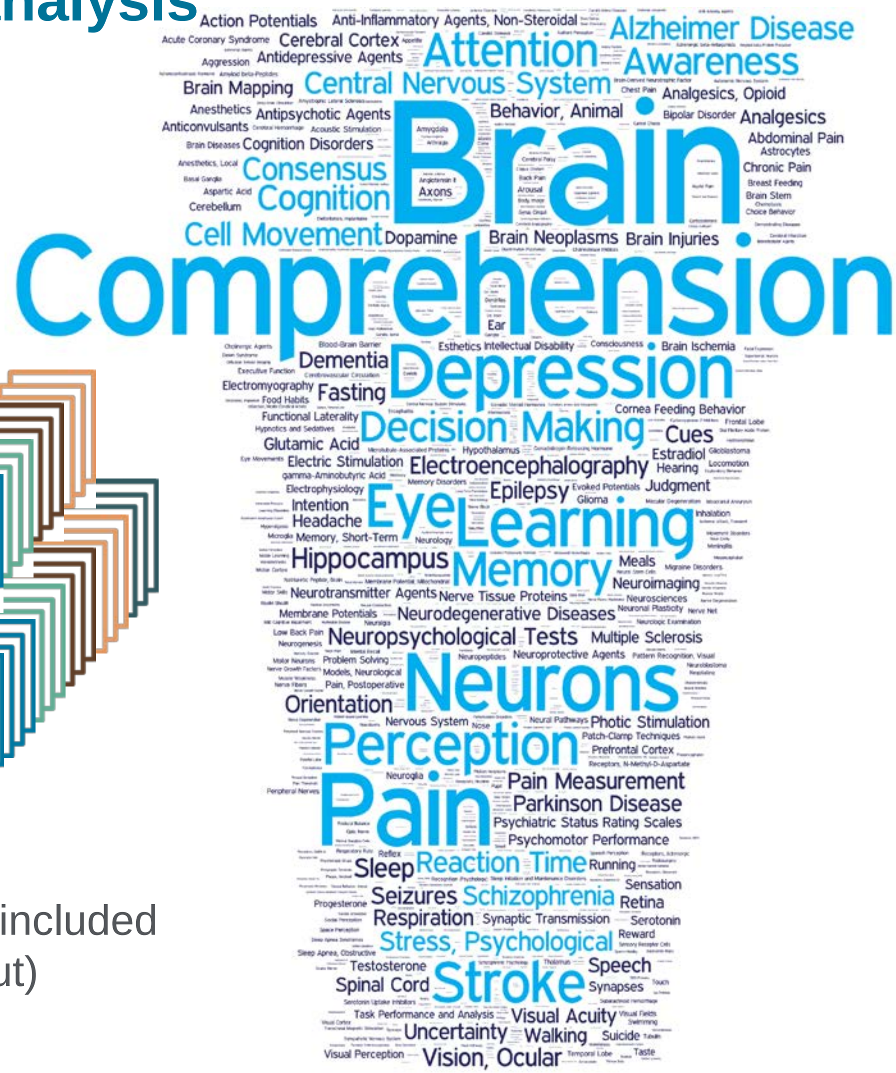


***Figure 1.3** — Word cloud of concepts from the selected document set where the selection rate was 100%, meaning that no relevant documents that contained these concepts were excluded. Size of each concept is weighted by the number of occurrences in the selected document set. Source: Scopus.*

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Brain Research Overview

Research Output, Citation Impact, Growth, Usage

Research output highest in the US, while growth is highest in China

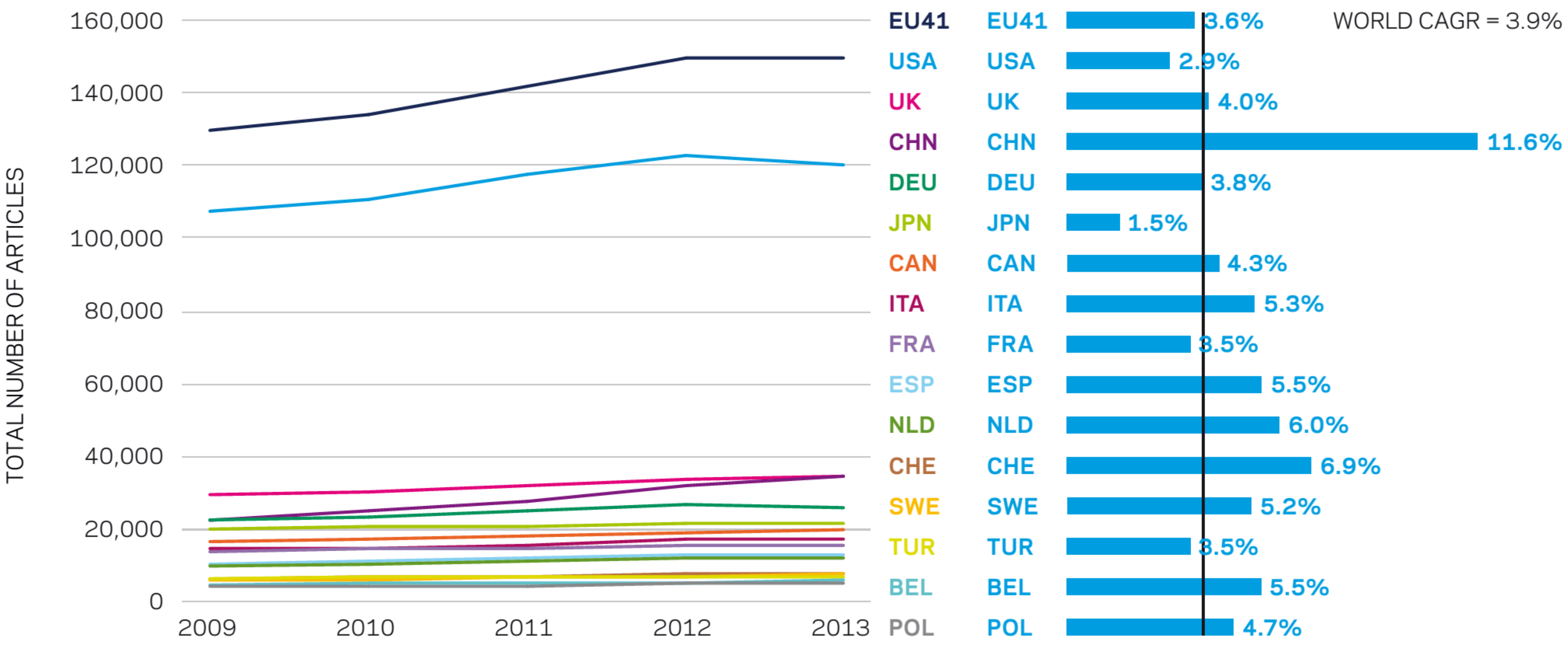


Figure 1.4 *— Overall number of articles and compound annual growth rate (CAGR) of articles for comparator countries, 2009-2013. Source: Scopus.*

Research from major European countries and the US receive the highest share of world citations

…but China's citation share has grown the most.

As a research area, brain and neuroscience articles have a FWCI of 1.14 in 2013, meaning authors publishing in BNR are cited 14% more than the world average.

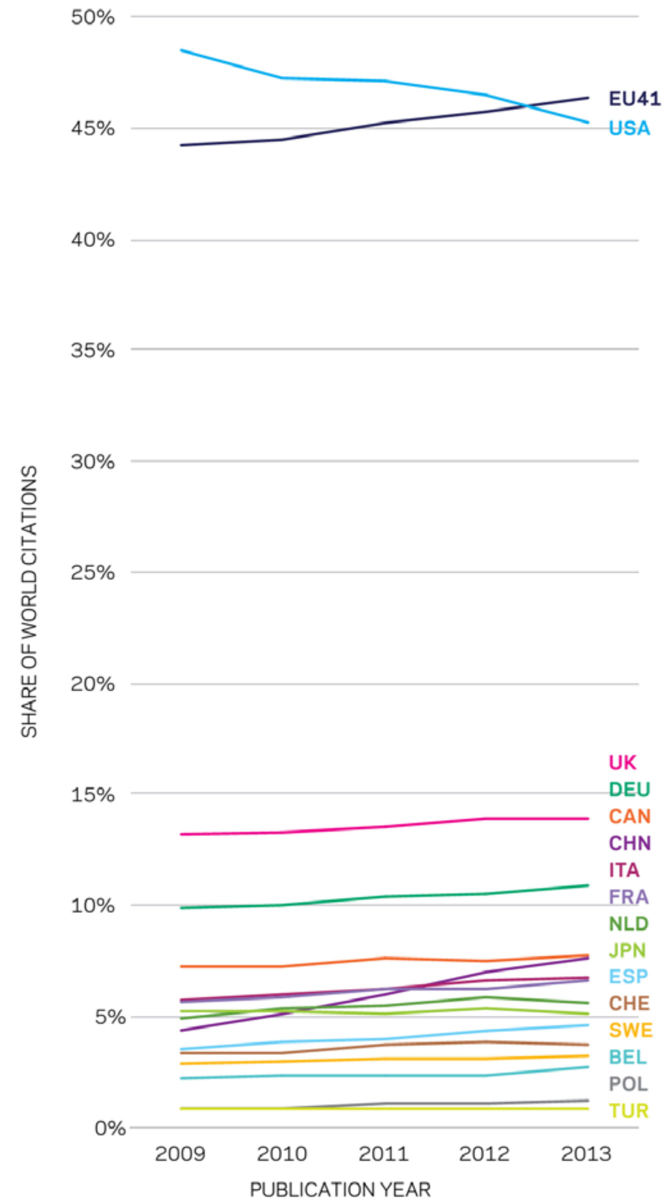


***Figure 1.8** — World citation share across comparator countries, 2009-2013. Source: Scopus.*

Collaboration & Cross-Disciplinary Mobility

Empowering Knowledge

All countries are increasing international collaboration

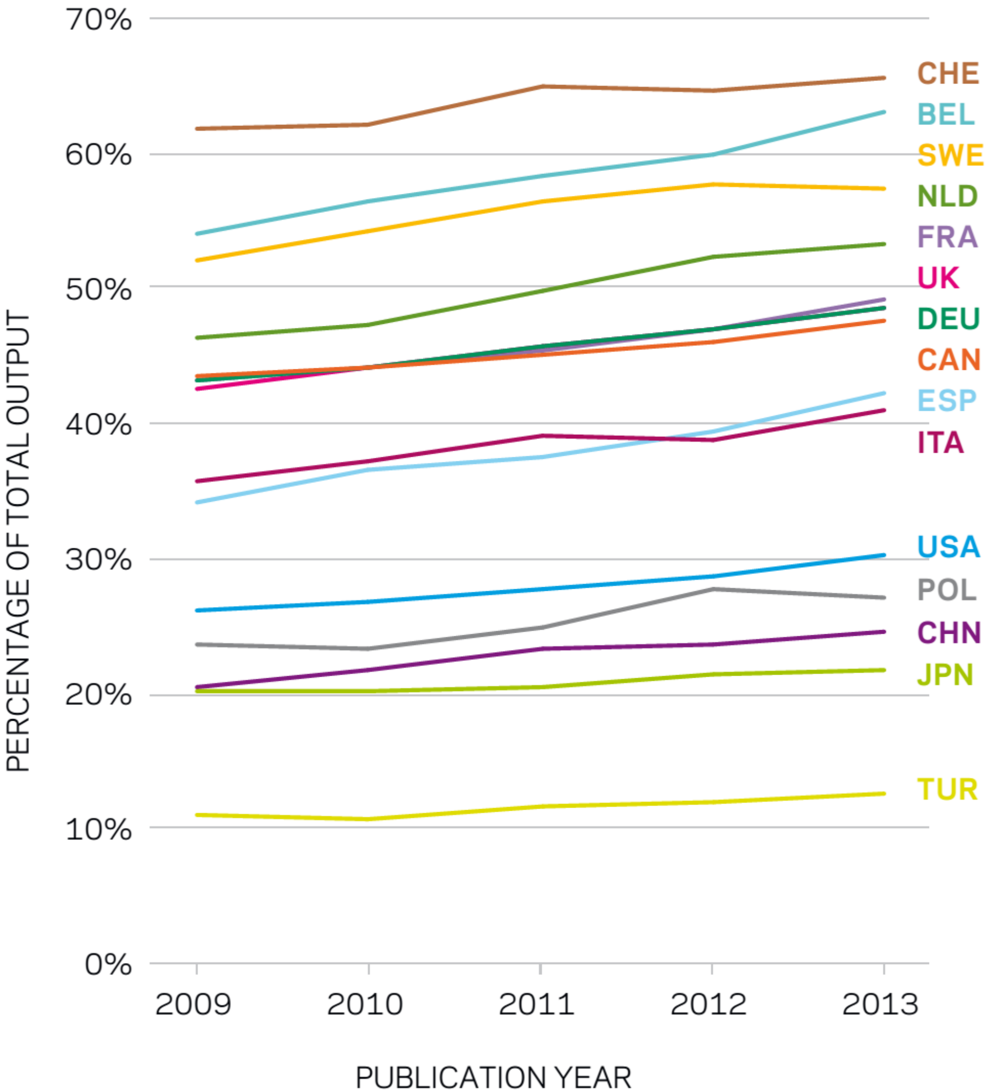
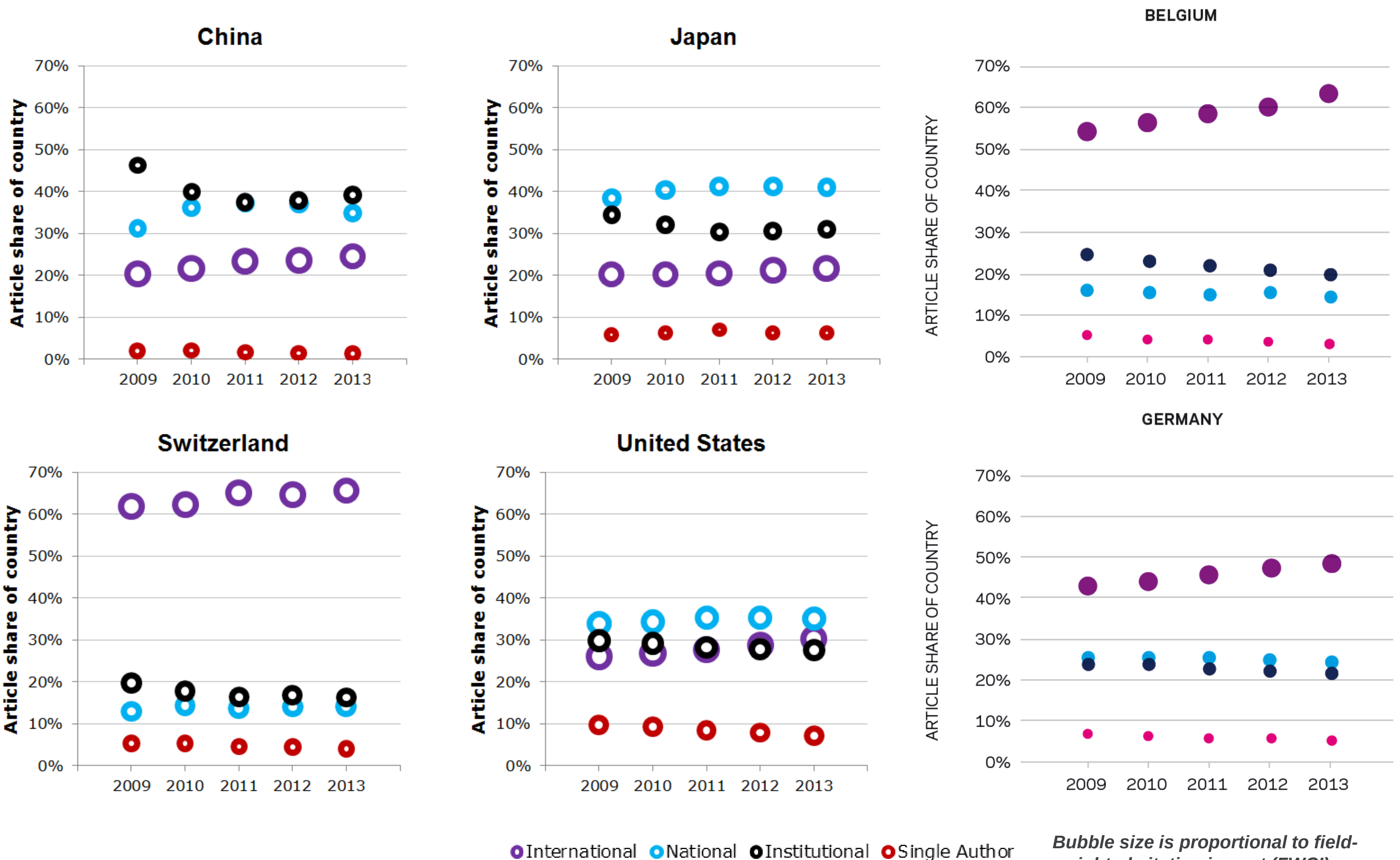


***Figure 2.1** — Level of international collaboration for comparator countries, in terms of percentage of internationally collaborated articles in brain and neuroscience research, 2009–2013. Source: Scopus.*

International collaborations have the highest FWCI



Bubble size is proportional to field-weighted citation impact (FWCI).

International collaborations have the highest FWCI

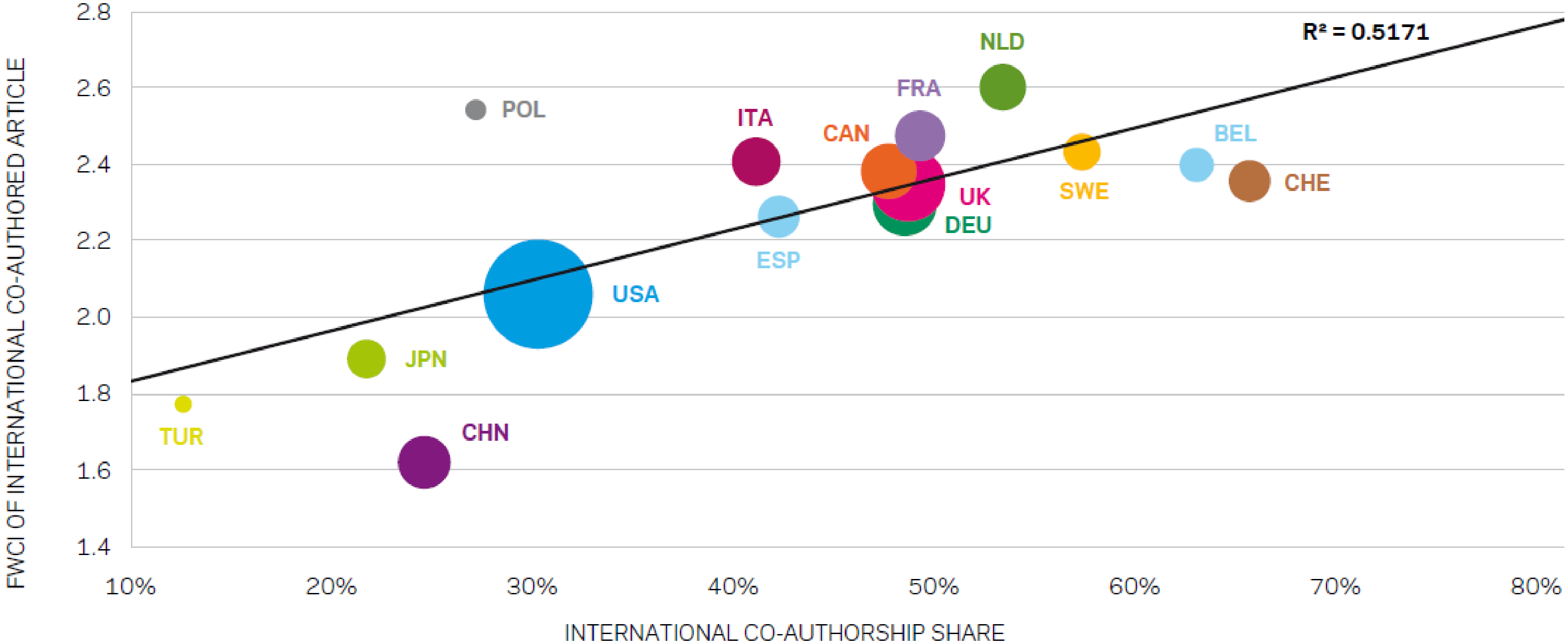


***Figure 2.3** — Correlation between international co-authorship share and FWCI of internationally co-authored articles in brain and neuroscience research for comparator countries, 2013. Size of circles is proportional to the number of international co-authored brain and neuroscience articles of the comparator country. The R^2 value (or coefficient of determination [71]) of linear regression is 0.5171, indicating that when we assume a simple linear model between international co-authorship share and the corresponding FWCI of international co-authored articles of a comparator country, the model accounts for 51.71% of the variance, suggesting a relationship between these two factors. Source: Scopus.*

Most of top 15 form core of global network

Country size
Overall international co-authored output for each country.

Country color
Field-weighted citation impact of the overall international co-authored output for each country.

Line color
Field-weighted citation impact of the co-authored articles between each country pair.

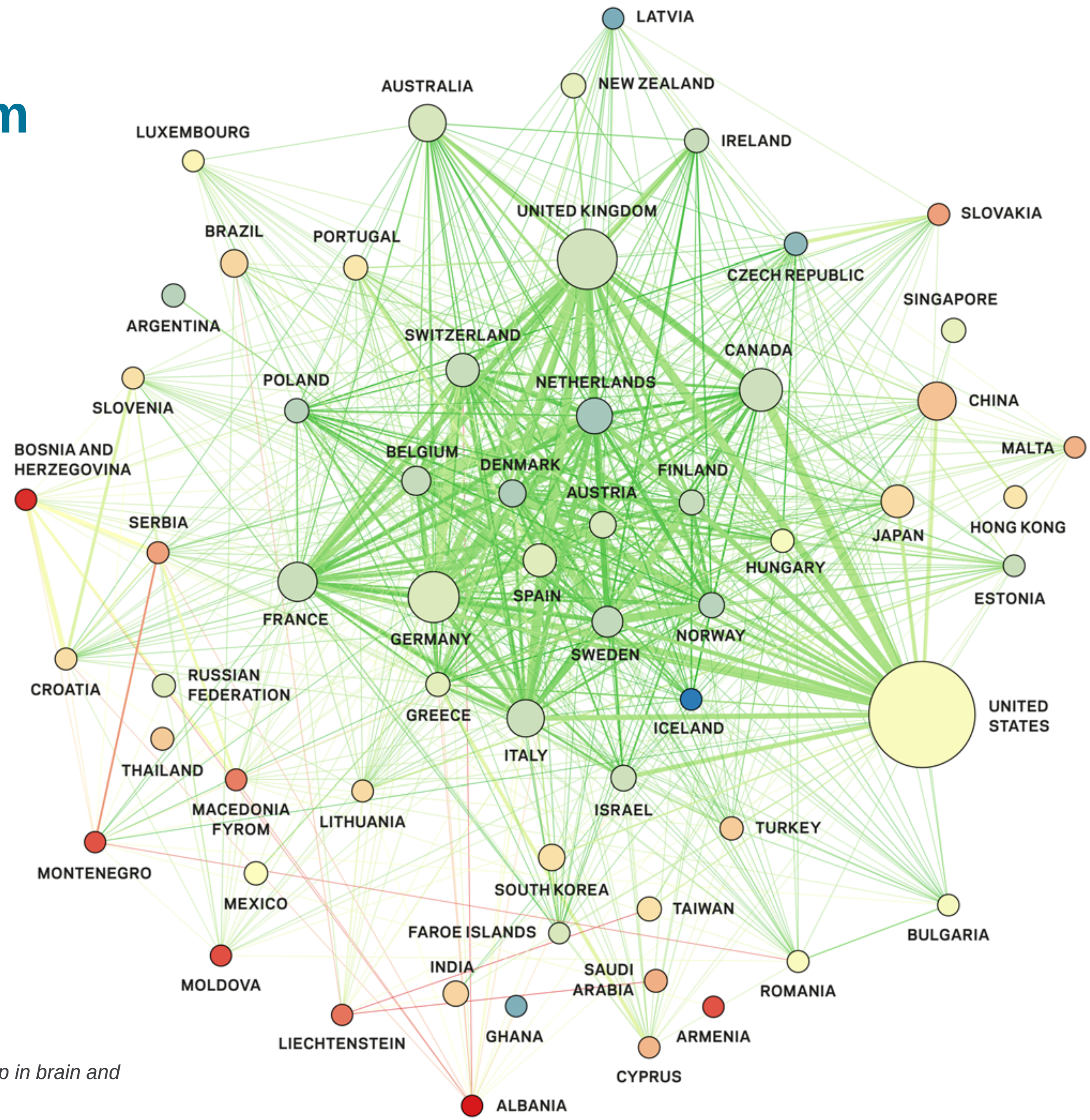


Figure 2.5 — International collaboration network map in brain and neuroscience research, 2009–2013.

Academia and industry don't collaborate often, but the results are highly impactful

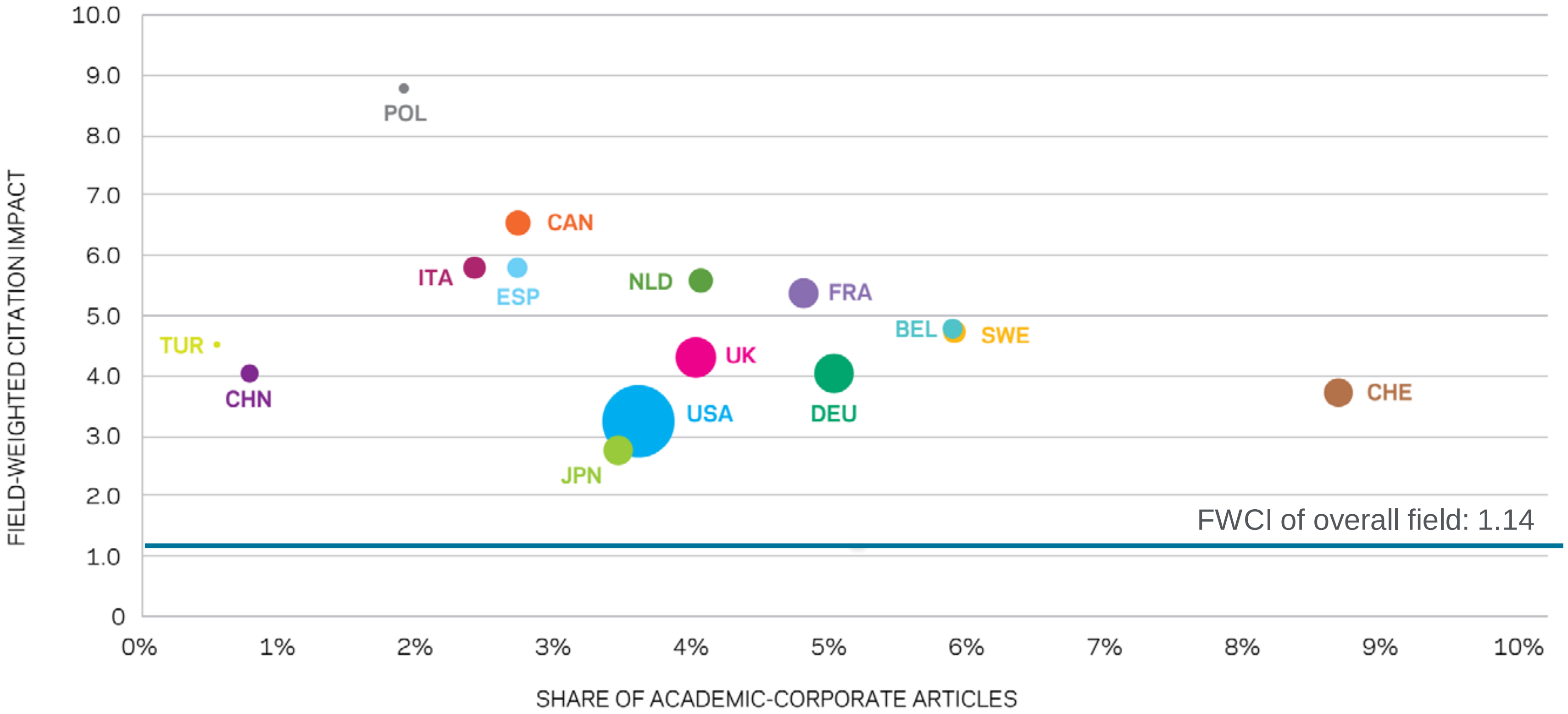


***Figure 2.6** — Field-weighted citation impact (FWCI) against the share of academic-corporate articles in brain and neuroscience research for comparator countries, 2013. Size of circles is proportional to the number of brain and neuroscience cross-sector articles of the comparator country. Source: Scopus.*

More than half of active brain and neuroscience researchers have published in multiple disciplines

OUTFLOW

Researchers who left the area of brain and neuroscience research (BNR)

INFLOW

Researchers who came into the area of BNR

SINGLE DISCIPLINE

Researchers who published only in the area of BNR

1.73M

From 1996 onwards, there were 1.73 million active brain and neuro-science researchers.

MULTIDISCIPLINARY

Researchers who spent fewer than two years in the area of BNR at any given time

More than half of active brain and neuroscience researchers have published in multiple disciplines

OUTFLOWS

18.5%

of the active brain and neuroscience researchers (about 319,000 researchers) moved from publishing in BNR to non-BNR for at least two years without returning.

FWCI of this group: 1.55
Relative Age: 1.26
Relative Productivity: 0.99

INFLOWS

16.3%

of the active brain and neuroscience researchers (about 281,000 researchers) moved from publishing in a non-BNR area to BNR for at least two years.

FWCI of this group: 1.59
Relative Age: 1.23
Relative Productivity: 1.03

SINGLE-DISCIPLINE

5.8%

of the active brain and neuroscience researchers (about 99,000 researchers) did not publish outside of brain and neuroscience research.

FWCI of this group: 1.55
Relative Age: 0.73
Relative Productivity: 0.60

1.73M

From 1996 onwards, there were 1.73 million active brain and neuro-science researchers.

MULTIDISCIPLINARY

59.5%

of the active brain and neuroscience researchers (about 1 million researchers) published publish across disciplines for less than two years at a time. Below are the top 20 disciplines in which they publish.

FWCI of this group: 1.48
Relative Age: 0.88
Relative Productivity: 1.02

Elsevier Research Intelligence

Thank you!

The **Brain Science report** can be downloaded at:
http://www.elsevier.com/online-tools/research-intelligence/resource-library/resources/brain-science-mapping-the-landscape-of-brain-and-neuroscience-research