

Pain and glory of meta-analysis

*Introduction to idea of the meta-analysis, how its used in medicine
and how it can be expanded to serve general bioinformatics.*

Ania Górska, PHD
University of Verona

Bioinformatics approaches to study antibiotics resistance emergence across levels of biological organization.

Dissertation
der Mathematisch-Naturwissenschaftlichen Fakultät
der Eberhard Karls Universität Tübingen
zur Erlangung des Grades eines Doktors der Naturwissenschaften
(Dr. rer. nat.)

vorgelegt von
M. Sc. Anna Górska
aus Warschau

Tübingen 2018





UNIVERSITÀ
di VERONA



Clinical Algorithm to efficiently
diagnose etiology of CA-ARTIs.

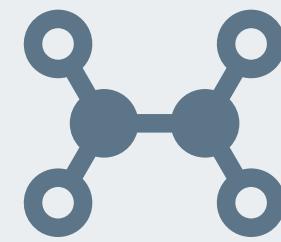
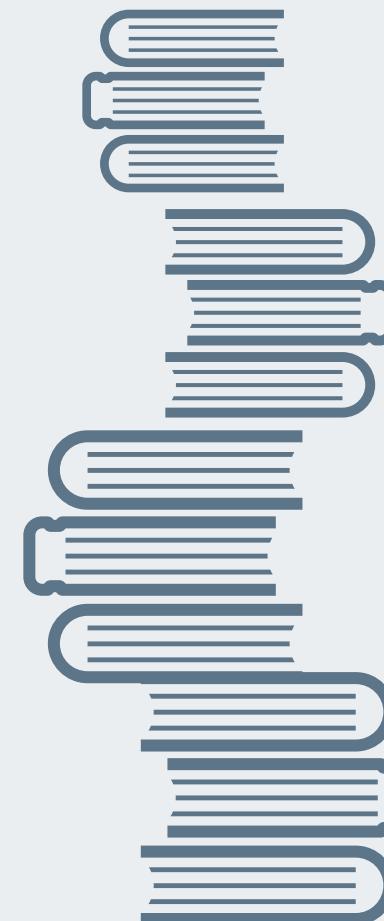
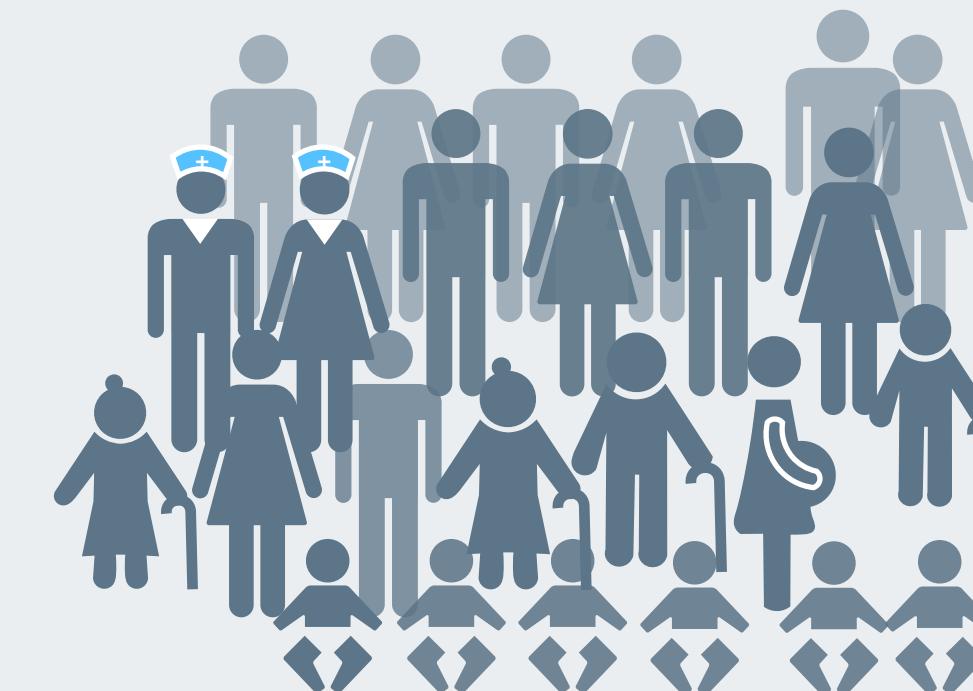


Long-COVID data analysis and
clinical algorithms

Systematic review
and meta-analysis

Impact of COVID on gut microbiome

Collaborator: Dr. med. Elda Righi
University Verona



Scanning of 16S Ribosomal RNA for PNA
Targets

Supervised by: Prof. Joanna Trylska, University of Warsaw,
Collaborator: Prof. Andrew Mc Cammon, UCSD San Diego

Assembly and comparison of genomes of the hospital acquired
MRSA strains: continuation of the **SATURN** project.
Collaborator: Prof. Dr. med. Surbhi Malhotra-Kumar, University of Antwerp

Phageome and its role in emergence
of the antibiotics resistance.

Collaborator: Dr. med. Silke Peter,
Universitätsklinikum Tübingen

TüBiom Projekt. Microbiome profiles
of participants taking antibiotics.

Impact of antibiotics on probability of MRSA/ESBL
acquisition: Data mining model for **SATURN** project.
Collaborator: Prof. Dr. med. Evelina Tacconelli, Universitätsklinikum
Tübingen

EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

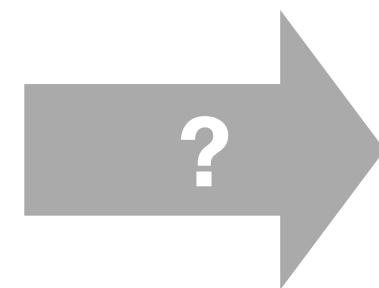




I'd like to:

To very briefly introduce to an idea of the **systematic review** and **meta-analysis**, its **implementation**, show you an **example** and to discuss its application to the **bioinformatics problems**.





(actionable) Knowledge, e.g.:

- 1. Best treatment!**
- 2. Second best treatment!**

...

A is better than B treatment if you are a woman!

Drug A works! (OR: ...)



(actionable) Knowledge, e.g.:

- 1. Best treatment!
- 2. Second best treatment!

...

A is better than B treatment if you are a woman!

Drug A works! (OR: ...)



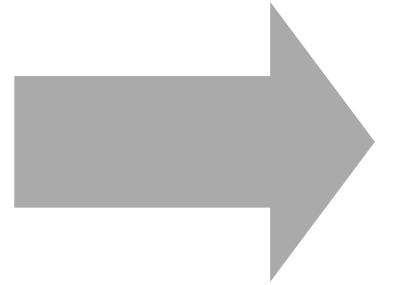
(actionable) Knowledge, e.g.:

1. Best treatment!
2. Second best treatment!

...

A is better than B treatment if you are a woman!

Drug A works! (OR: ...)



Systematic review

+

Meta-analysis

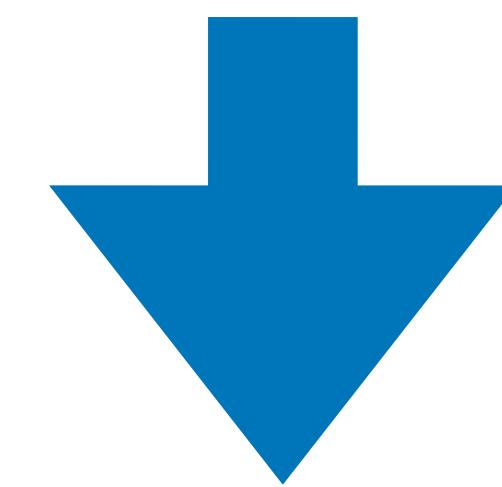
Systematic review



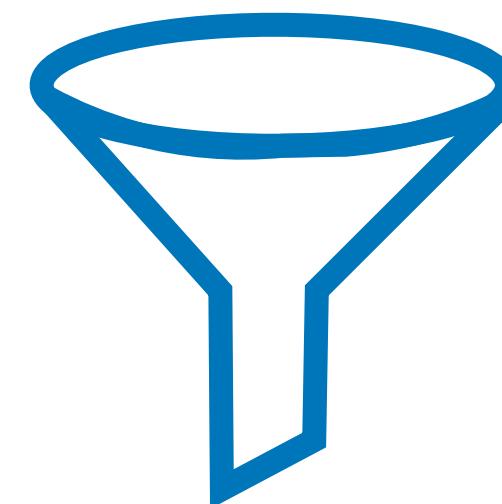
question



search



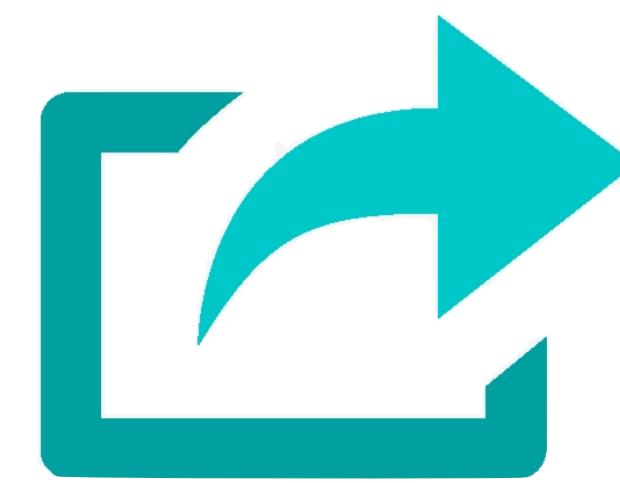
download



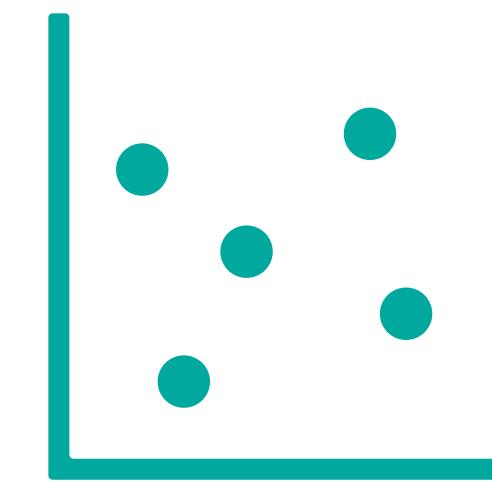
filter

+

Meta-analysis



extract



analyse



Question: Define the PICO

Population description: Age / Health status

Intervention: Diagnostic test / Medication / Procedure

Comparison: Another intervention

Outcome: Accurate diagnosis / Improvement



Search: sources



White and (?) grey literature

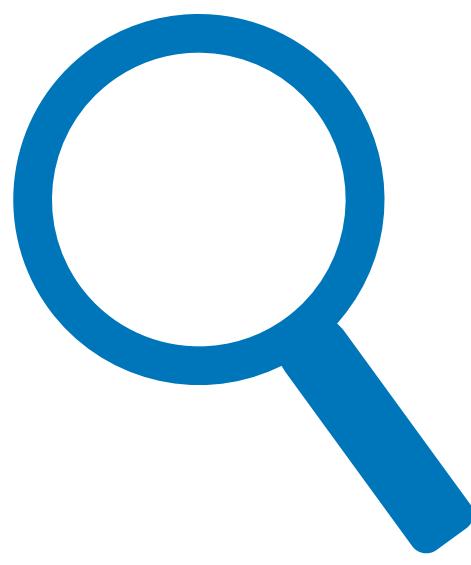


WEB OF SCIENCE™



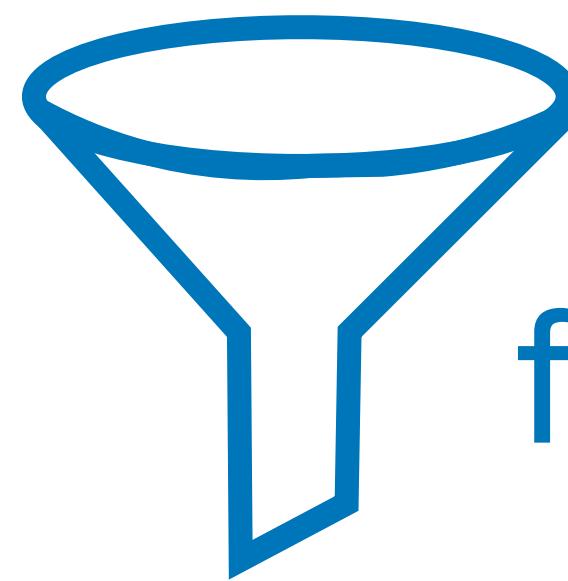
Search: search strategy

```
"(\"Respiratory Tract Infections\"[Mesh] OR (respiratory infection*) OR (acute respiratory illness*) OR \"pneumonia\"[Mesh] OR pneumonia OR (lung infection*) OR (lung abscess*) OR (pulmonary infection*) OR (pulmonary abscess*) OR bronchiolitis OR (acute bronchitis) OR influenza OR \"influenza, human\"[Mesh] OR \"Pharyngitis\"[Mesh] OR pharyngitis OR \"Tonsillitis\"[Mesh] OR tonsillitis OR \"Peritonsillar abscess\"[Mesh] OR (pharyngeal abscess*) OR (tonsillar abscess*)) AND (\\"Community-Acquired Infections\"[Mesh] OR outpatient* OR (community acquired) OR CAP OR (community onset) OR (long term facilit*) OR (nursing home*) OR (residential home) OR (rehabilitation facilit*) OR (rehabilitation centre*) OR (rehabilitation center*) OR veteran OR \"child\"[MeSH Terms] OR \"adolescent\"[MeSH Terms] OR paediatric* [All fields] OR pediatric* [All fields] OR \"pediatrics\" [MeSH term] OR children OR \"Ambulatory Care\"[Mesh] OR \"Family Practice\"[Mesh] OR general practice OR GP OR \"Physicians, Family\"[Mesh] OR \"Primary Health Care\"[Mesh] OR \"Emergency Service, Hospital\"[Mesh] OR (primary care*) OR (general practi*) OR GP OR (family doctor*) OR (emergency room*) OR ER OR (emergency unit*) OR (emergency department*)) AND (\\"sensitivity and specificity\"[Mesh] OR (sensitivity specificity) OR \"predictive value of tests\"[Mesh] OR (predictive value) OR \"reproducibility of results\"[Mesh] OR (diagnostic test) OR (diagnostic tests)) ....
```



Search: results





filter based on abstract

PMID	title	authors	year	journal	abstract	language	new_ref	if_full_text	source	ACCEPTED	REJECTON CODE	LMIC	Area	Type of Index test	If other specific (RC)		
3277800	Seroepidemiological study of Legionella infection in Denmark. A 28-month retrospective survey.	Heltberg I., Jepsen OB., Larsen SO., Lind K.	1988	Danish medical bulletin	An indirect immunofluorescence (IF) test for Legionella antibodies has been used since 1978 at Statens Serum Institut, Copenhagen. An increasing annual number of blood specimens from all parts of the country has been tested by IF and the number of Legionella antigens in the test was increased from 4 over 10 to 13, resulting in an ever growing number of seropositive patients over the years. We investigated the occurrence of serologically diagnosed Legionella infections from November 1982 through February 1985, a period of 28 months during which the same 13 Legionella antigens were applied in the IF test. We used CDC's criteria for the serological diagnosis of a current Legionella infection: a greater than or equal to 4-fold rise in antibody titre to greater than or equal to 128 in the IF test. In a test of more than 5,000 blood specimens from 3,374 patients, 69 were found to have diagnostic titre rises. When analysed according to serological reactions with three groups of antigens, seroconversion to a <i>L. pneumophila</i> antigen was found to be more frequent in patients 30-59 years old than seroconversion to a non- <i>L. pneumophila</i> Legionella antigen, while in the age group 60-69 this relation was reversed. Thirteen of the 69 patients had acquired their infection abroad. Twelve of these were below the age of 60, and they had all seroconverted to a <i>L. pneumophila</i> antigen. Clinical data were in accordance with the assumption that Legionella may have been the aetiological agent of the disease in our patients selected by serological criteria (ABSTRACT TRUNCATED AT 250 WORDS)	eng	No references in the database	FALSE	PUBMED	0	Not diagnostic accuracy study						
2902556	Serologic diagnosis of whooping cough by enzyme-linked immunosorbent assay.	Conway SP., Balfour AH., Ross H.	1988	The Pediatric infectious disease journal	Pernasal swabs were obtained on 3 consecutive days from 146 children referred for hospital admission with suspected whooping cough, and immunoglobulin A and immunoglobulin M antibodies to <i>Bordetella pertussis</i> were measured by enzyme-linked immunosorbent assay. The clinical features in 113 of the children were considered consistent with the diagnosis. Sixty-four cases were confirmed by serology, which showed a greater sensitivity (57% vs 35%) than pernasal swab culture with no loss of specificity (100%). Paired serum samples were necessary for diagnosis in 30 (47%) of these 64 cases. Seventeen (43%) of 40 cases confirmed by pernasal swab culture had negative serologic results. Most of these were young infants who showed a less reliable antibody response. Detection of antibodies to <i>B. pertussis</i> by enzyme-linked immunosorbent assay can be a valuable additional test in the differential diagnosis of whooping cough but is not appropriate as the sole diagnostic test.	eng	No references in the database	FALSE	PUBMED	1		Laboratory		Antigen detection technique			





Example: Value-DX DTA meta-analysis

Pneumonia:



Or



?

Systematic review

Diagnostic accuracy of point-of-care tests in acute community-acquired lower respiratory tract infections. A systematic review and meta-analysis

Elisa Gentilotti ^{1,*}, Pasquale De Nardo ^{1,*}, Eleonora Cremonini ^{1,*}, Anna Górska ¹,
Fulvia Mazzaferrri ¹, Lorenzo Maria Canziani ^{2,3}, Mona Mustafa Hellou ⁴,
Yudith Olchowski ⁴, Itamar Poran ⁵, Mariska Leeflang ⁶, Jorge Villacian ⁷,
Herman Goossens ⁸, Mical Paul ⁴, Evelina Tacconelli ^{1,*}

¹⁾ Division of Infectious Diseases, Department of Diagnostics and Public Health, University of Verona, Italy

²⁾ Department of Biomedical Sciences, Humanitas University, Rozzano, Italy

³⁾ Department of Internal Medicine, Humanitas Clinical and Research Center IRCCS, Rozzano, Italy

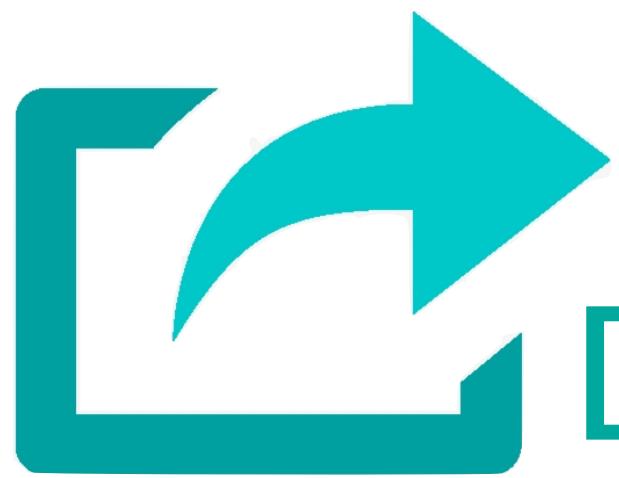
⁴⁾ Infectious Diseases Institute, Rambam Health Care Campus, Haifa, Israel

⁵⁾ Medicine E, Rabin Medical Centre, Beilinson Hospital, Petah-Tikva, Israel

⁶⁾ Department of Epidemiology and Data Science, Amsterdam Public Health, Amsterdam University Medical Centres, University of Amsterdam, Amsterdam, Netherlands

⁷⁾ Janssen Diagnostics BVBA, Beerse, Belgium

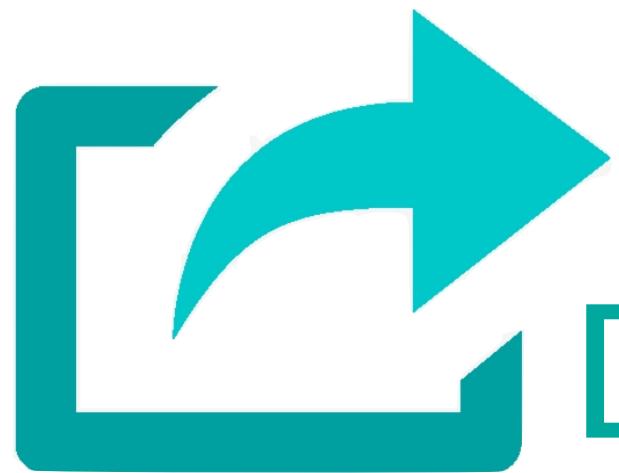
⁸⁾ Laboratory of Medical Microbiology, Vaccine and Infectious Diseases Institute, University of Antwerp, Antwerp, Belgium



Data extraction

**Elisa Gentilotti
Eleonora Cremonini
Pasquale De Nardo**

~ 1 year of work

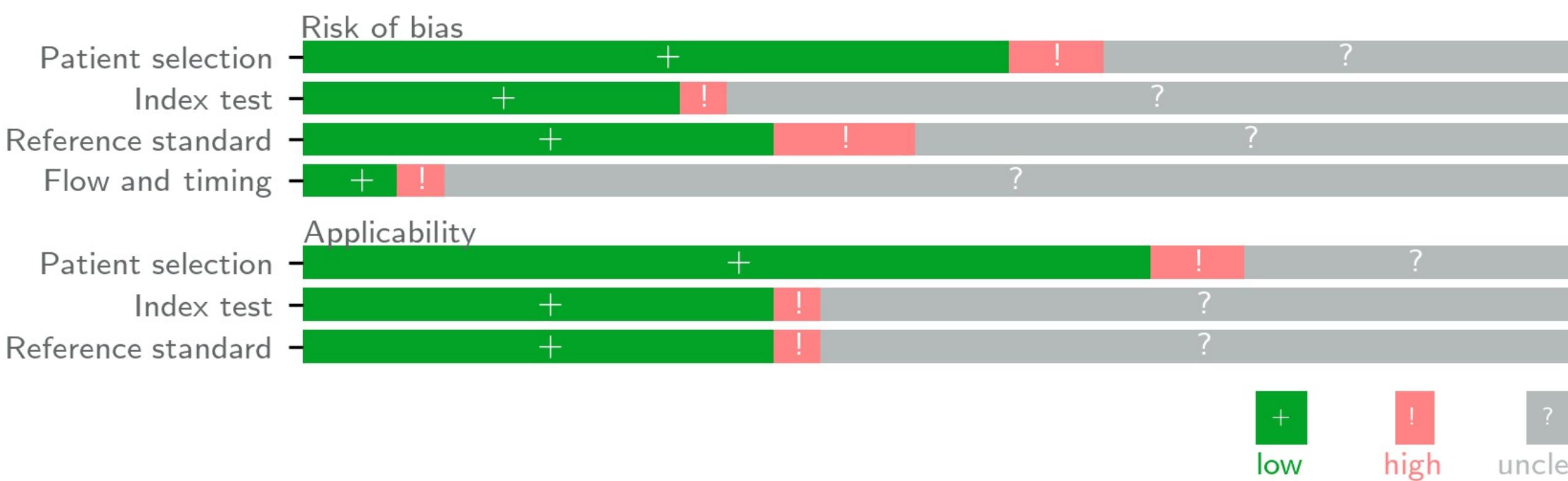


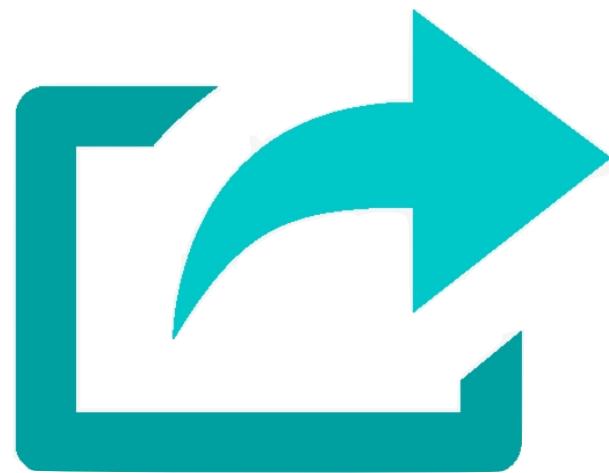
Data extraction: quality control

	Risk of bias			Applicability		
	Patient selection	Index test	Reference standard	Patient selection	Index test	Reference standard
Ahn S (2011)	?	?	?	?	?	?
Berg AS (2017)	?	?	+	?	?	+
Canavaggio P (2017)	?	+	+	?	?	+
Dai XQ (2012)	?	+	!	?	+	!
Erdman LK (2015)	+	?	+	+	?	+
Flanders SA (2004)	+	+	?	?	+	?
Gauchan E (2016)	?	?	!	+	?	?
Graffelman AW (2004)	?	+	+	?	+	+
Holm A (2007)	+	+	+	?	+	+

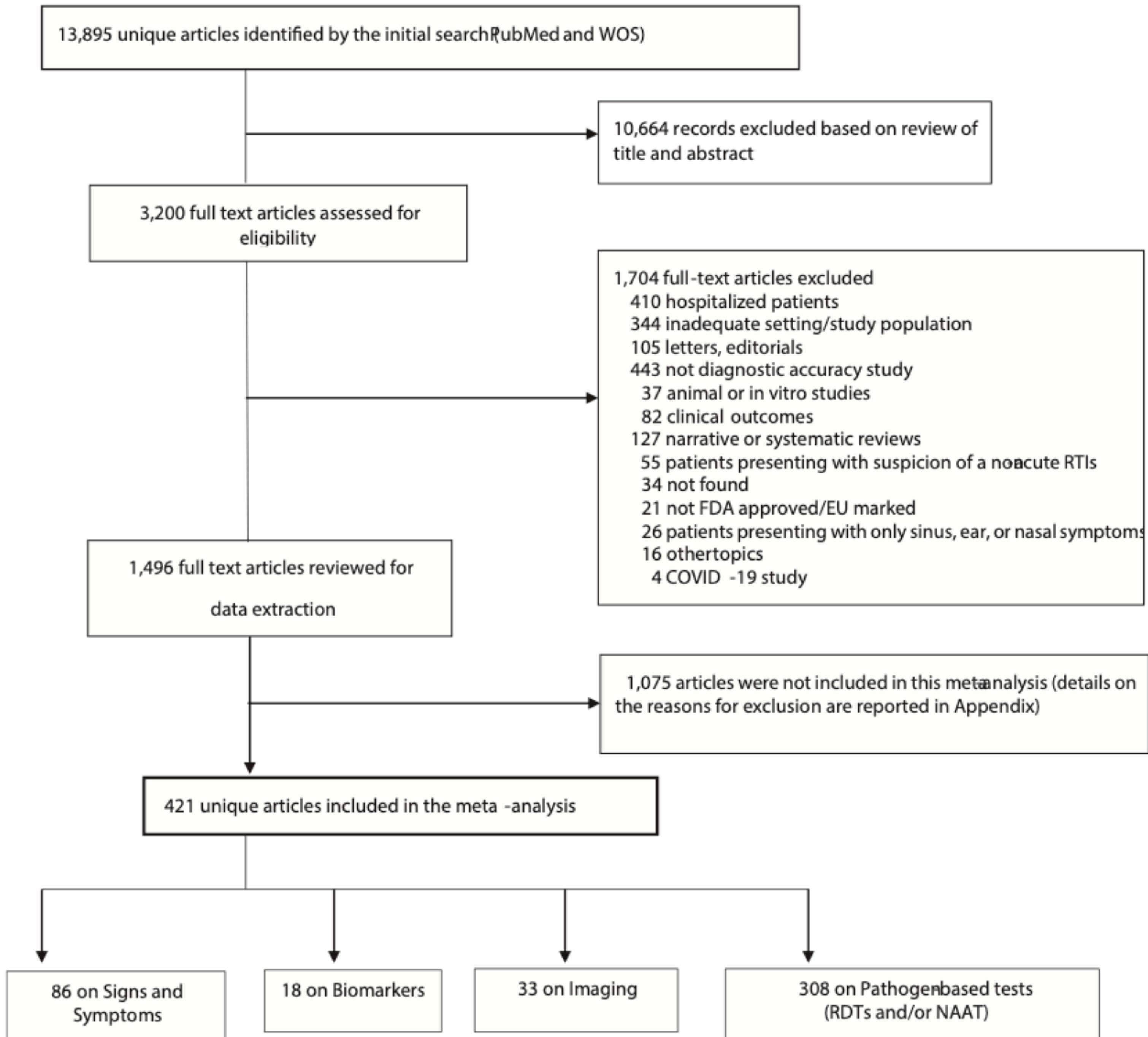
	Risk of bias			Applicability		
	Patient selection	Index test	Reference standard	Patient selection	Index test	Reference standard
Hopstaken RM (2005)	+	?	?	!	+	?
Hopstaken RM (2009)	+	?	?	?	+	?
Huang SY (2014)	+	?	?	?	+	?
Indavarapu A (2011)	+	?	?	?	+	?
Koster MJ (2013)	+	?	+	?	+	?
Le Bel J (2015)	+	?	+	?	+	?
Masiá M (2007)	!	?	?	?	+	?
Melbye H (1988)	+	?	?	?	+	?
Müller B (2007)	+	+	+	?	+	+

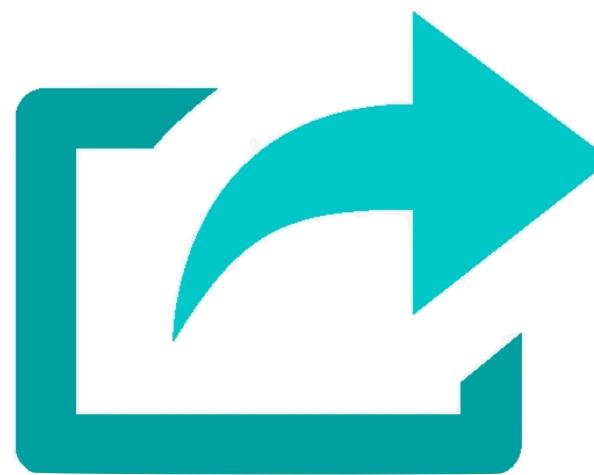
	Risk of bias			Applicability		
	Patient selection	Index test	Reference standard	Patient selection	Index test	Reference standard
Nazerian P (2016)	+	+	?	?	+	?
Phungoen P (2011)	?	?	+	?	?	+
Rainer TH (2009)	+	?	?	?	+	?
Ruiz-González A (2000)	?	?	?	?	!	+
Shah S (2010)	!	!	?	?	!	!
Shin DH (2011)	?	?	+	?	?	+
Sim JK (2016)	?	?	?	?	?	?
Steurer J (2011)	+	?	?	?	+	?
Van Vugt SF (2013)	+	+	!	?	+	?



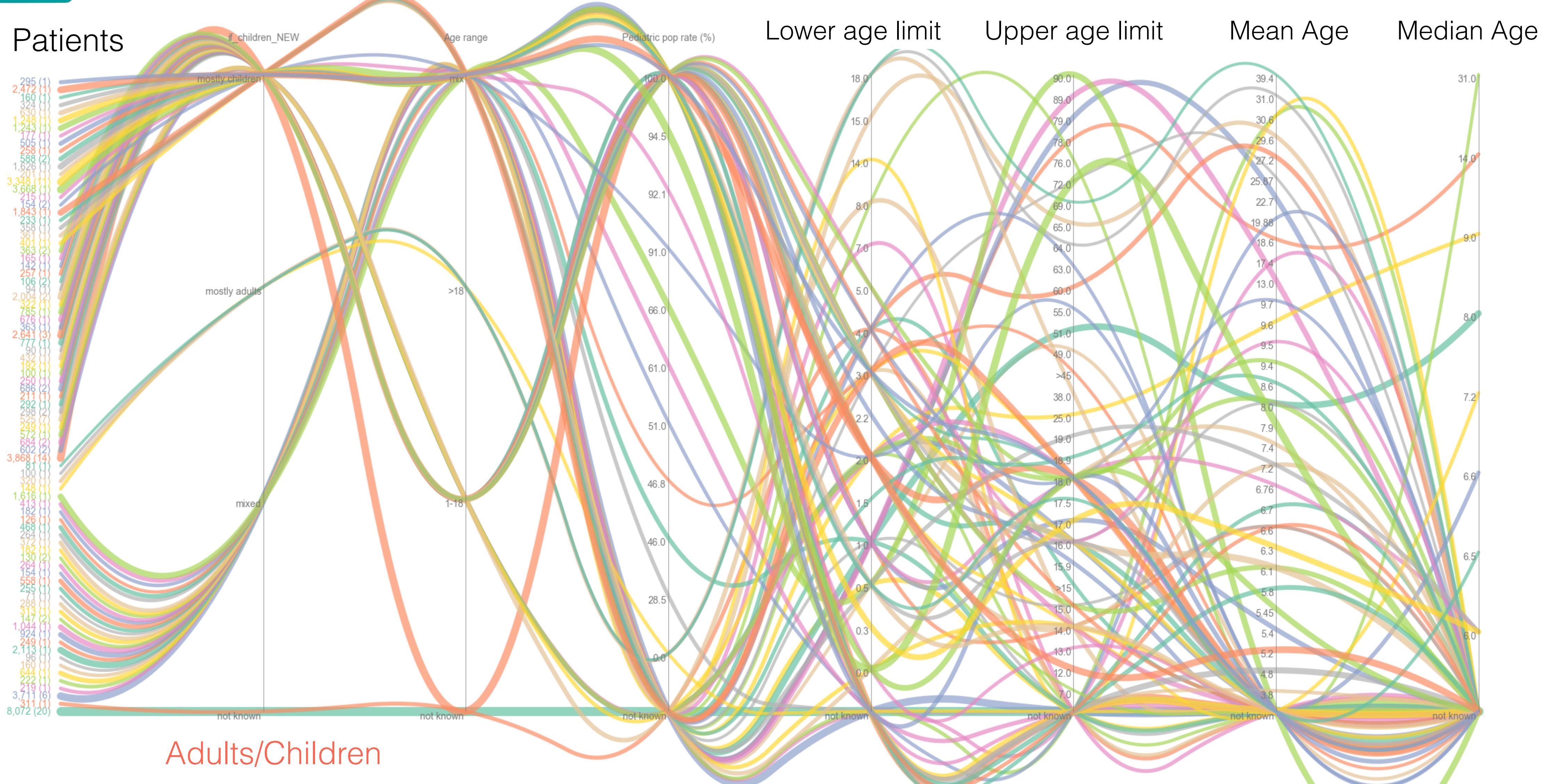


Data extraction: PRIMSA





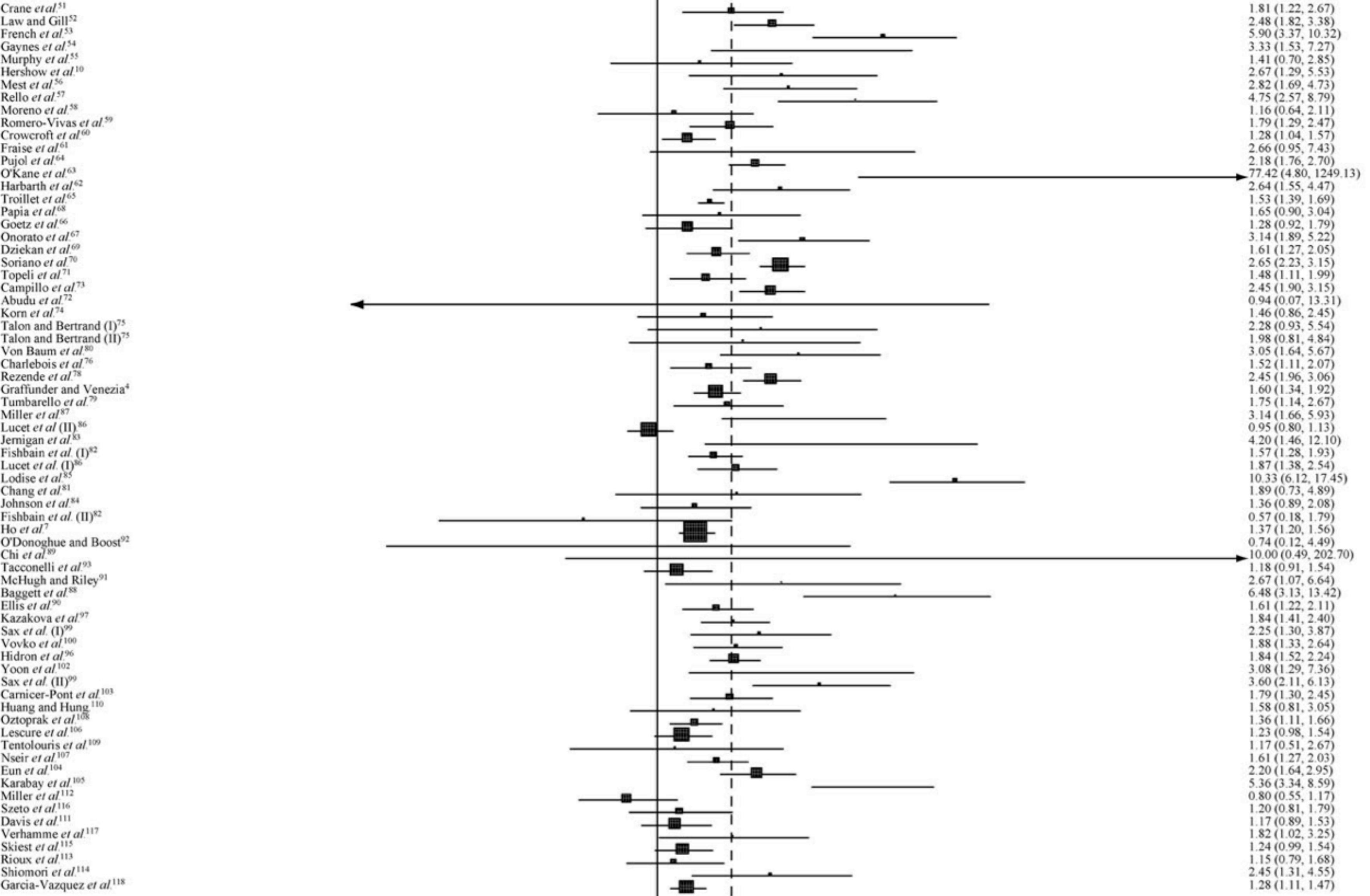
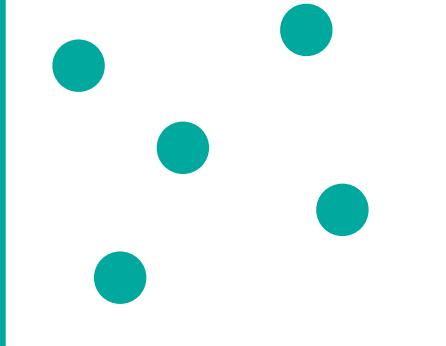
Data extraction: further analysis



Meta-analysis: forest plot

Does antibiotic exposure increase the risk of methicillin-resistant *Staphylococcus aureus* (MRSA) isolation?
A systematic review and meta-analysis

Evelina Tacconelli*, Giulia De Angelis, Maria A. Cataldo, Emanuela Pozzi and Roberto Cauda



(risk ratio)

0.1

1

5

10

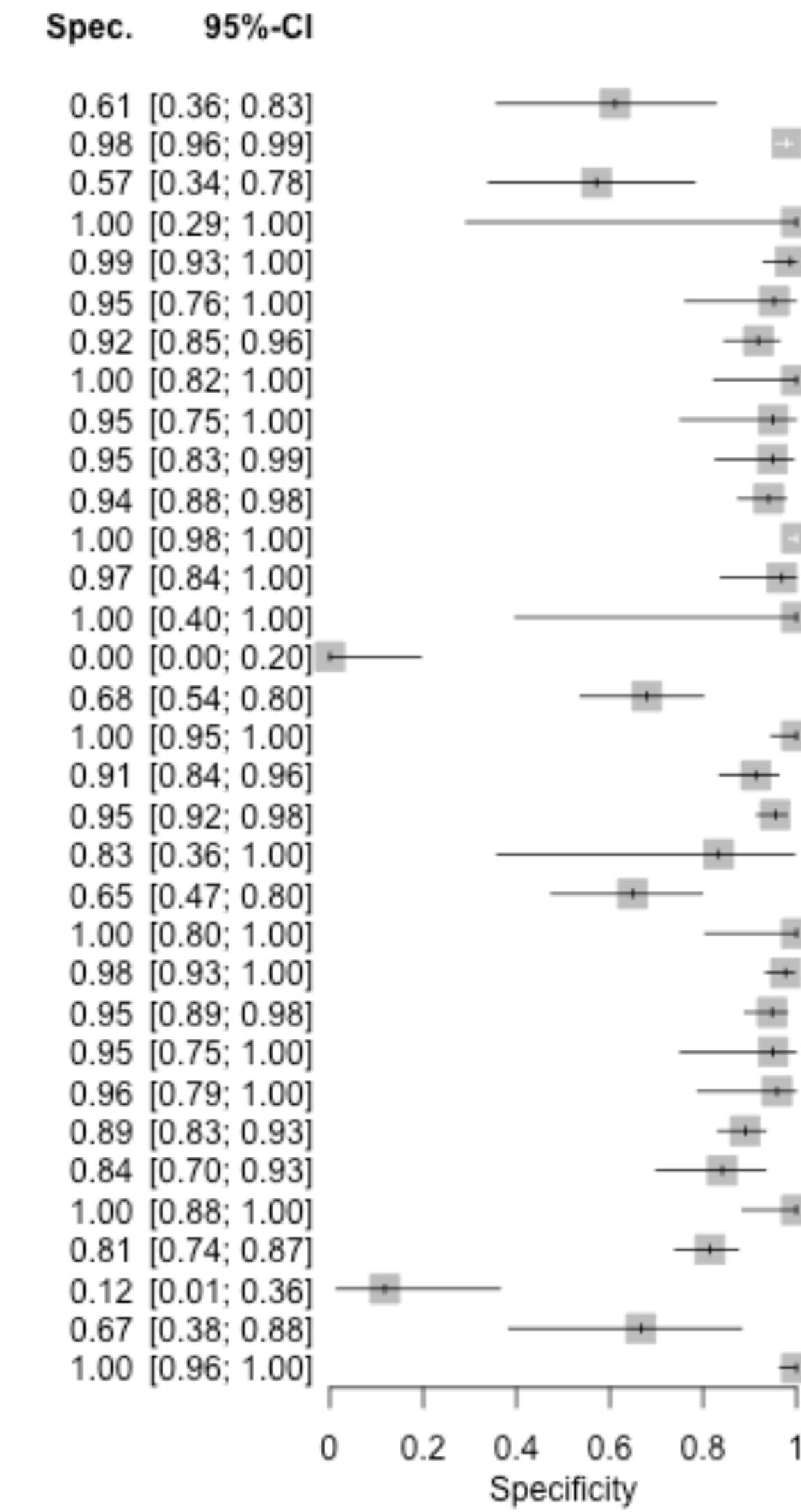
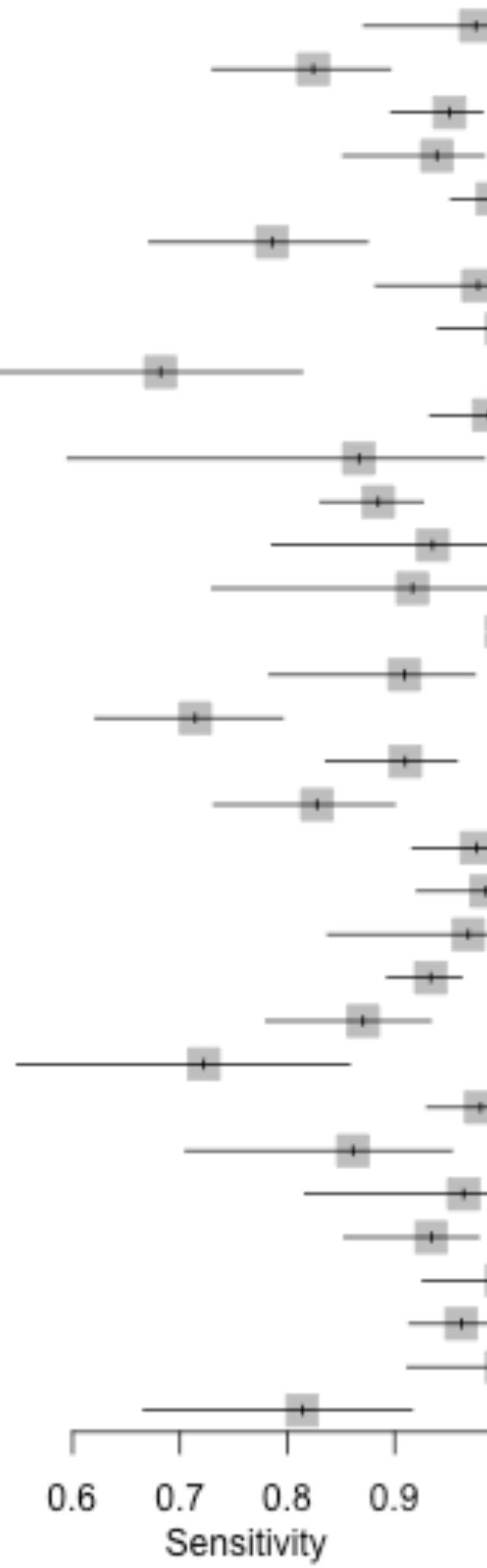
100

RR

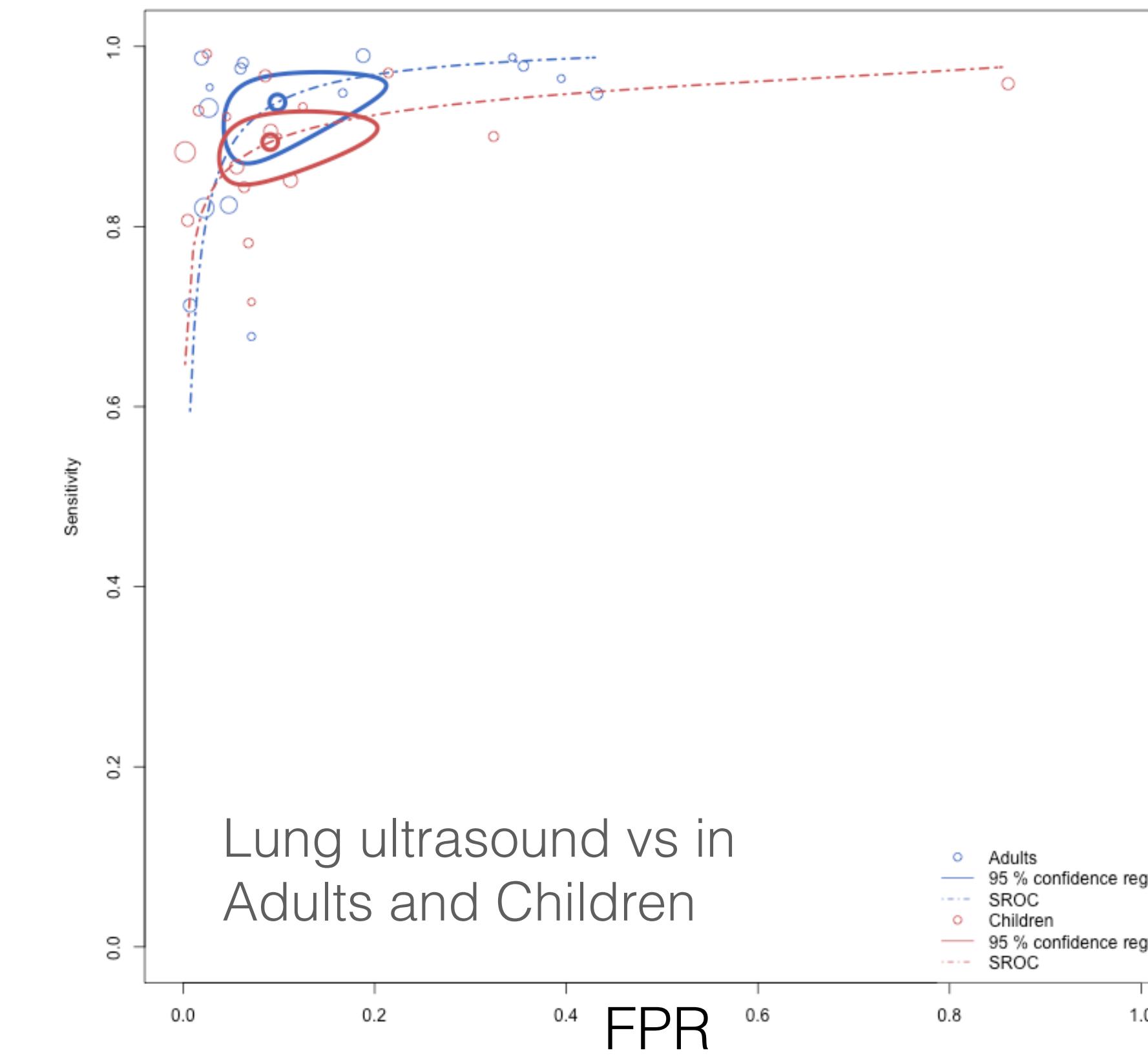
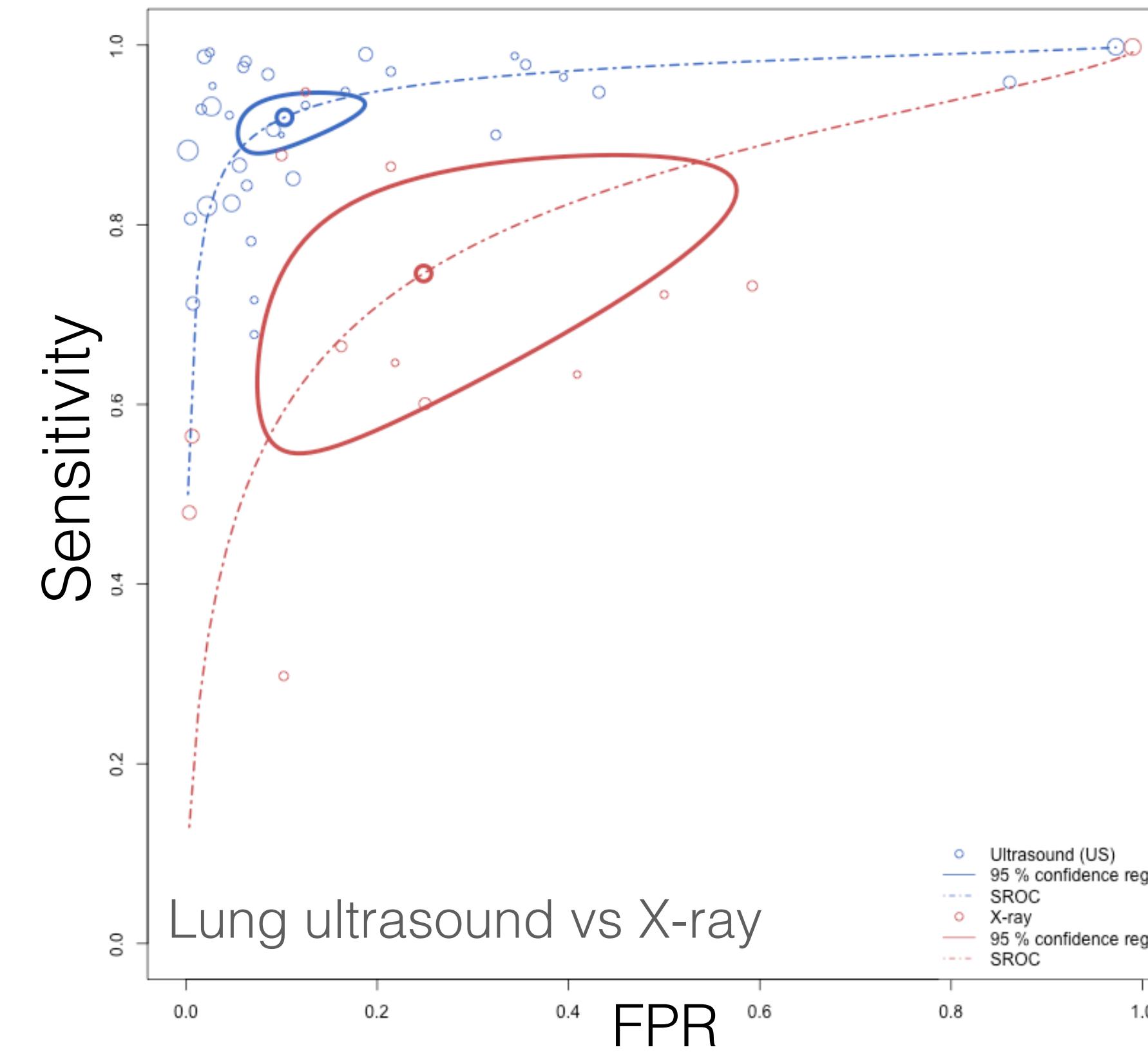
Figure 2. RR associated with antibiotic use for MRSA infection or colonization.

Meta-analysis: forest plot

Test	TP	FP	TN	FN	Sens.	95%-CI
Ultrasound (US)	40	7	11	1	0.98	[0.87; 1.00]
Ultrasound (US)	75	6	286	16	0.82	[0.73; 0.90]
Ultrasound (US)	117	9	12	6	0.95	[0.90; 0.98]
Ultrasound (US)	62	0	3	4	0.94	[0.85; 0.98]
Ultrasound (US)	114	1	76	1	0.99	[0.95; 1.00]
Ultrasound (US)	55	1	20	15	0.79	[0.67; 0.87]
Ultrasound (US)	44	8	90	1	0.98	[0.88; 1.00]
Ultrasound (US)	60	0	19	0	1.00	[0.94; 1.00]
Ultrasound (US)	30	1	19	14	0.68	[0.52; 0.81]
Ultrasound (US)	80	2	37	1	0.99	[0.93; 1.00]
Ultrasound (US)	13	6	95	2	0.87	[0.60; 0.98]
Ultrasound (US)	169	0	230	22	0.88	[0.83; 0.93]
Ultrasound (US)	29	1	31	2	0.94	[0.79; 0.99]
Ultrasound (US)	22	0	4	2	0.92	[0.73; 0.99]
Ultrasound (US)	263	17	0	0	1.00	[0.99; 1.00]
Ultrasound (US)	40	17	36	4	0.91	[0.78; 0.97]
Ultrasound (US)	80	0	67	32	0.71	[0.62; 0.80]
Ultrasound (US)	91	8	84	9	0.91	[0.84; 0.96]
Ultrasound (US)	72	9	189	15	0.83	[0.73; 0.90]
Ultrasound (US)	82	1	5	2	0.98	[0.92; 1.00]
Ultrasound (US)	67	13	24	1	0.99	[0.92; 1.00]
Ultrasound (US)	31	0	17	1	0.97	[0.84; 1.00]
Ultrasound (US)	211	3	127	15	0.93	[0.89; 0.96]
Ultrasound (US)	74	6	109	11	0.87	[0.78; 0.93]
Ultrasound (US)	26	1	19	10	0.72	[0.55; 0.86]
Ultrasound (US)	99	1	23	2	0.98	[0.93; 1.00]
Ultrasound (US)	31	18	146	5	0.86	[0.71; 0.95]
Ultrasound (US)	27	7	37	1	0.96	[0.82; 1.00]
Ultrasound (US)	71	0	30	5	0.93	[0.85; 0.98]
Ultrasound (US)	48	26	114	0	1.00	[0.93; 1.00]
s Ultrasound (US)	127	15	2	5	0.96	[0.91; 0.99]
s Ultrasound (US)	40	5	10	0	1.00	[0.91; 1.00]
s Ultrasound (US)	35	0	102	8	0.81	[0.67; 0.92]



Meta-analysis: Diagnostic Test Accuracy



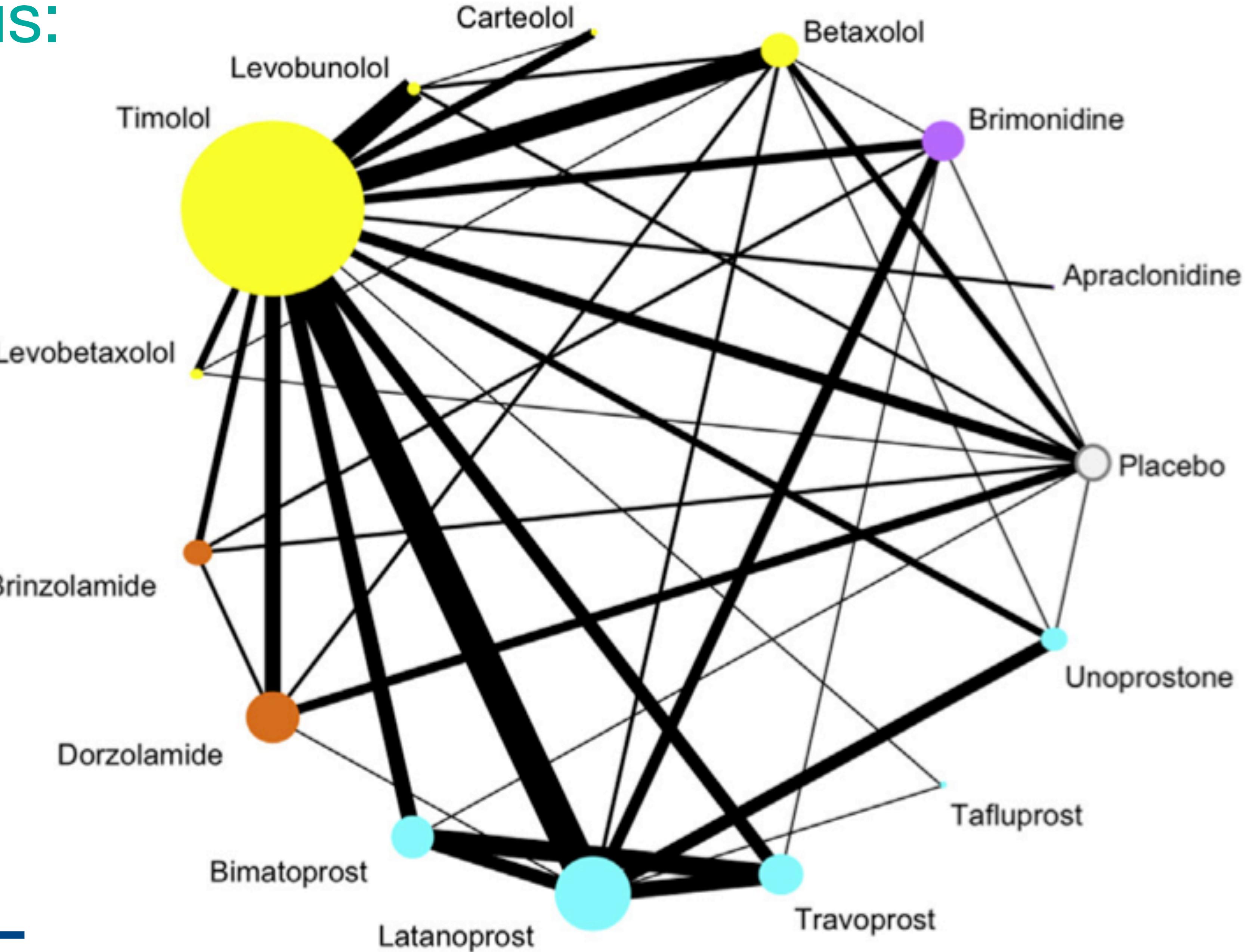
	OVERALL ACCURACY		POPULATION		SETTING		WHO REGION	
	Sen (95%CI)	Spec (95%CI)	Sen (95%CI)	Spec (95%CI)	Sens (95%CI)	Spec (95%CI)	Sens (95%CI)	Spec (95%CI)
Imaging (n. studies, population)								
LUS 24 (3,571)	90 (85-93)	90 (81-95)	Ch: 89 (83-93) Ad: 91 (82-96)	Ch: 90 (74-97) Ad: 91 (77-97)	ED: 89 (84-93)	ED: 89 (78-94)	EURO: 91 (86-95)	EURO: 90 (78-96)
Chest X-ray 7 (638)	68 (46-84)	67 (43-84)	--	--	ED: 73 (56-84)	ED: 64 (42-82)	EURO: 67 (41-86)	EURO: 70 (45-88)

• Meta-analysis: • Network

Comparative Effectiveness of First-Line Medications for Primary Open-Angle Glaucoma

A Systematic Review and Network Meta-analysis

Tianjing Li, MD, PhD,¹ Kristina Lindsley, MS,¹ Benjamin Rouse, MHS,² Hwanhee Hong, PhD,³
Qiyuan Shi, MHS,² David S. Friedman, MD, PhD,⁴ Richard Wormald, FRCOphth,⁵ Kay Dickersin, MA, PhD¹





Senior Editors: Julian Higgins¹, James Thomas²

Associate Editors: Jacqueline Chandler³, Miranda Cumpston^{4,5}, Tianjing Li⁶, Matthew Page⁴, Vivian Welch⁷

Part 1: About Cochrane Reviews

- I. [Introduction](#)
- II. [Planning a Cochrane Review](#)
- III. [Reporting the review](#)
- IV. [Updating the review](#)
- V. [Overviews of Reviews](#)

Part 2: Core methods

- 1. [Starting a review](#)
- 2. [Determining the scope and questions](#)
- 3. [Inclusion criteria & grouping for synthesis](#)
- 4. [Searching & selecting studies](#)
- 5. [Collecting data](#)
- 6. [Effect measures](#)
- 7. [Bias and conflicts of interest](#)
- 8. [Risk of bias in randomized trials](#)
- 9. [Preparing for synthesis](#)
- 10. [Meta-analyses](#)
- 11. [Network meta-analyses](#)
- 12. [Synthesis using other methods](#)
- 13. [Bias due to missing results](#)
- 14. [‘Summary of findings’ tables & GRADE](#)
- 15. [Interpreting results](#)



Cochrane is an international network with headquarters in the UK, a registered **not-for-profit organization**, and a member of the UK **National Council for Voluntary Organizations**.

Cochrane Reviews 55 **Cochrane Protocols 17** **Trials 10806** **Editorials 7** **Special Collections 9** **Clinical Answers 41** **More ▾**

55 Cochrane Reviews matching Covid-19 in Title Abstract Keyword

Cochrane Database of Systematic Reviews
Issue 7 of 12, July 2022

[Select all \(55\)](#) [Export selected citation\(s\)](#) [Show all previews](#)

Order by [Relevancy ▾](#) Results per page [25 ▾](#)

1 **Remdesivir for the treatment of COVID-19**
Kelly Ansems, Felicitas Grundeis, Karolina Dahms, Agata Mikolajewska, Volker Thieme, Vanessa Piechotta, Maria-Inti Metzendorf, Miriam Stegemann, Carina Benstoem, Falk Fichtner
Intervention Review 5 August 2021 Free access
[Show PICOs ▾](#) [Show preview ▾](#)

2 **Routine laboratory testing to determine if a patient has COVID-19**
Inge Stegeman, Eleanor A Ochodo, Fatuma Guleid, Gea A. Holtman, Bada Yang, Clare Davenport, Jonathan J Deeks, Jacqueline Dinnes, Sabine Dittrich, Devy Emperador, Lotty Hooft, René Spijker, Yemisi Takwoingi, Ann Van den Brueel, Junfeng Wang, Miranda Langendam, Jan Y Verbakel, Mariska MG Leeflang, Cochrane COVID-19 Diagnostic Test Accuracy Group
Diagnostic Review 19 November 2020 Open access
[Show preview ▾](#)

3 **Colchicine for the treatment of COVID-19**
Agata Mikolajewska, Anna-Lena Fischer, Vanessa Piechotta, Anika Mueller, Maria-Inti Metzendorf, Marie Becker, Elena Dorando, Rafael L Pacheco, Ana Luiza C Martimbianco, Rachel Riera, Nicole Skoetz, Miriam Stegemann
[Show preview ▾](#)

<https://www.cochranelibrary.com>

Living meta- analysis

<https://www.finddx.org>

FILTERS

TOTAL TESTS: 1939

Reset Filters

Manufacturer

Nothing selected ▾

Region

Nothing selected ▾

Country

Nothing selected ▾

Type of technology

Nothing selected ▾

Self-testing/self-collection

Nothing selected ▾

Assay target

Nothing selected ▾

Test format

Nothing selected ▾

Target analyte

Nothing selected ▾

Validated sample types

Nothing selected ▾

Instrument requirement

Nothing selected ▾

Level of automation

Nothing selected ▾

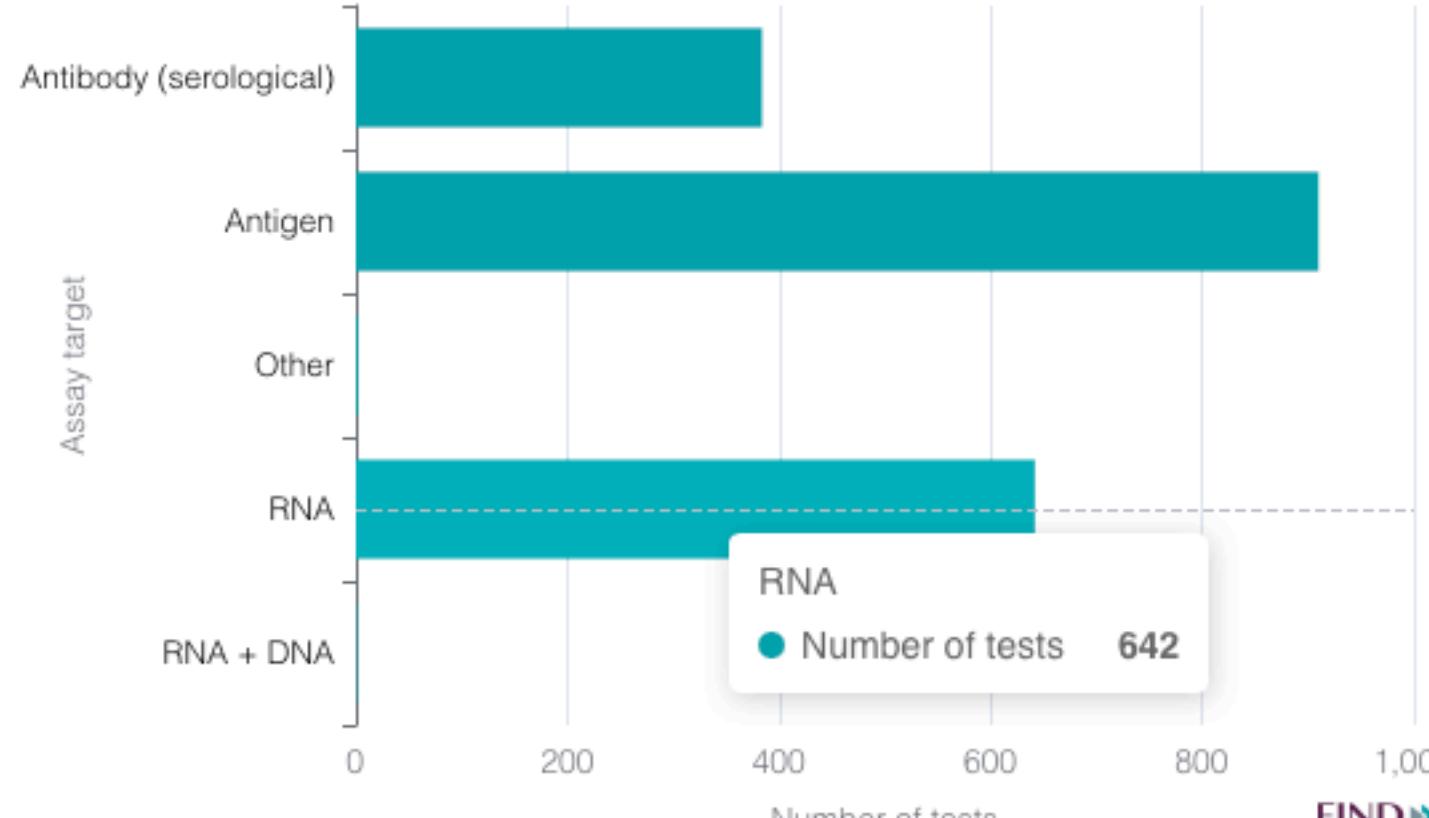
Laboratory/point-of-care

Overview

Impact of SARS-CoV-2 variants

List of tests

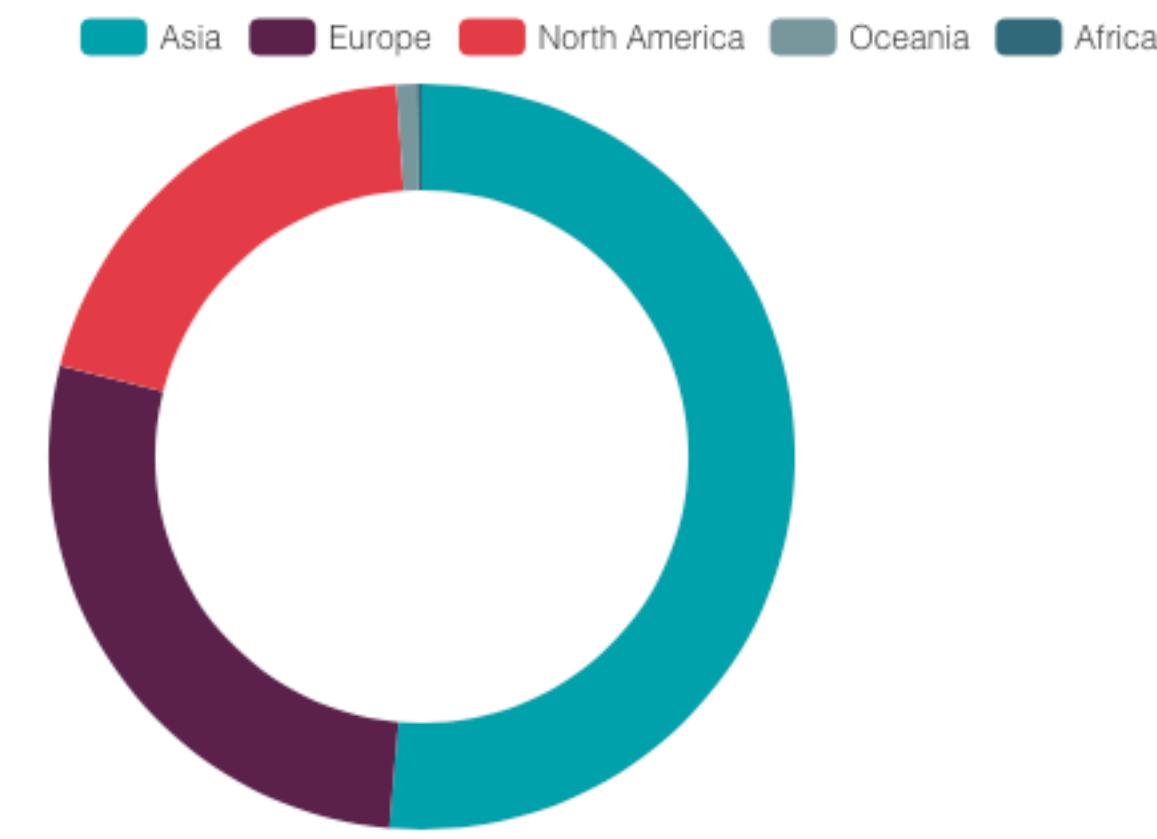
Assay target



FIND ➤
Diagnosis for all

Source: <https://www.finddx.org/test-directory>

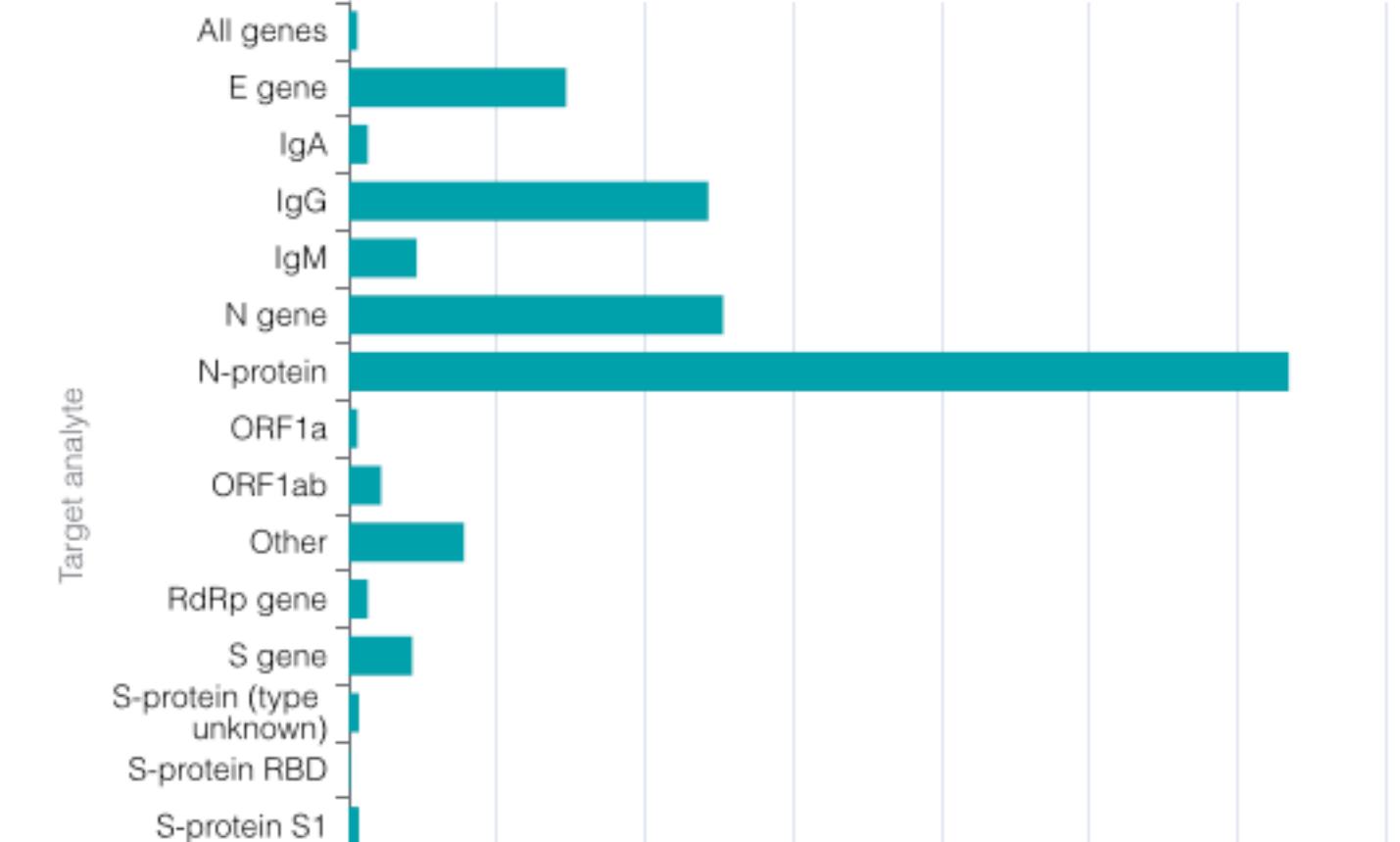
Manufacturer region



FIND ➤
Diagnosis for all

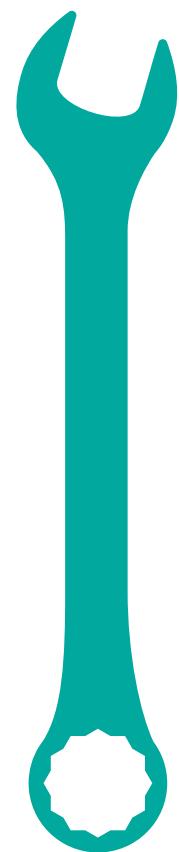
Source: <https://www.finddx.org/test-directory>

Target analyte



Validated sample types





Tools: RevMan

<https://revman.cochrane.org>

Cochrane RevMan [Practice] Caffeine for daytime drowsiness AG My reviews Practice reviews Help Log out Context

Default view Full text Add Review note Add Review title note

Dashboard

Status

Review type: Intervention review
Advanced features: None enabled

Actions

- Tag current version
- Make global edits
- Enable advanced features

Validation

Errors: 28

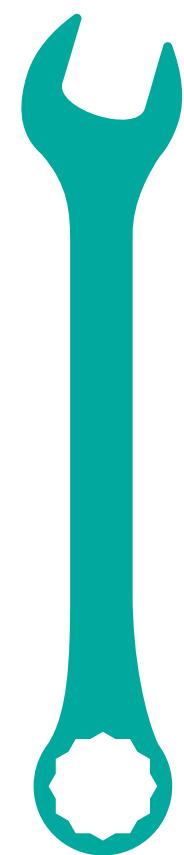
Warnings: 14

[View the list of validation rules here.](#)

History

Version	Version create...	Date	Description
current	Anna Gorska	Jul 07, 2022 10:07	Current version
1.0	Anna Gorska	Jul 07, 2022 10:07	Initial version

Revert View Compare to...



Tools: Rayyan

<https://www.rayyan.ai>

Possible Duplicates

Unresolved	2
Deleted	0
Not duplicates	0
Resolved	0

Inclusion decisions

Undecided	2
Maybe	0
Included	4
Excluded	7
Conflict	1

Decision by

Prof Zbys Fedorowicz
El-Gohary
MA Jan Schoones

Minimum collaborator decisions

At least 1	12
At least 2	4
At least 3	0

Maximum collaborator decisions

At most 0	2
At most 1	10
At most 2	14

Search methods

Uploaded References [2014... 14]

Keywords for include

randomized	9
double blind	6
randomly	6

2014-05-22: TINEA UPDATE Blind OFF

Showing 1 to 8 of 14 unique entries

Search: id or title or abstract or author

Date	Title	Authors	Rating
2013-01-01	Efficacy and safety of terbinafine hyd... S, Choudhary; S, Bisati; A, ...	Zbys m.el-gohary M.el-G please review	
2013-01-01	A comparative randomized open label... S, Thaker; D, Mehta; H, Sha...	Zbys m.el-gohary need to see full text	
2013-01-01	A comparative study... Amit, K.; Navin, B.; Priyamv...	Zbys M.el-G please review wrong drug wrong intervention	
2014-01-01	A randomized, multicenter, double-bl... Kaur, M.; Jarratt, M. T.; Jone...	Zbys m.el-gohary M.el-G please review	
2013-01-01	Comparative evaluation of newer to... Tamil Selvan, A.; Girisha, G....	M.el-G please review need to see full text	
2013-01-01	A comparative study to evaluate effi... Thaker, S. J.; Mehta, D. S.; ...	M.el-G please review need to see full text	

✓ Highlights ON

A comparative study of efficacy of terbinafine and fluconazole in patients of tinea corporis

Objectives: This study aimed to compare the efficacy of terbinafine and fluconazole in the treatment of Tinea corporis. **Material and methods:** Total 116 tinea corporis patients who were not responding to topical antifungal therapy of 2 weeks were selected and they were randomly divided into two groups. Group-I received oral terbinafine (250 mg) daily for 4 weeks. Group-II received oral fluconazole (150 mg) once weekly for 4 weeks. **Evaluation:** Evaluation is done by assessment of target symptoms, i.e., scaling, erythema, and pruritus (as clinical score 0 to 3) and by Clinical response rates at the end of treatment. **Results:** There was a significant decrease in the clinical score beginning from baseline to 4th week in both the groups ($P < 0.05$). If we compare the clinical score of both the groups after 4th week, there is slight more reduction of clinical score in group-I than of group-II ($P > 0.05$). The clinical response rate of group-I at 4th week was 92.86%, whereas Clinical response rate of group-II was 82.00% ($P > 0.05$). **Conclusion:** Both fluconazole and terbinafine are quite effective in the treatment of tinea corporis patients in terms of clinical cure. Terbinafine shows slightly better results than fluconazole ($P > 0.05$). 2013 IJPMBS. All Rights Reserved.

Authors: Amit, K.; Navin, B.; Priyamvada, S.; Monika, S.;

Journal: International Journal of Pharma Medicine and Biological Sciences - Volume 2, Issue 4, pp. 92-8- - published 2013-01-01

Publication Types: Journal Article

Topics: Fluconazole | Tinea

anna.gorska ▾ Help

Tools: R packages

General MetaAnalysis R package (for forest plots etc.)

<https://cran.r-project.org/web/packages/meta/meta.pdf>

Diagnostic test accuracy R package:

<https://cran.r-project.org/web/packages/mada/mada.pdf>

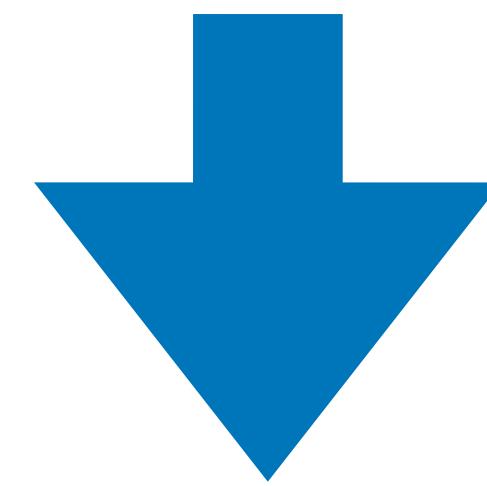
Automatisation?



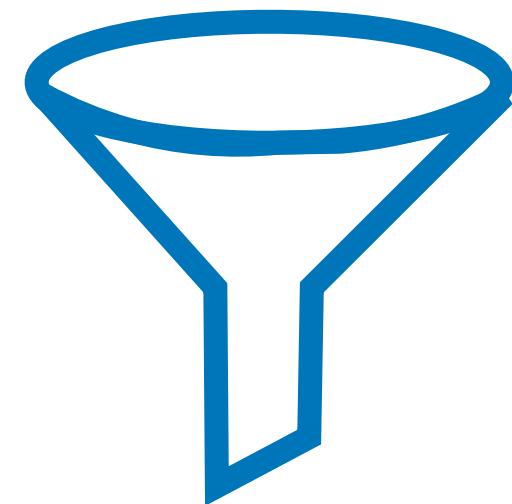
question



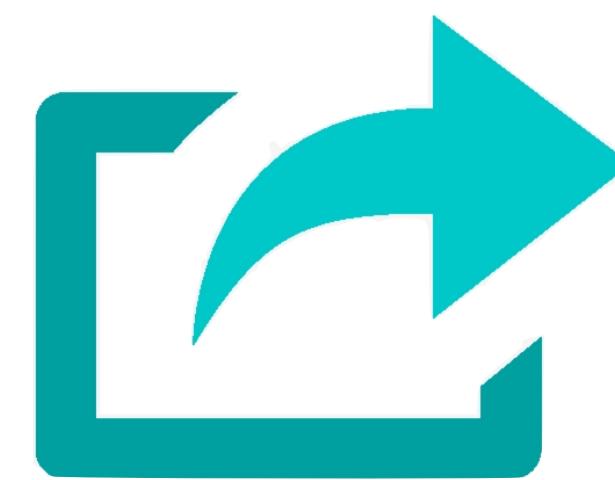
search



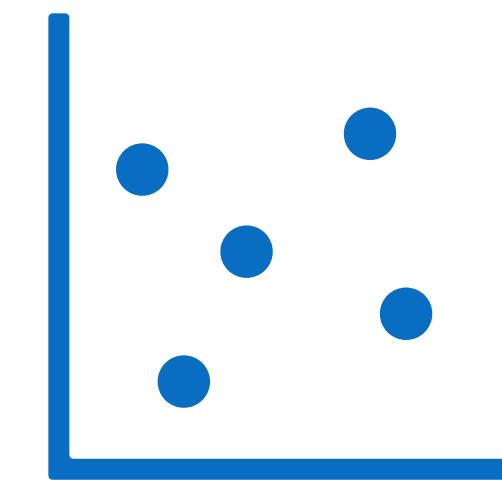
download



filter



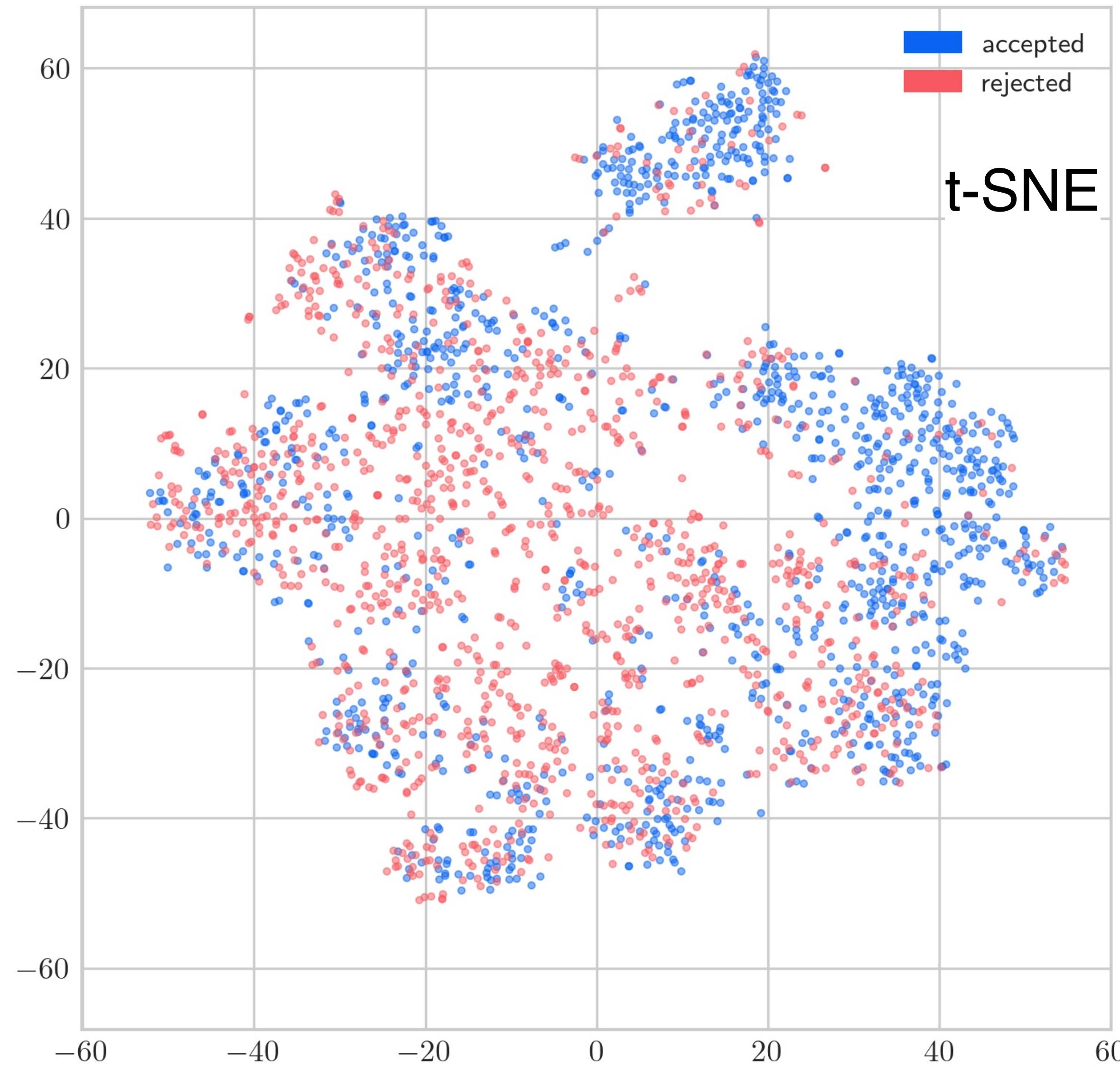
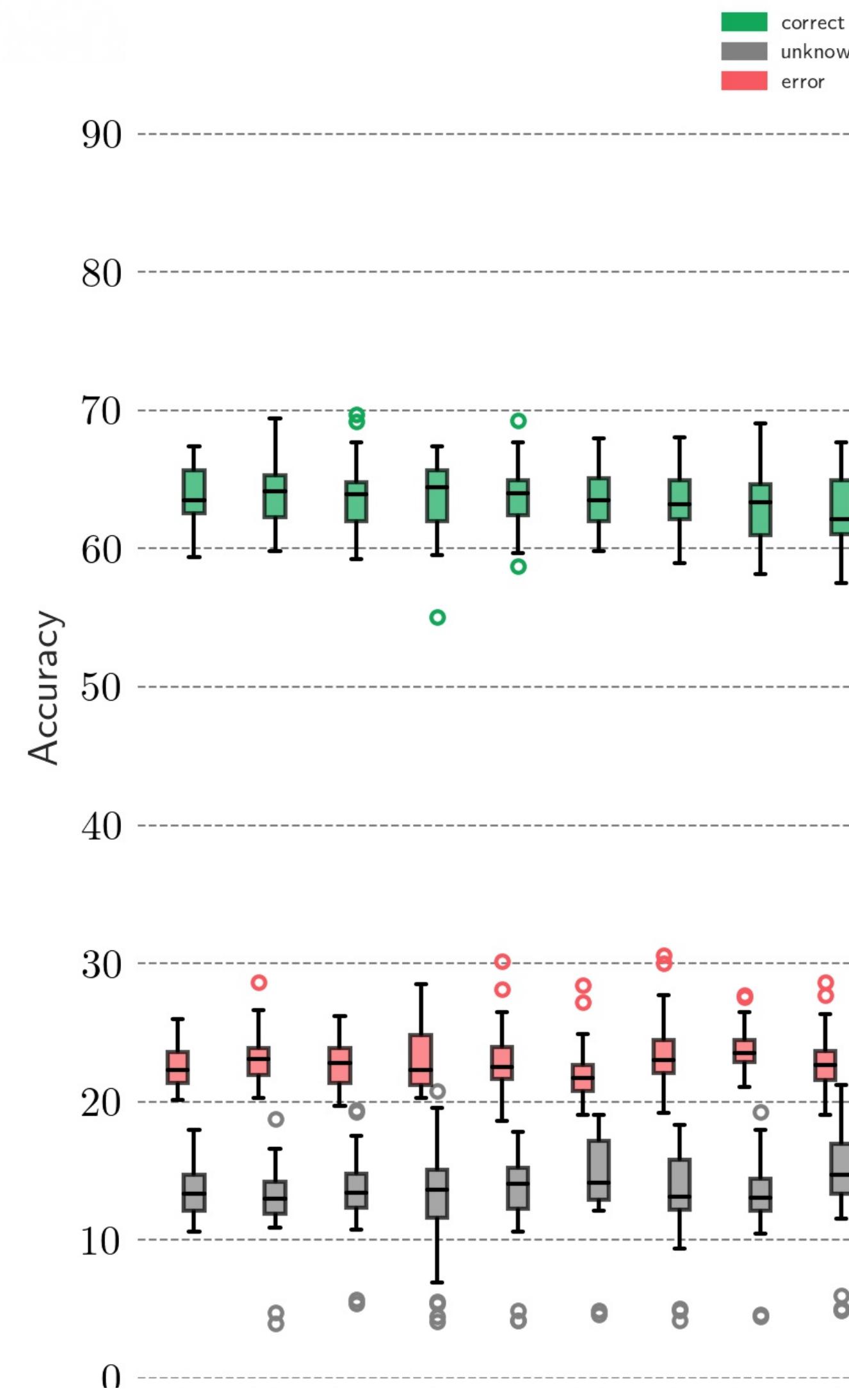
extract

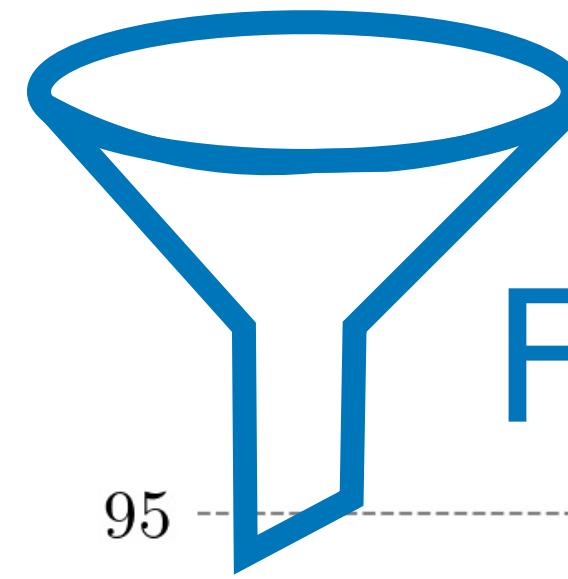


analyse

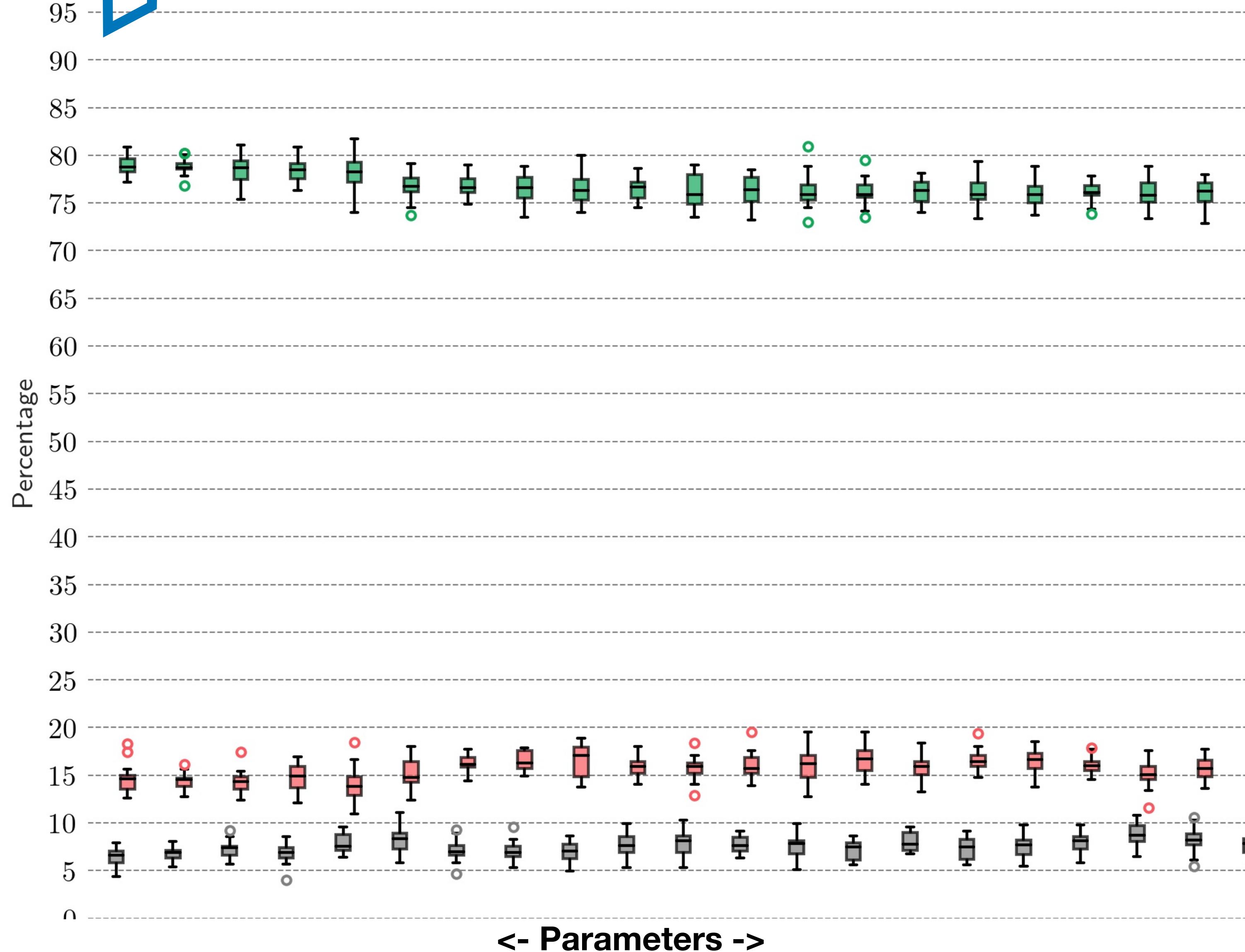


Example: Value-DX DTA meta-analysis





Filtering is a supervised learning task



Ongoing meta-analysis of
the post-covid condition

fastText

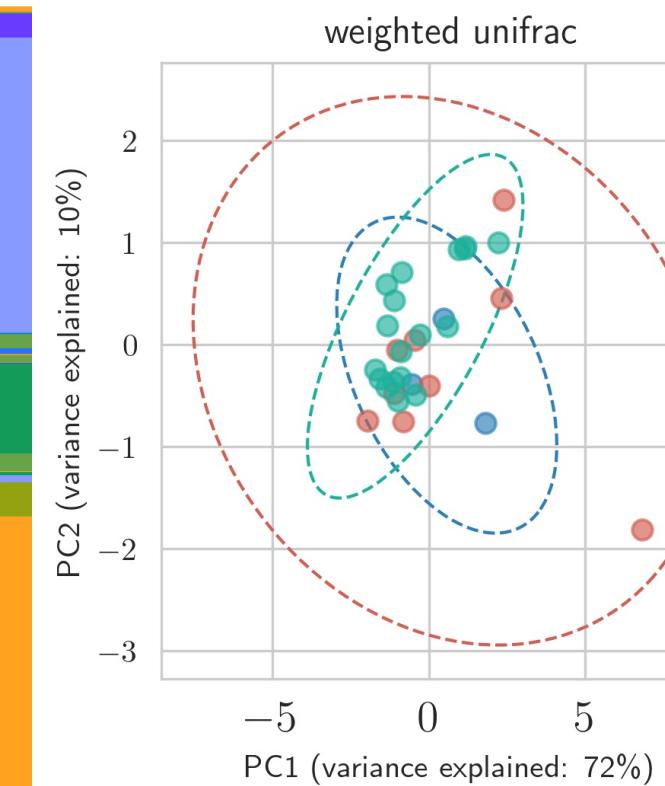
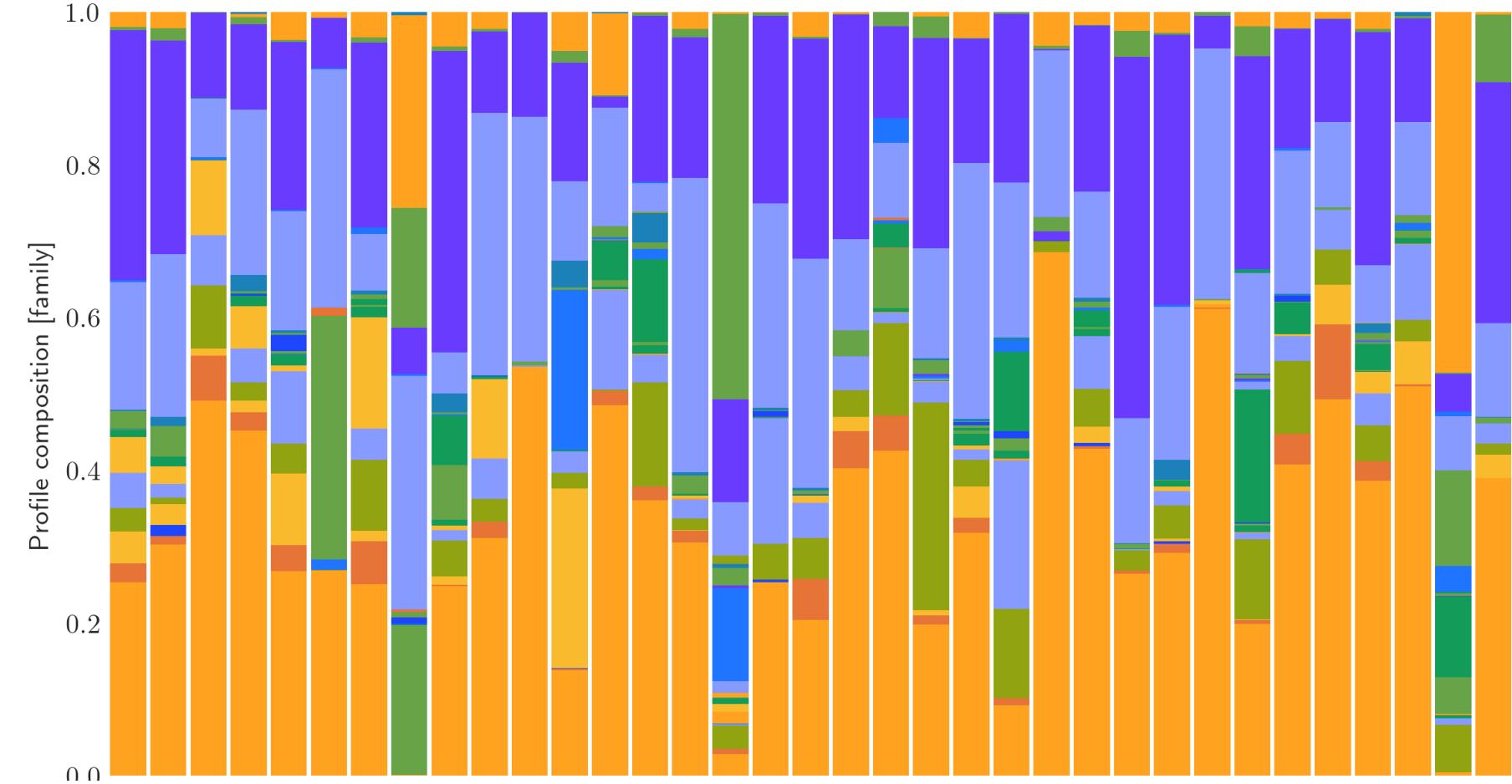
model for abstract and title.

<https://fasttext.cc>

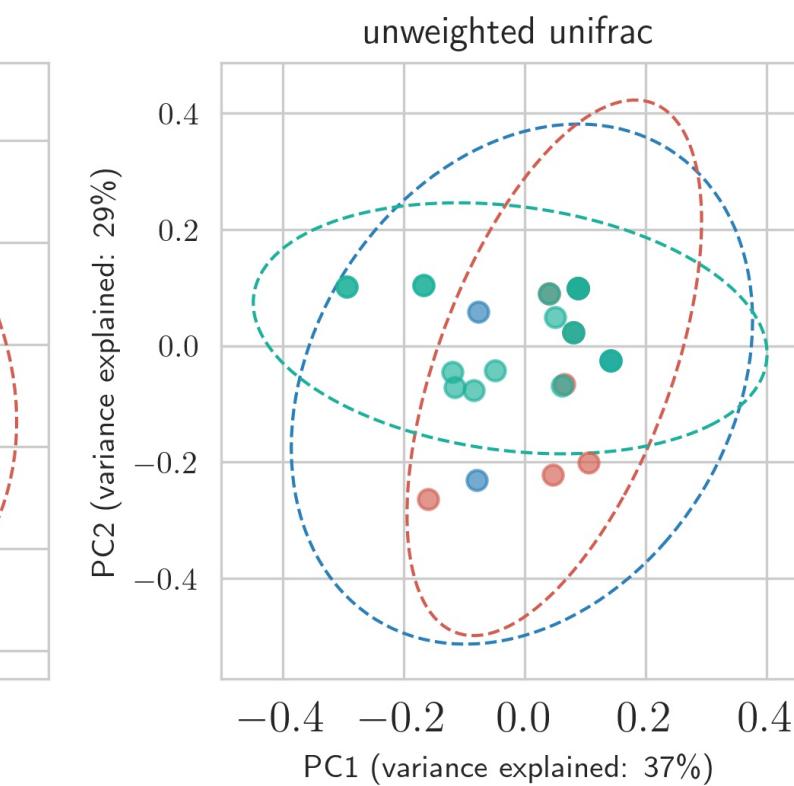
Back to bioinformatics!



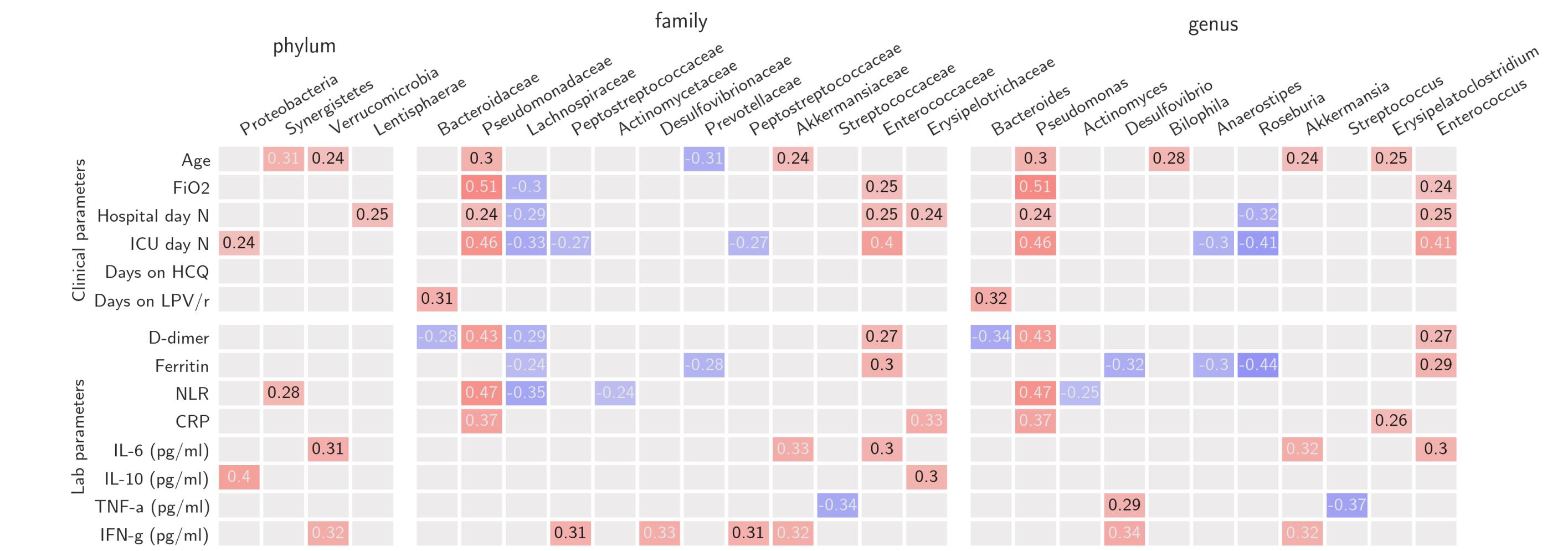
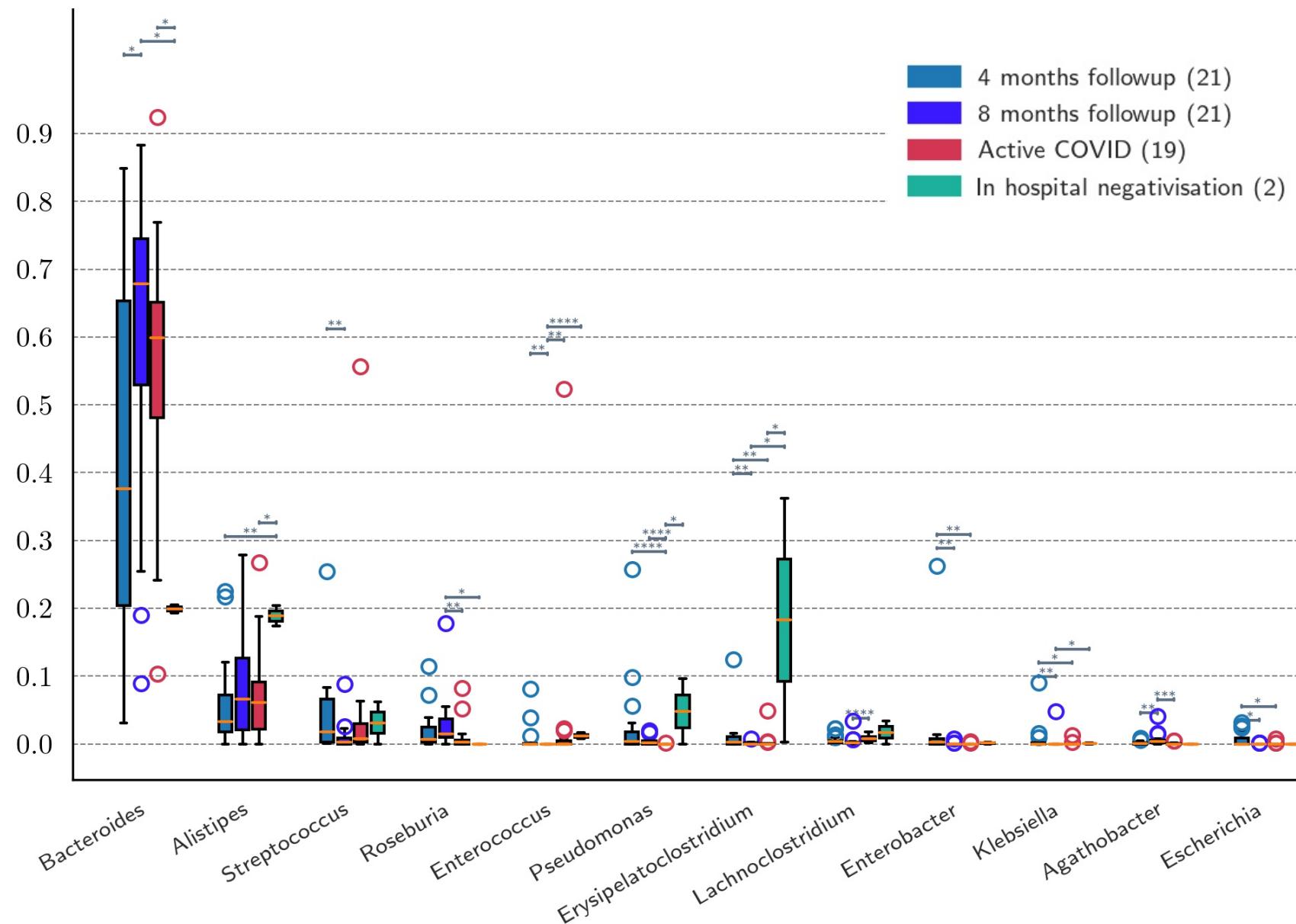
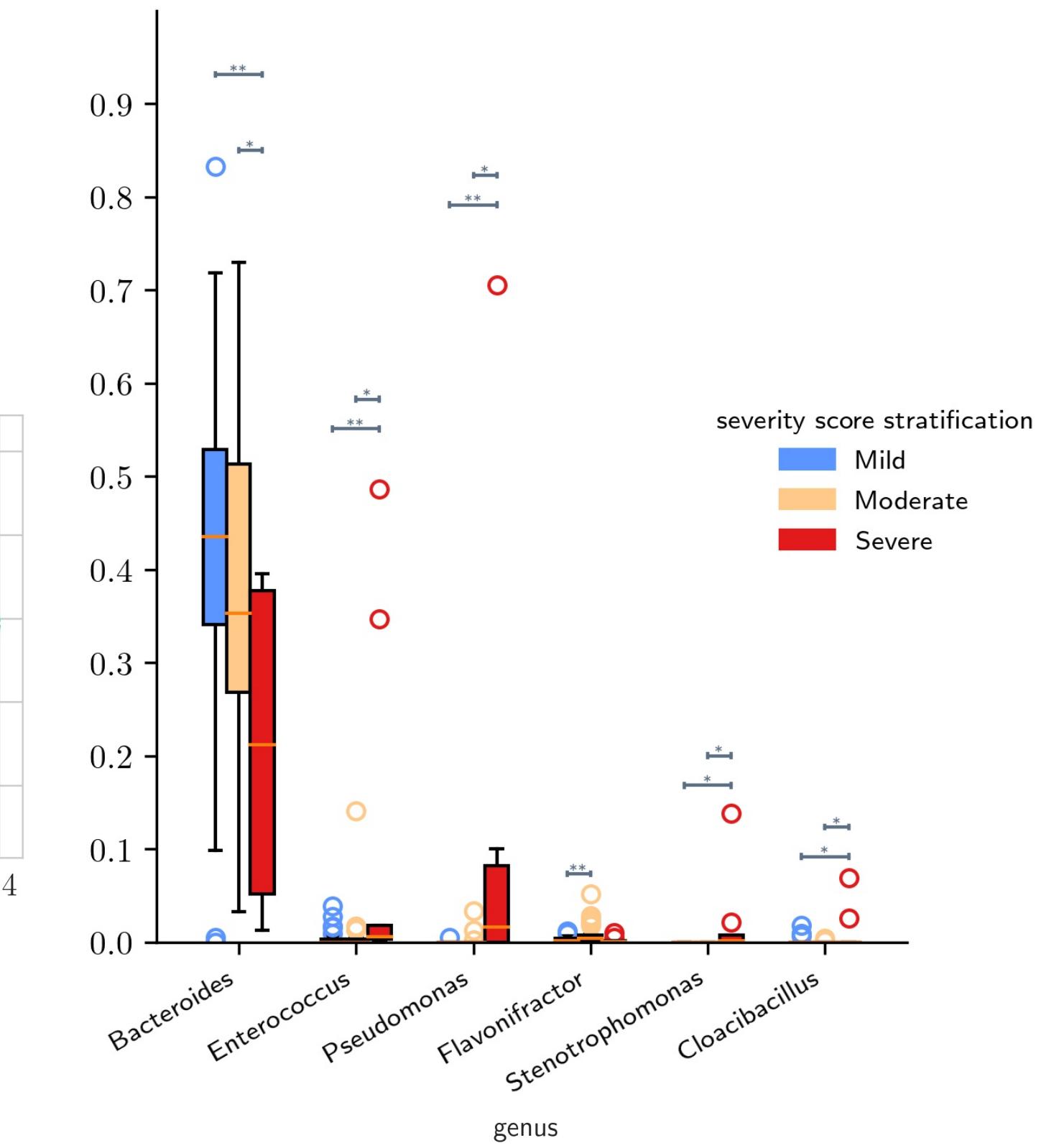
You are walking across your normal gut microbiome analysis ..



Before COVID vs After COVID: *p*-value: 0.173
Before COVID vs During COVID: *p*-value: 1.0
After COVID vs During COVID: *p*-value: 0.082
3-way: *p*-value: 0.228



Before COVID vs After COVID: *p*-value: 0.271
Before COVID vs During COVID: *p*-value: 0.398
After COVID vs During COVID: *p*-value: 0.314
3-way: *p*-value: 0.259



Meta-analysis in metagenomics



genus	title	mesh diseases	mesh subject	mesh others	extract	abstract	remove	annotation	A	
Pseudomonas	Microbial Biomarkers in Patients with Nonresponsive Celiac Disease.	Celiac Disease; Dysbiosis	Bacteroides; Humans; Middle Aged; Pseudomonas fluorescens; Saccharomyces cerevisiae	Biopsy; Correlation of Data; Diet, Gluten-Free; Duodenum; Endoscopy, Gastrointestinal; Female; Finland; Gastrointestinal Microbiome; Immunohistochemistry; Male; Serologic Tests; Treatment Failure	We thus hypothesized that increased seroreactivity to the serum gluten-sensitive microbial antibodies Saccharomyces cerevisiae (ASCA), Pseudomonas fluorescens-associated sequence (I2), and Bacteroides caccae TonB-linked outer membrane protein (OmpW) is associated with NRCD. ASCA, I2 and OmpW were measured in 20 seronegative CD patients with persistent villous damage despite strict dietary treatment (NRCD group). Fifty-eight responsive patients served as CD controls (55 on gluten-free treatment) and 80 blood donors as non-CD controls. At least one microbial marker was positive in 80% of NRCD patients, in 97% of untreated CD and 87% of treated CD patients, and in 44% of controls. NRCD patients had the highest frequency of ASCA positivity (65% vs 52, 20, and 0%, respectively) and also significantly higher ASCA IgA (median 14.5 U/ml) and IgG (32.5 U/ml) titers than treated CD patients (7.0 U/ml, 13.0 U/ml) and non-CD controls (4.5 U/ml, 5.8 U/ml). The frequencies of I2 and OmpW were lower in NRCD than in untreated CD (65% and 45% vs 86% and 59%, respectively), and I2 titers were higher in NRCD (median absorbance 0.76) and untreated (1.0) and treated	have a dysbiotic microbiota. We thus hypothesized that increased seroreactivity to the serum gluten-sensitive microbial antibodies Saccharomyces cerevisiae (ASCA), Pseudomonas fluorescens-associated sequence (I2), and Bacteroides caccae TonB-linked outer membrane protein (OmpW) is associated with NRCD. ASCA, I2 and OmpW were measured in 20 seronegative CD patients with persistent villous damage despite strict dietary treatment (NRCD group). Fifty-eight responsive patients served as CD controls (55 on gluten-free treatment) and 80 blood donors as non-CD controls. At least one microbial marker was positive in 80% of NRCD patients, in 97% of untreated CD and 87% of treated CD patients, and in 44% of controls. NRCD patients had the highest frequency of ASCA positivity (65% vs 52, 20, and 0%, respectively) and also significantly higher ASCA IgA (median 14.5 U/ml) and IgG (32.5 U/ml) titers than treated CD patients (7.0 U/ml, 13.0 U/ml) and non-CD controls (4.5 U/ml, 5.8 U/ml). The frequencies of I2 and OmpW were lower in NRCD than in untreated CD (65% and 45% vs 86% and 59%, respectively), and I2 titers were higher in NRCD (median absorbance 0.76) and untreated (1.0) and treated	0: Allowed	increase		
Ruminococcus	Intestinal microbiota profiling and predicted metabolic dysregulation in psoriasis patients.	Psoriasis	Adult; Bacteroidetes; Firmicutes; Humans; Megasphaera; Middle Aged; Ruminococcus; Young Adult	Body Mass Index; Carbohydrates; Chemotaxis; Computational Biology; Discriminant Analysis; Feces; Female; Gastrointestinal Microbiome; High-Throughput Nucleotide Sequencing; Iron; Male; RNA, Ribosomal, 16S; Vitamin B 12	Ruminococcus and Megasphaera, of the phylum Firmicutes, were the top-two genera of discriminant abundance in psoriasis.	The intestinal microbiota has been known to involve in obesity and host immune response. We aimed to investigate the intestinal microbiota and potential genetic function in relation to clinical presentation in psoriasis patients. Faecal microbiota and predicted genetic function inferred from high-throughput 16S ribosomal RNA sequencing were analysed between psoriasis (n = 32) and age-, gender- and body mass index (BMI)-matched non-psoriasis subjects (n = 64), from a referral medical centre. The correlation between altered microbiota and disease activity, arthritis and systemic anti-psoriatic drugs was also investigated. We observed a distinct faecal microbial community structure in psoriasis patients, with an increased abundance of phylum Firmicutes and decreased abundance of phylum Bacteroidetes, across different subgroup of subjects. Ruminococcus and Megasphaera, of the phylum Firmicutes, were the top-two genera of discriminant abundance in psoriasis. A number of functional genes and metabolic pathways involving bacterial chemotaxis and carbohydrate transport were predicted over-represented, whereas genes related to cobalamin and iron transport were predicted under-represented in faecal microbiota of psoriasis patients. The distinct faecal microbial composition in psoriasis might be associated with altered transport of carbohydrate, cobalamin and iron, An aberrant gut microbiota may be associated with a broad spectrum of diseases including mental illness. The gut microbiota is scarcely studied in bipolar disorder (BD). We examined the gut microbiota composition in patients with newly diagnosed BD, their unaffected first-degree relatives and healthy individuals. Stool samples were collected from 113 patients with BD, 39 unaffected first-degree relatives and 77 healthy individuals and the microbiota was profiled using 16S rRNA gene amplicon sequencing. The gut microbiota community membership of patients with BD differed from that of healthy individuals ($R^{2} = 1.0\%$, $P = 0.008$), whereas the community membership of unaffected first-degree relatives did not. Flavonifractor was present in 61% of patients with BD, 42% of their unaffected relatives and 39% of healthy individuals. Presence of Flavonifractor was associated with an odds ratio of 2.9 (95%CI: 1.6-5.2, $P = 5.8 \times 10^{-4}$, $Q = 0.036$) for having BD.; When excluding smokers, presence of Flavonifractor was associated with an odds ratio of 2.3 (95%CI: 1.1-5.3, $P = 0.019$) for having BD.; However, when considering the subsample of non-smokers only, BD and presence of Flavonifractor were no longer associated when adjusted for all possible tests at genus level ($Q = 0.6$).; Presence of Flavonifractor in	The intestinal microbiota has been known to involve in obesity and host immune response. We aimed to investigate the intestinal microbiota and potential genetic function in relation to clinical presentation in psoriasis patients. Faecal microbiota and predicted genetic function inferred from high-throughput 16S ribosomal RNA sequencing were analysed between psoriasis (n = 32) and age-, gender- and body mass index (BMI)-matched non-psoriasis subjects (n = 64), from a referral medical centre. The correlation between altered microbiota and disease activity, arthritis and systemic anti-psoriatic drugs was also investigated. We observed a distinct faecal microbial community structure in psoriasis patients, with an increased abundance of phylum Firmicutes and decreased abundance of phylum Bacteroidetes, across different subgroup of subjects. Ruminococcus and Megasphaera, of the phylum Firmicutes, were the top-two genera of discriminant abundance in psoriasis. A number of functional genes and metabolic pathways involving bacterial chemotaxis and carbohydrate transport were predicted over-represented, whereas genes related to cobalamin and iron transport were predicted under-represented in faecal microbiota of psoriasis patients. The distinct faecal microbial composition in psoriasis might be associated with altered transport of carbohydrate, cobalamin and iron, An aberrant gut microbiota may be associated with a broad spectrum of diseases including mental illness. The gut microbiota is scarcely studied in bipolar disorder (BD). We examined the gut microbiota composition in patients with newly diagnosed BD, their unaffected first-degree relatives and healthy individuals. Stool samples were collected from 113 patients with BD, 39 unaffected first-degree relatives and 77 healthy individuals and the microbiota was profiled using 16S rRNA gene amplicon sequencing. The gut microbiota community membership of patients with BD differed from that of healthy individuals ($R^{2} = 1.0\%$, $P = 0.008$), whereas the community membership of unaffected first-degree relatives did not. Flavonifractor was present in 61% of patients with BD, 42% of their unaffected relatives and 39% of healthy individuals. Presence of Flavonifractor was associated with an odds ratio of 2.9 (95%CI: 1.6-5.2, $P = 5.8 \times 10^{-4}$, $Q = 0.036$) for having BD. When excluding smokers, presence of Flavonifractor was	0: Allowed	decrease	
Flavonifractor	Gut microbiota composition in patients with newly diagnosed bipolar disorder and their unaffected first-degree relatives.	Bipolar Disorder; Cigarette Smoking	Adult; Clostridiales; Humans; Middle Aged	Case-Control Studies; Denmark; Family; Female; Gastrointestinal Microbiome; Male; Odds Ratio;	Flavonifractor was present in 61% of patients with BD, 42% of their unaffected relatives and 39% of healthy individuals.; Presence of Flavonifractor was associated with an odds ratio of 2.9 (95%CI: 1.6-5.2, $P = 5.8 \times 10^{-4}$, $Q = 0.036$) for having BD.; When excluding smokers, presence of Flavonifractor was associated with an odds ratio of 2.3 (95%CI: 1.1-5.3, $P = 0.019$) for having BD.; However, when considering the subsample of non-smokers only, BD and presence of Flavonifractor were no longer associated when adjusted for all possible tests at genus level ($Q = 0.6$).; Presence of Flavonifractor in	Flavonifractor was present in 61% of patients with BD, 42% of their unaffected relatives and 39% of healthy individuals.; Presence of Flavonifractor was associated with an odds ratio of 2.9 (95%CI: 1.6-5.2, $P = 5.8 \times 10^{-4}$, $Q = 0.036$) for having BD.; When excluding smokers, presence of Flavonifractor was associated with an odds ratio of 2.3 (95%CI: 1.1-5.3, $P = 0.019$) for having BD.; However, when considering the subsample of non-smokers only, BD and presence of Flavonifractor were no longer associated when adjusted for all possible tests at genus level ($Q = 0.6$).; Presence of Flavonifractor in	0: Allowed	increase		



2,634
publications

135
genera

2,273
Combinations
to review

fastText

1. Step

label _REMOVED acc: 95.56%
label _ALLOWED acc: 58.06%

2. Step

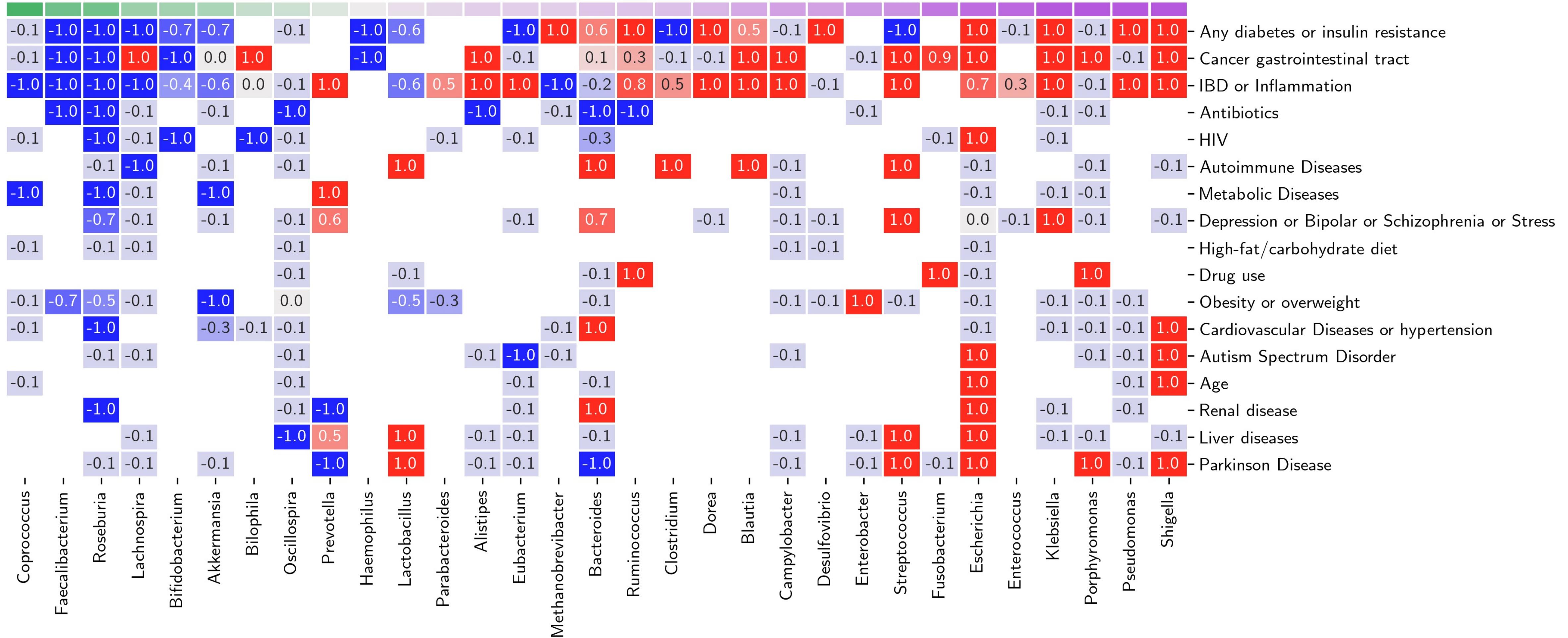
label _other acc: 95.71%
label _infant acc: 91.67%
label _probiotic acc: 0.0%
label _animals acc: 0.0%
label _review acc: 0.0%

3. Step

label _decrease acc: 69.05%
label _increase acc: 79.69%



Good



Take Home

- Systematic review is a **formalised process** of finding, extracting and reviewing information from the publications.
- **Meta-analysis** refers to the **statistical methods** used to compute summary statistics for a group of publication results.
- Systematic-review and meta-analysis is a staple method in the **evidence-driven medicine**.
- **Outlook:** what we really need is a fast, automatised, **meta-analysis** toolkit for *living* meta-analysis, of any topic.



Thank you!

anna.gorska@univr.it
aniagorska.me



ID-CARE



Funded by
the European Union



UNIVERSITÀ
di VERONA

