

RESEARCH LUXEMBOURG COVID-19 TASK FORCE

Eine Task Force zur Koordinierung der öffentlichen Forschung im Rahmen der
COVID-19 Pandemie

Proaktives Mitigierungsprogramm Large-Scale Testing - Update



Die heutige Lage in Luxemburg (08/07/2020)

4,650 positive Tests (+47 gegenüber dem Vortag)

Einwohner: 3,793

Nicht-Einwohner: 857

Durchschnittsalter: 44 Jahre

468 aktive Infektionsfälle

110 Todesfälle (+0 gegenüber dem Vortag)

Durchschnittsalter: 84

Altersmedian: 84

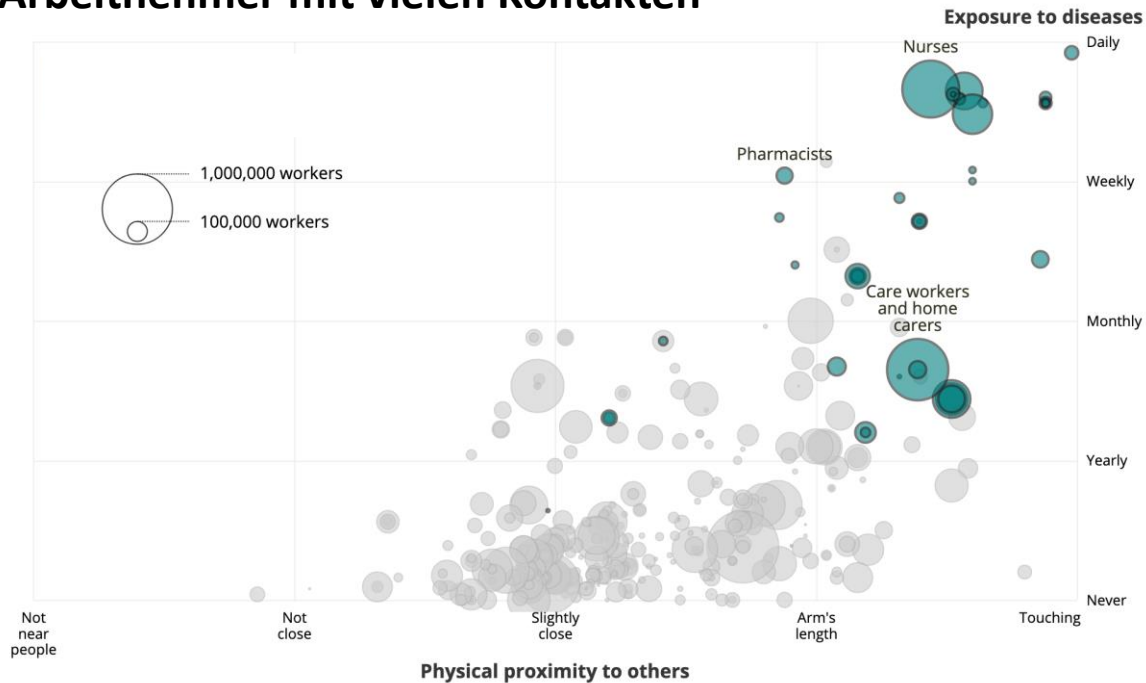
$R_t=1.25$

$R_{eff}=1.05$



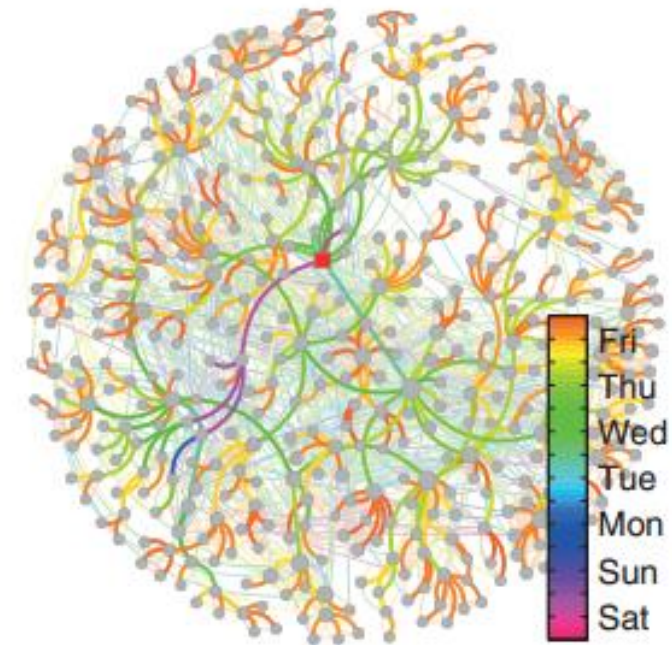
Potentielle Akteure einer zweiten Welle

Arbeitnehmer mit vielen Kontakten



Quelle: ONET – US Department of Labor, Annual Population Survey and Annual Survey of Hours and Earnings – Office of National Statistics

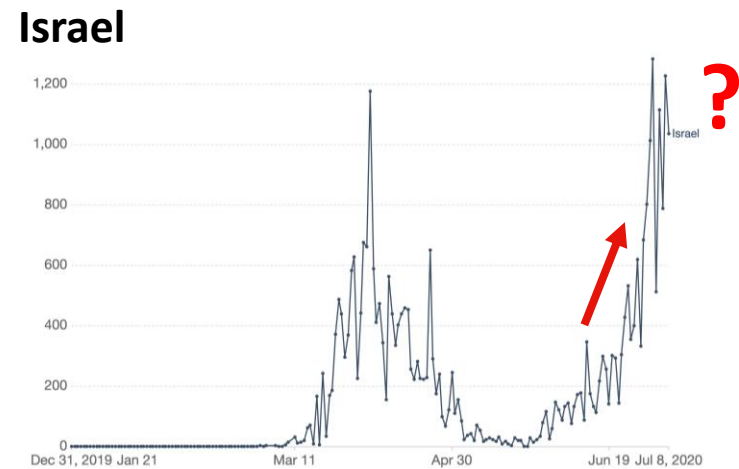
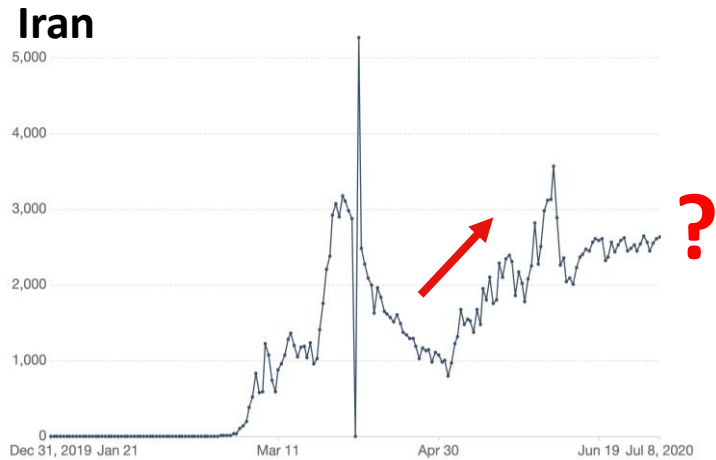
Super-Spreader



Quelle: MIT Technology Review

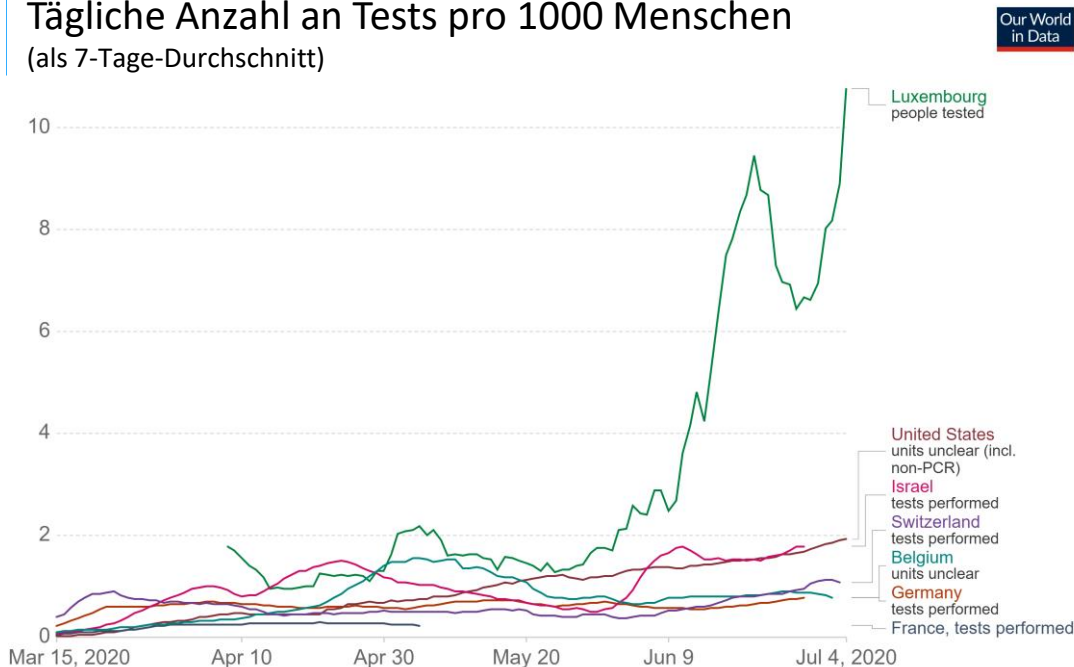


Länder mit zweiten Infektionswellen



Tägliche Anzahl von Tests in Luxemburg

Tägliche Anzahl an Tests pro 1000 Menschen
(als 7-Tage-Durchschnitt)

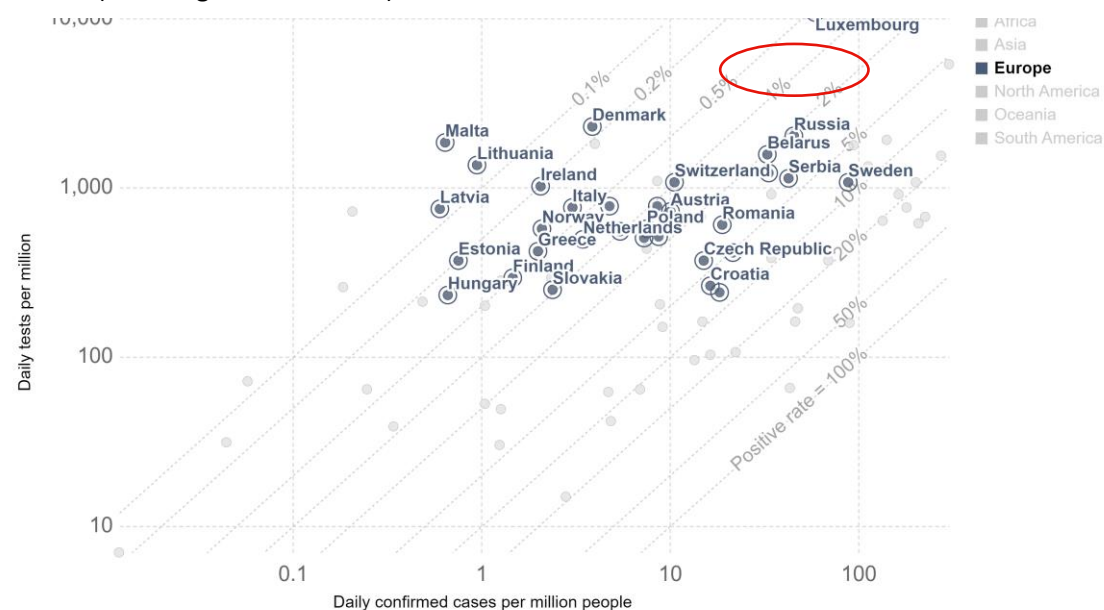


Source: Official data collated by Our World in Data

Note: Comparisons of testing data across countries are affected by differences in the way the data are reported. Daily data is interpolated for countries not reporting testing data on a daily basis. Details can be found at our Testing Dataset page.

OurWorldInData.org/coronavirus • CC BY

Tägliche Anzahl an Tests vs. Tägliche Anzahl an Neuinfektionen pro Mio. (als 7-Tage-Durchschnitt)



Source: Testing data from official sources collated by Our World in Data, confirmed cases from ECDC OurWorldInData.org/coronavirus • CC BY

Note: Comparisons of testing data across countries are affected by differences in the way the data are reported. Daily data is interpolated for countries not reporting testing data on a daily basis. Details can be found at our Testing Dataset page.

- Seit Beginn der LST hat Luxemburg die Anzahl der Tests pro 1000 Personen erheblich erhöht und weist die höchste Rate an Tests und positiven Fällen in Europa auf
- Länder mit der niedrigsten Anzahl an Todesfällen durch COVID-19 weisen die höchste Anzahl an Tests und positiven Fällen auf



Auslastung der Teststationen

Repräsentative Auslastung an Wochentagen (vs. Kapazität) – Juni

Site	Working hours													
	7	8	9	10	11	12	13	14	15	16	17	18	19	20
COVID_Schieren_Colmar_N7	69%	68%	39%	77%	61%	31%	40%	66%	56%	61%	33%	40%	21%	9%
COVID_Parc_Hosingen	71%	65%	41%	72%	50%	27%	35%	56%	49%	47%	24%	22%	10%	4%
COVID_P&R_HOWALD_CR231	54%	51%	34%	71%	60%	40%	35%	47%	37%	30%	18%	26%	13%	8%
COVID_Luxembourg_P&R_Bouillon	56%	56%	34%	62%	41%	35%	35%	36%	31%	39%	22%	26%	15%	6%
COVID_Niederanven-Roodt/Syre_N1	58%	54%	32%	58%	46%	33%	31%	43%	36%	40%	18%	23%	15%	4%
COVID_Machtum-Grevenmacher_N10	64%	52%	35%	55%	39%	25%	34%	42%	32%	34%	18%	31%	11%	8%
COVID_JUNGLINSTER_PR	45%	45%	24%	45%	45%	39%	41%	43%	41%	41%	19%	32%	14%	5%
COVID_WALKIN_Rotondes_Luxembourg	46%	59%	32%	50%	40%	47%	31%	31%	30%	32%	19%	18%	11%	5%
COVID_Steinfurt_Windhof_N6	52%	40%	30%	56%	38%	26%	31%	39%	28%	32%	15%	18%	8%	3%
COVID_Parking_Rond-point_Raemerich	38%	32%	33%	59%	35%	20%	25%	40%	28%	29%	12%	24%	13%	6%
COVID_Frisange	37%	30%	32%	63%	39%	25%	24%	38%	29%	27%	12%	20%	10%	5%
COVID_Kirchberg_Parking_Adenauer	41%	37%	21%	39%	37%	35%	29%	32%	26%	27%	11%	17%	10%	9%
COVID_Dippach_Greivelsbarrier_N5	47%	29%	33%	58%	35%	20%	20%	37%	25%	26%	9%	16%	9%	4%
COVID_P&R_Steinfurt	48%	31%	34%	46%	33%	13%	21%	30%	21%	25%	16%	19%	5%	2%
COVID_Asselt_Roedt	38%	37%	20%	39%	33%	19%	22%	30%	30%	26%	14%	22%	4%	1%
COVID_Neudorf-Findel_N1	35%	36%	21%	35%	27%	23%	18%	23%	20%	19%	6%	12%	7%	5%
COVID_Bascharage_ZI_Bommelscheuer	19%	15%	21%	33%	20%	9%	13%	22%	17%	14%	7%	9%	6%	3%

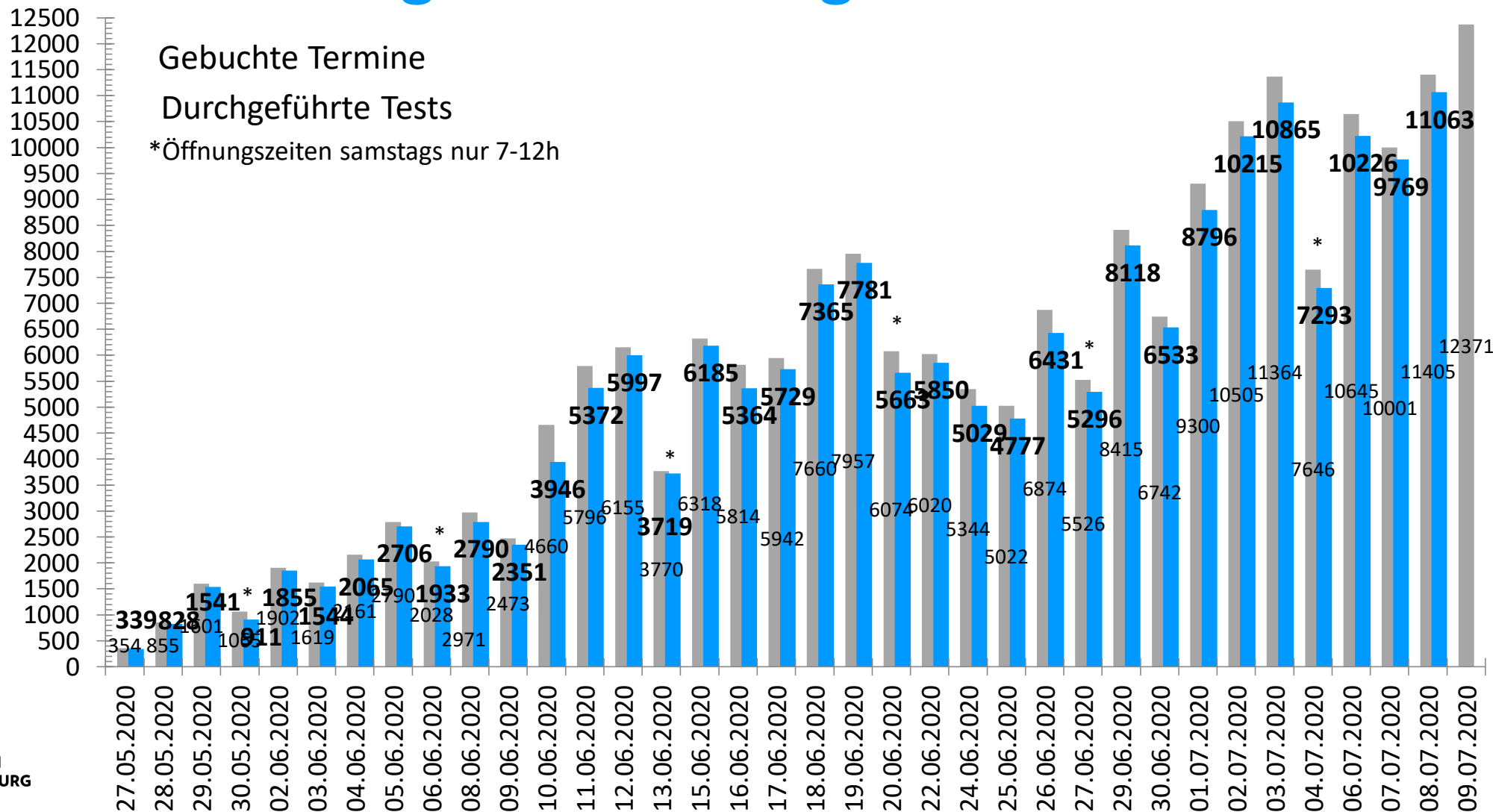


Large-scale testing: Status quo

- 750K Einladungen wurden bisher versendet
- 940K Einladungen werden bis zum 10. Juli verschickt werden
- Bis einschließlich 6ten Juli wurden ca. 175K Termine gebucht und ca. 166K dieser Termine wurden wahrgenommen
 - Adhärenzrate von 95%



Large-scale testing: Testbuchungen

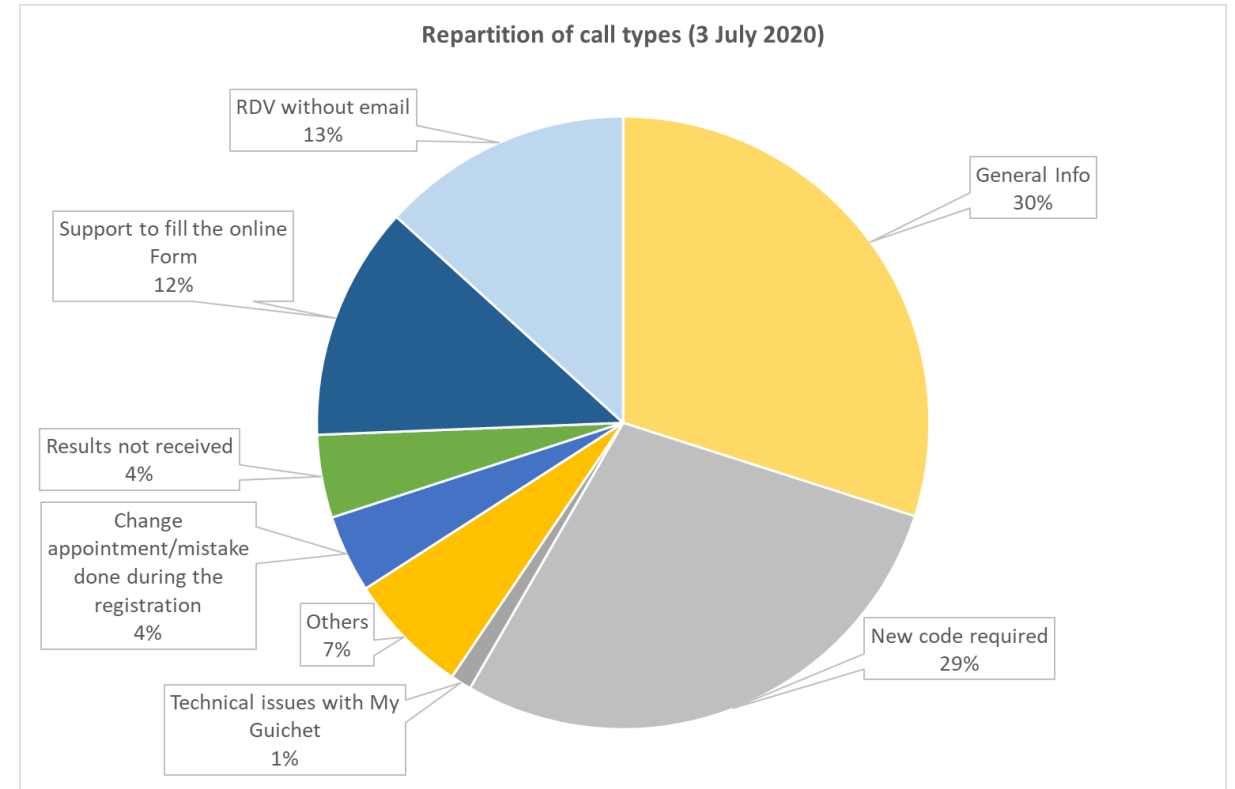




Helpline - Status quo

20.000 Anrufe wurden von der Helpline beantwortet

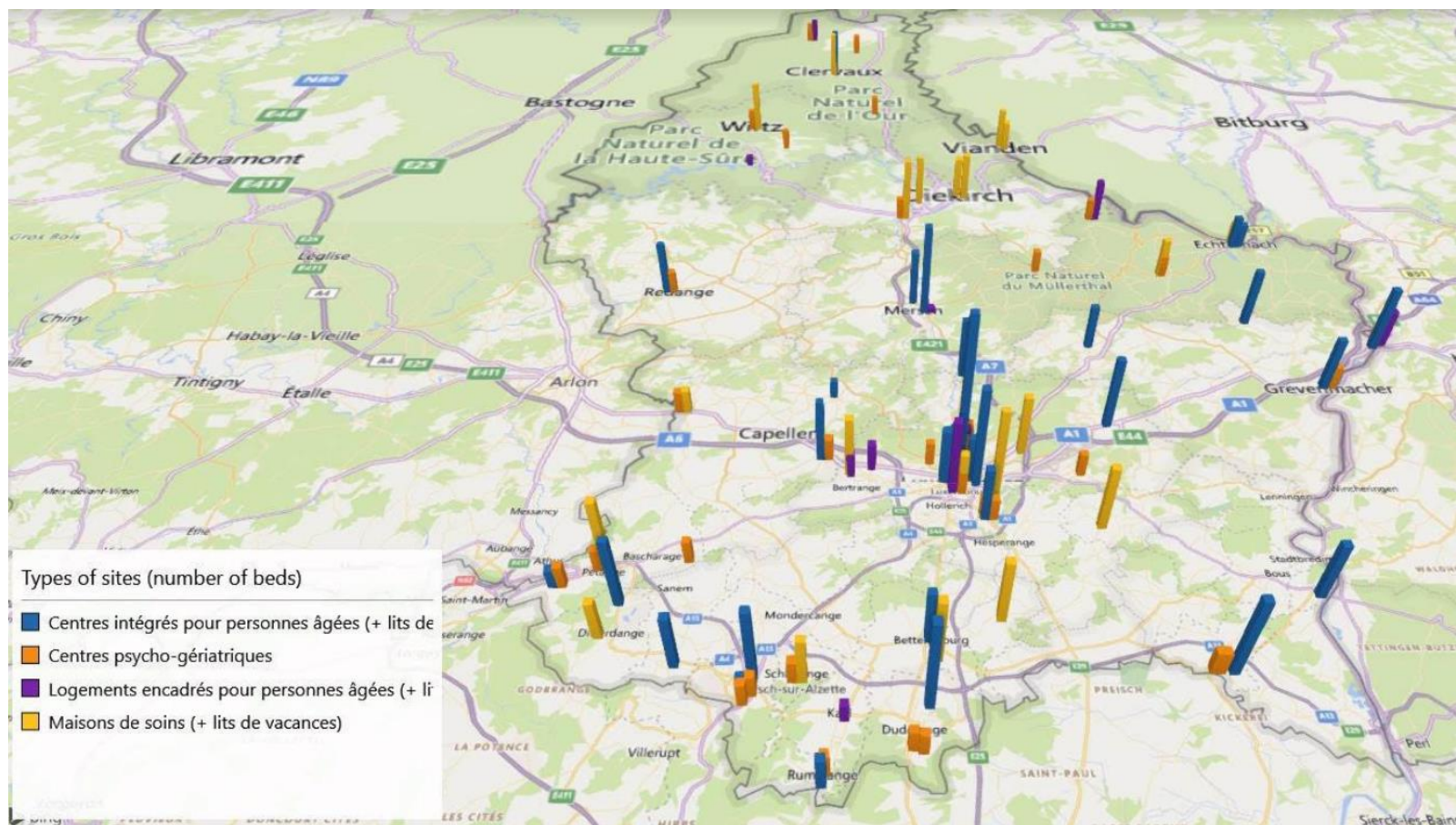
- Davon 2.000 von Menschen ohne Email-Adresse
- Davon 4.000 aufgrund von abgelaufenen Gutscheinen
- Telefonische Terminbuchung: 10–15min
- Bis zu 7.000 Anrufe/Tag





Konzept für mobile Probenabnahme

In scope: 102 Orte



- **Centres Intégrés (CIPA):**
 - 30 Orte
 - 3.913 Betten
- **Maisons de soins:**
 - 22 Orte
 - 2.482 Betten
- **Logements encadrés:**
 - 12 Orte
 - 990 Betten
- **Centres psy-G:**
 - 38 Orte
 - Anzahl Betten unbekannt

Animation zur Test-Strategie

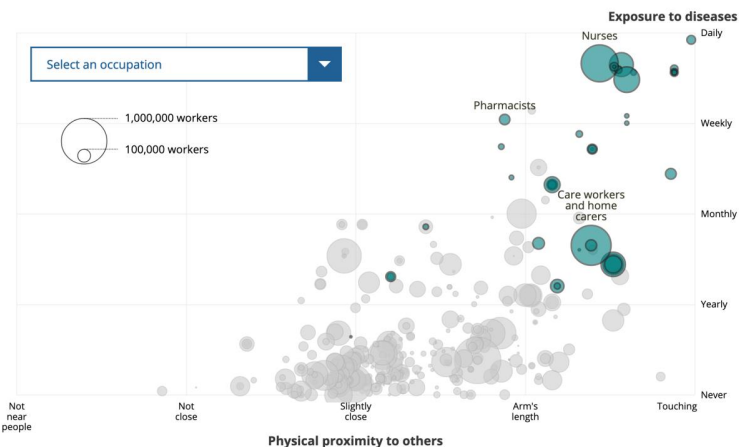
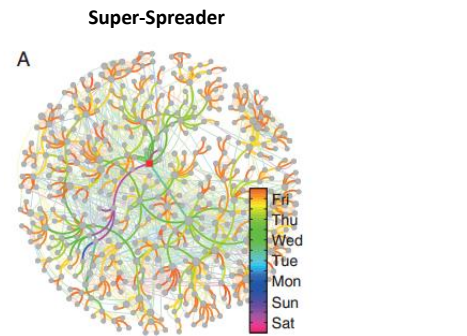


<https://www.youtube.com/watch?v=XGMIjR1cVo0&feature=youtu.be>



Zwischenstand Large Scale Testing Anfang Juli:

Abdecken der Riskogruppen:



Am 9.7. 12.300 Tests

Teilnahmerate steigt auf über 50%

Bis zum 6.7.:

268 Positive aus LST

Am 8.7.:

16 Positive

Bei steigenden infektionszahlen wird die Teilnahme am LST wichtig, und fuer kontaktintensive Sektoren kritisch



Einteilung in Kategorien

Wer wird wann, wie getestet?

- **Kategorie 1:** Arbeitnehmer mit vielen Kontakten (Super-Spreader-Potenzial).
2-Wochen Intervalle.
- **Kategorie 2:** Arbeitnehmer in Luxemburg. Repräsentative Gruppen pro Sektor.
Entweder einmal oder mehrmals (2-Wochen Intervalle) getestet
- **Kategorie 3:** Gesamtbevölkerung eingeteilt in repräsentative Gruppen.
Einmaliges Testen.

Jede Woche wird jemand um Sie herum getestet – was den Schutz für jeden erhöht!

Die Testgruppen führen zu einem engmaschiges Netz, das dem Virus kaum Raum mehr lässt.

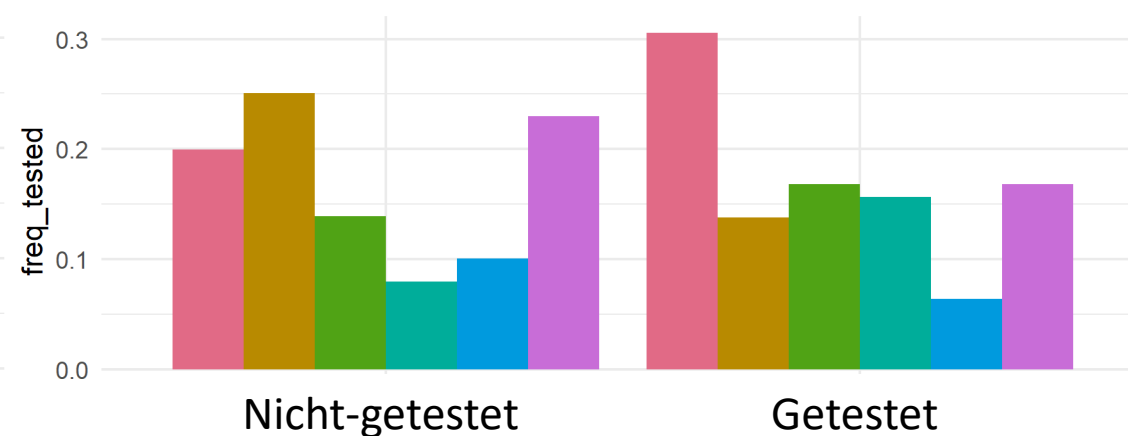
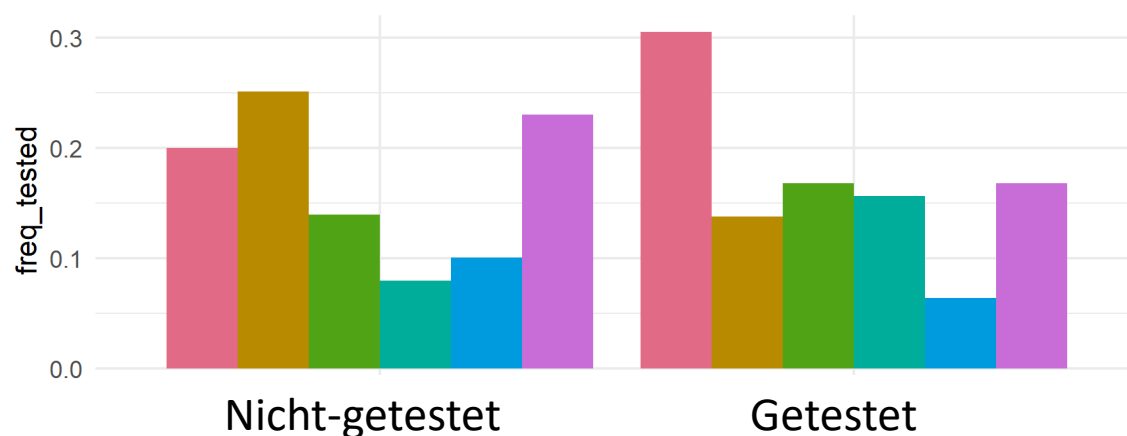


Tests pro Sektor

Alle Tests

Nur LST

Source: IGSS data, Luxembourgish residents and international commuters, enriched with COVID19 PCR test results from the DiSa.

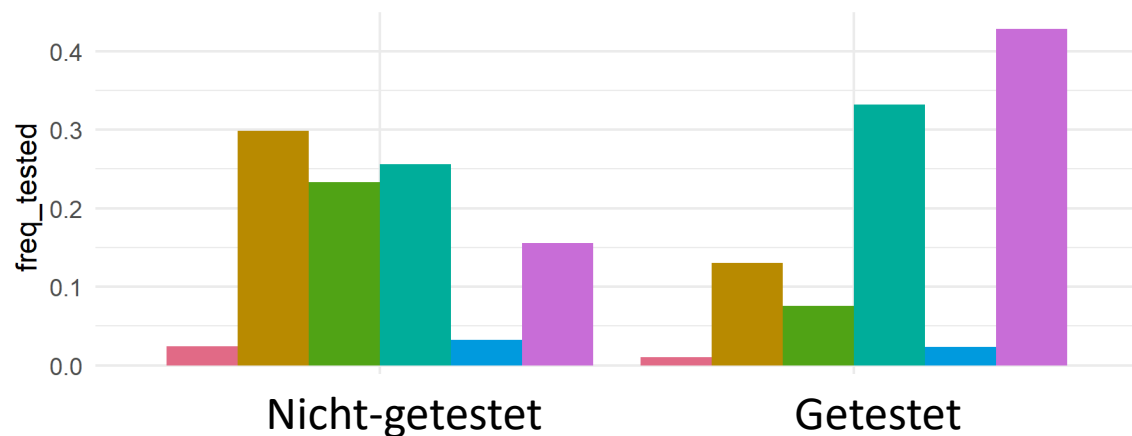


- Bau
- Verkauf & Reparatur von Autos und Motorrädern
- Transport & Lager
- Hotels & Restauration
- Information & Kommunikation
- Finanz- und Versicherungssektor



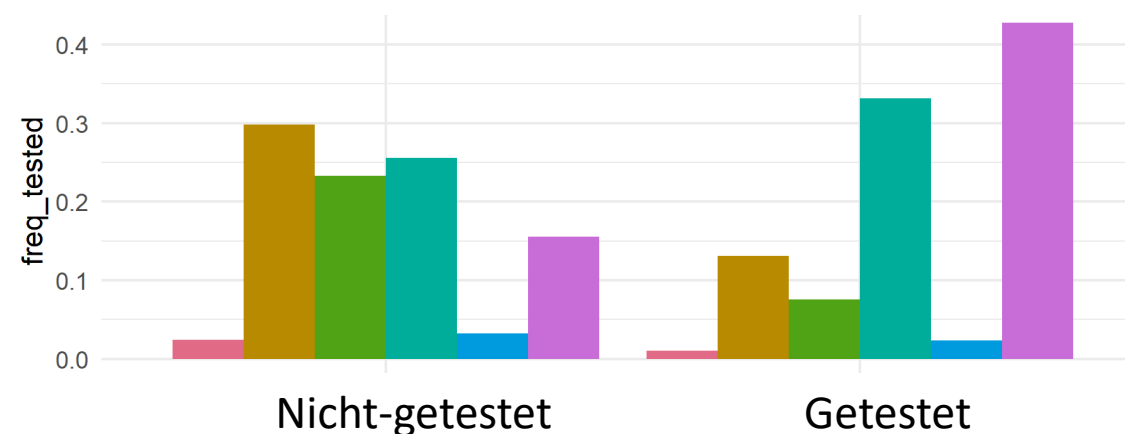
Tests pro Sektor

Alle Tests



Nur LST

Source: IGSS data, Luxembourgish residents and international commuters, enriched with COVID19 PCR test results from the DiSa.

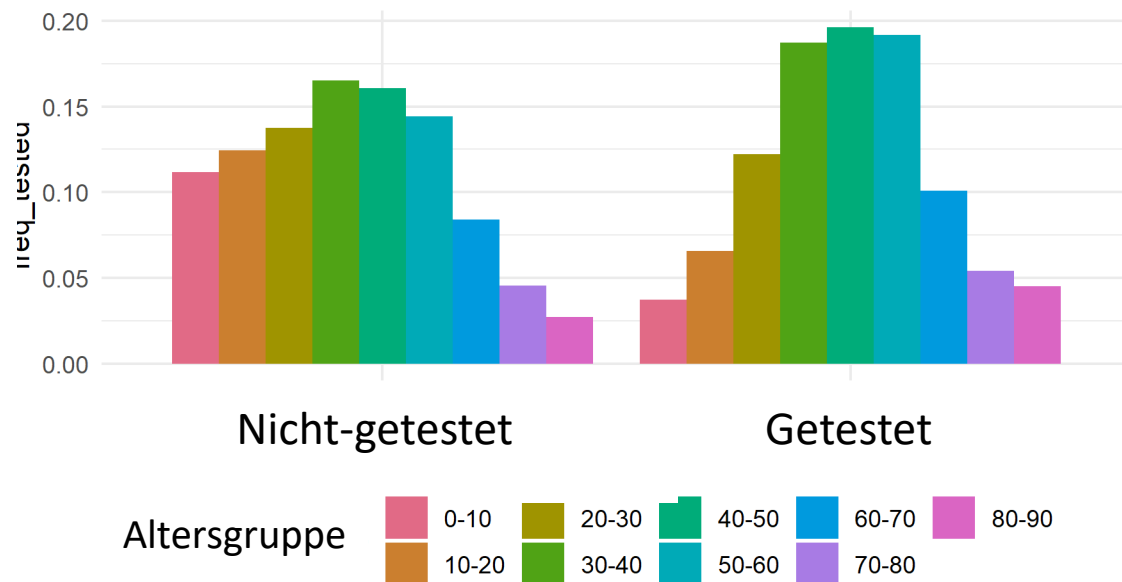


- Immobilien
- Spezialisierte, wissenschaftliche und technische Aktivitäten
- Administration & unterstützende Funktionen
- Öffentliche Administration
- Schule
- Gesundheitswesen und Sozialarbeit



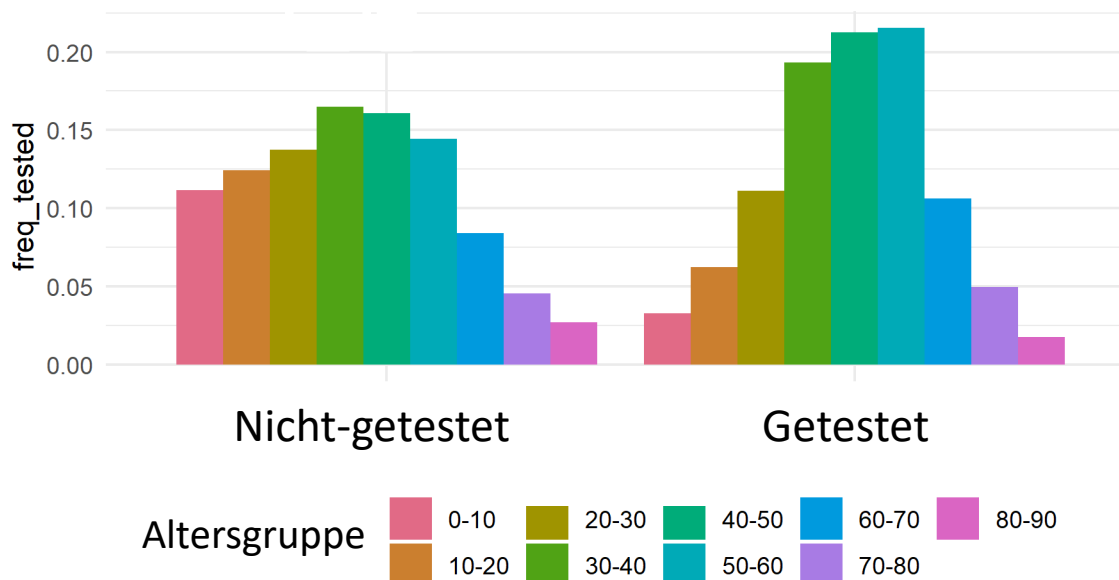
Altersverteilung

Alle Tests



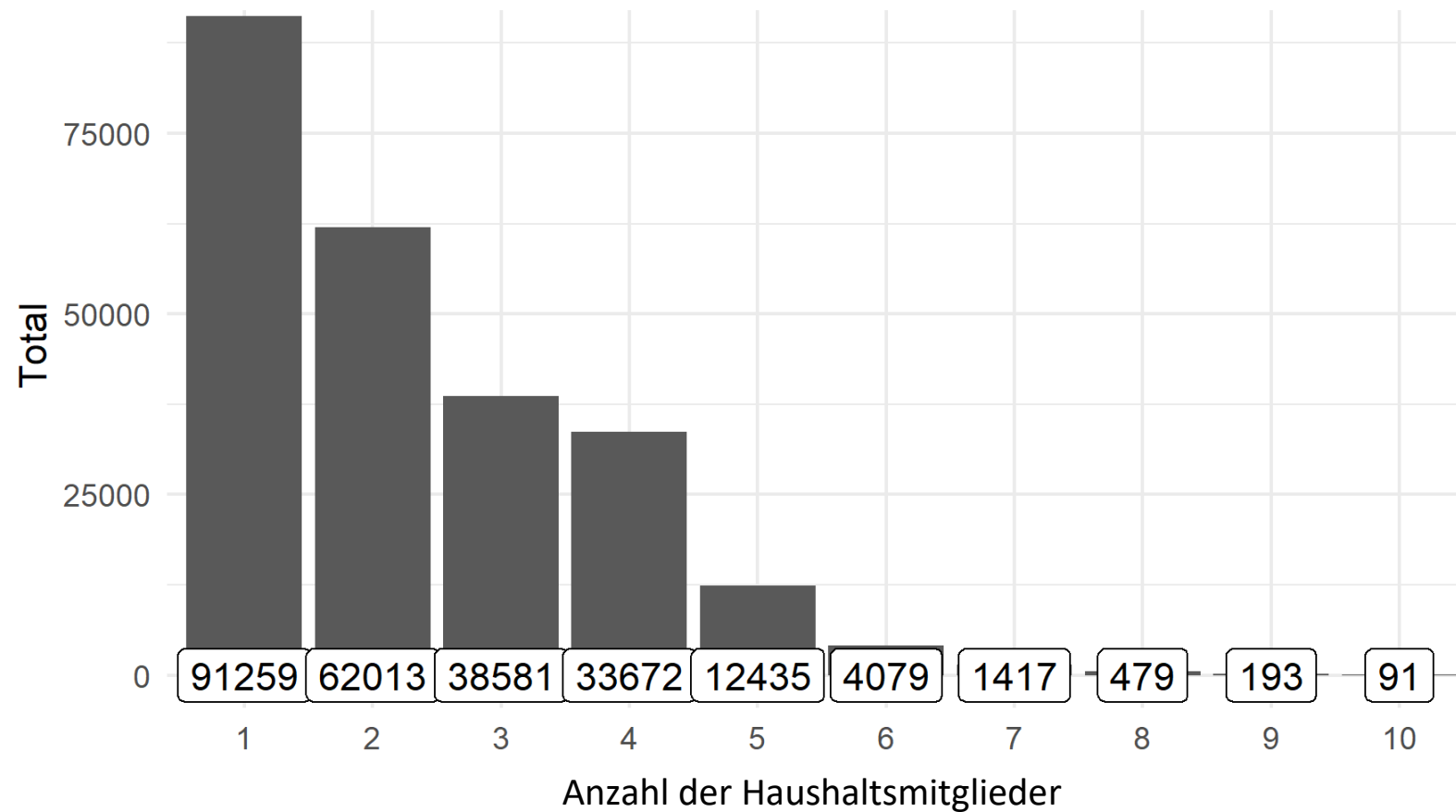
Nur LST

Source: IGSS data, Luxembourgish residents and international commuters, enriched with COVID19 PCR test results from the DiSa.





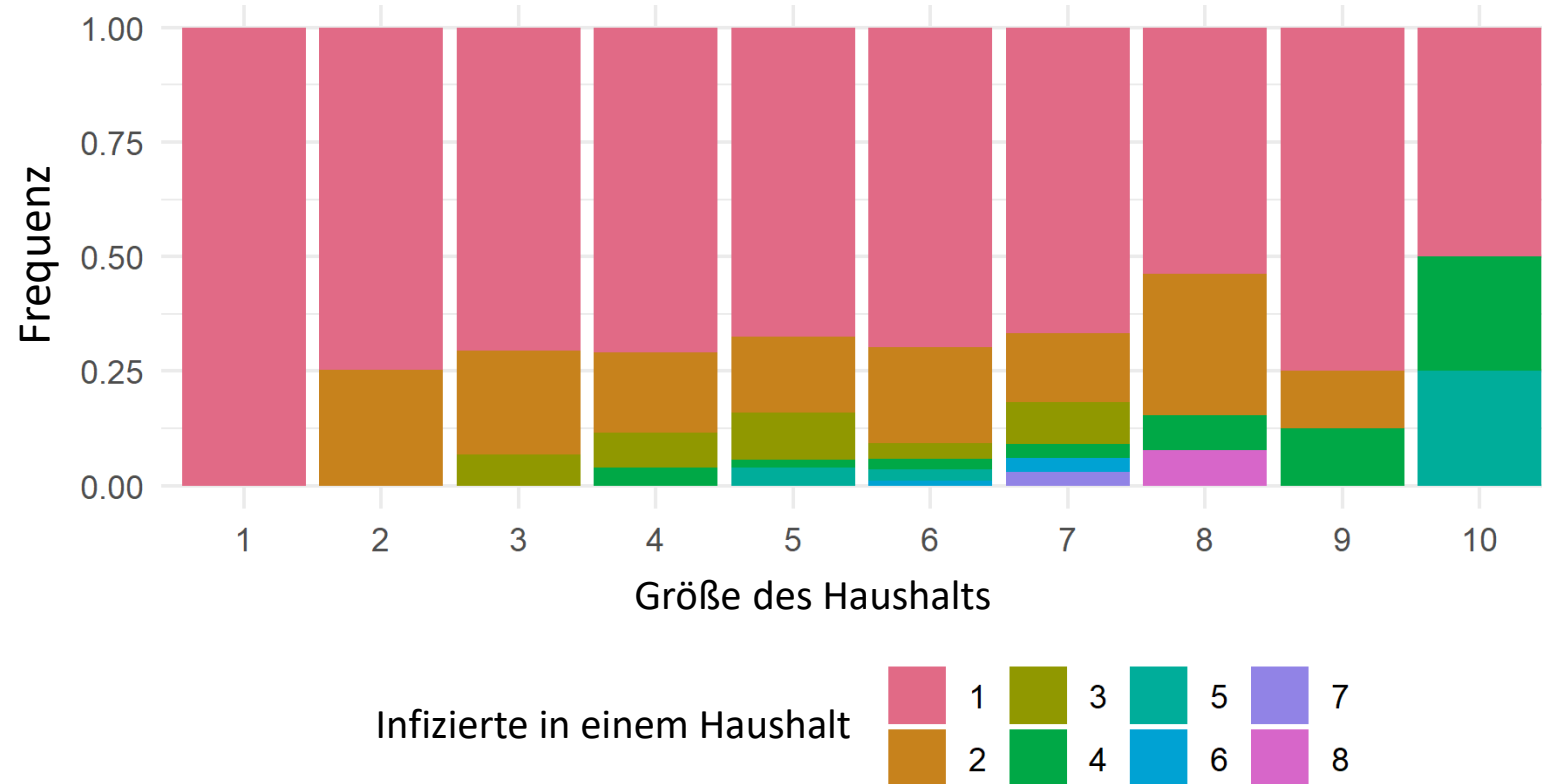
Luxemburgs Haushalte



Source: IGSS data, Luxembourgish residents only, households of size equal or less than 10.



Infektionen im Haushalt

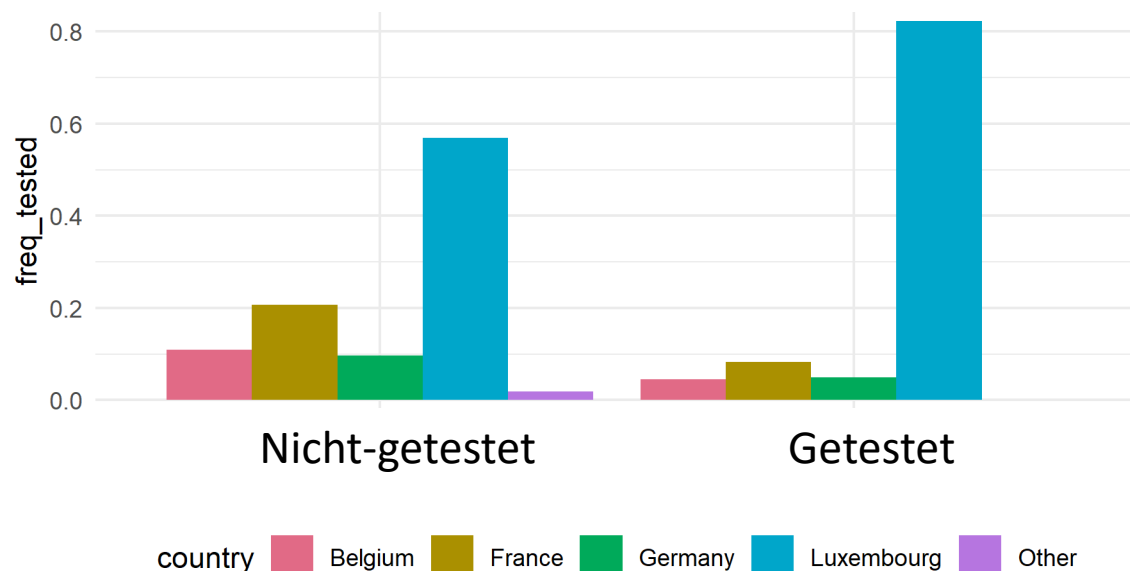


Source: IGSS data, Luxembourgish residents only, households of size equal or less than 10.



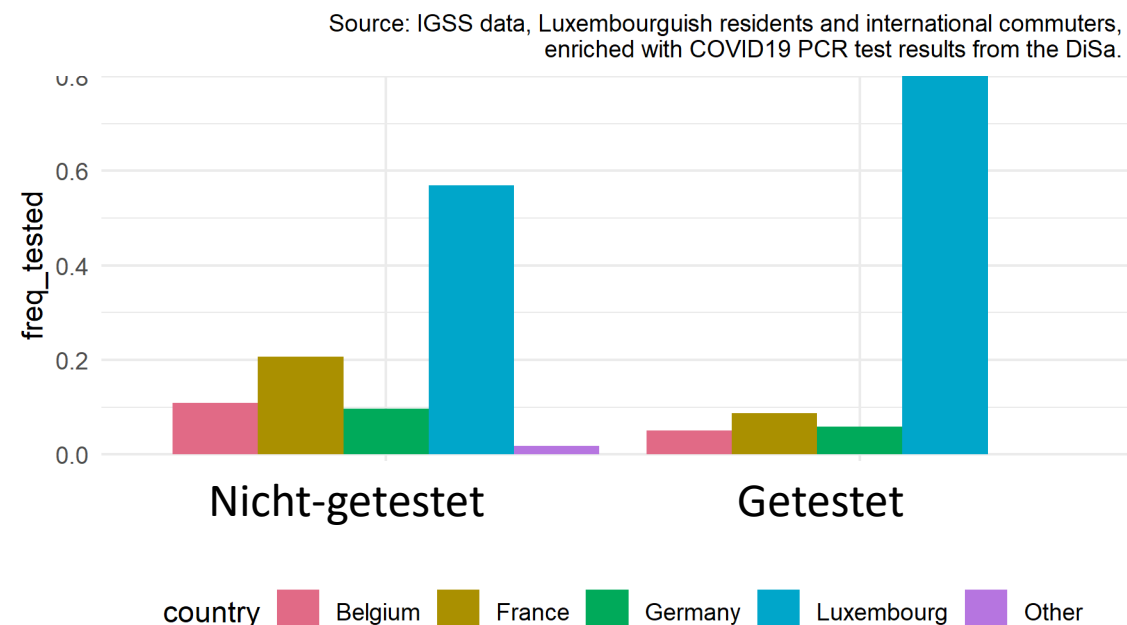
Land des Wohnsitzes

Alle Tests



Source: IGSS data, Luxembourgish residents and international commuters, enriched with COVID19 PCR test results from the DiSa.

Nur LST



Large-Scale Testing Phase 2



LST 2.0 = Änderung der Teststrategie

Phase 1

**Proaktive Mitigierung
um Infektionsketten zu
unterbrechen und
Contact Tracing zu
fördern**

Phase 2

**Langfristiges
strategisches
Monitoring der
Bevölkerung,
taktische
Interventions bei
Aufflammen**

Zeitspanne: 1. September 2020 bis Q2 2021 oder länger



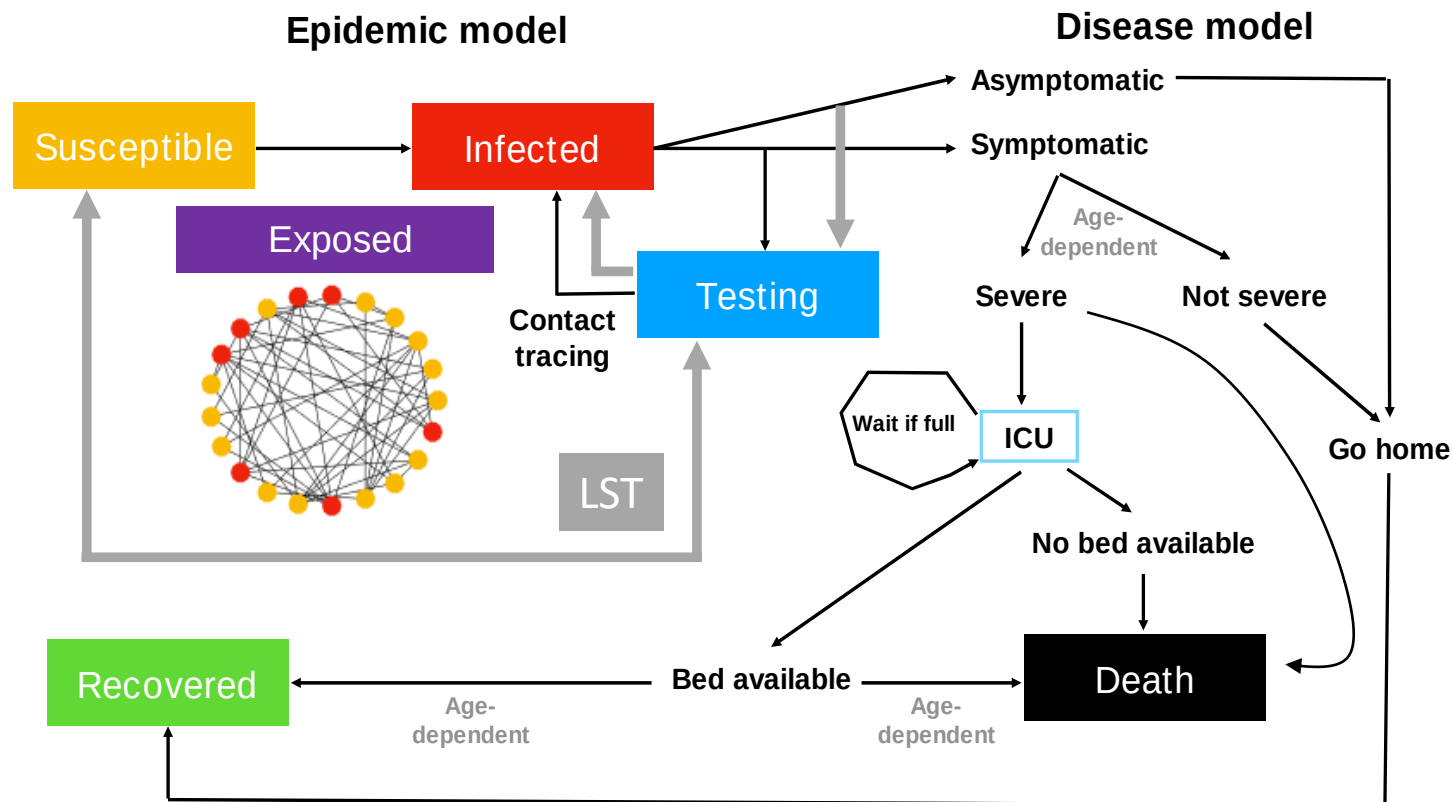
Modellierungen zum Large-Scale Testen (LST)

Atte Aalto, Laurent Mombaerts, Laurent Heirendt, Stefano Magni,
Jorge Goncalves & Alexander Skupin

09.07.2020



Covid-19 Model: Agenten basiertes SEIR-Model



S = *susceptible*
anfällig für eine Virusinfektion

E = *exposed*
dem Virus ausgesetzt

I = *infected*
derzeit Virusträger

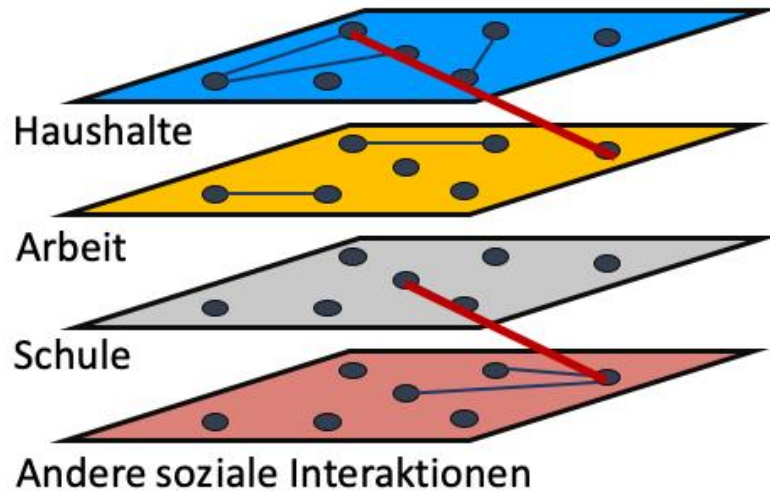
R = *recovered*
genesen

→ Dynamik wird durch **Interaktionsnetzwerke** bestimmt.

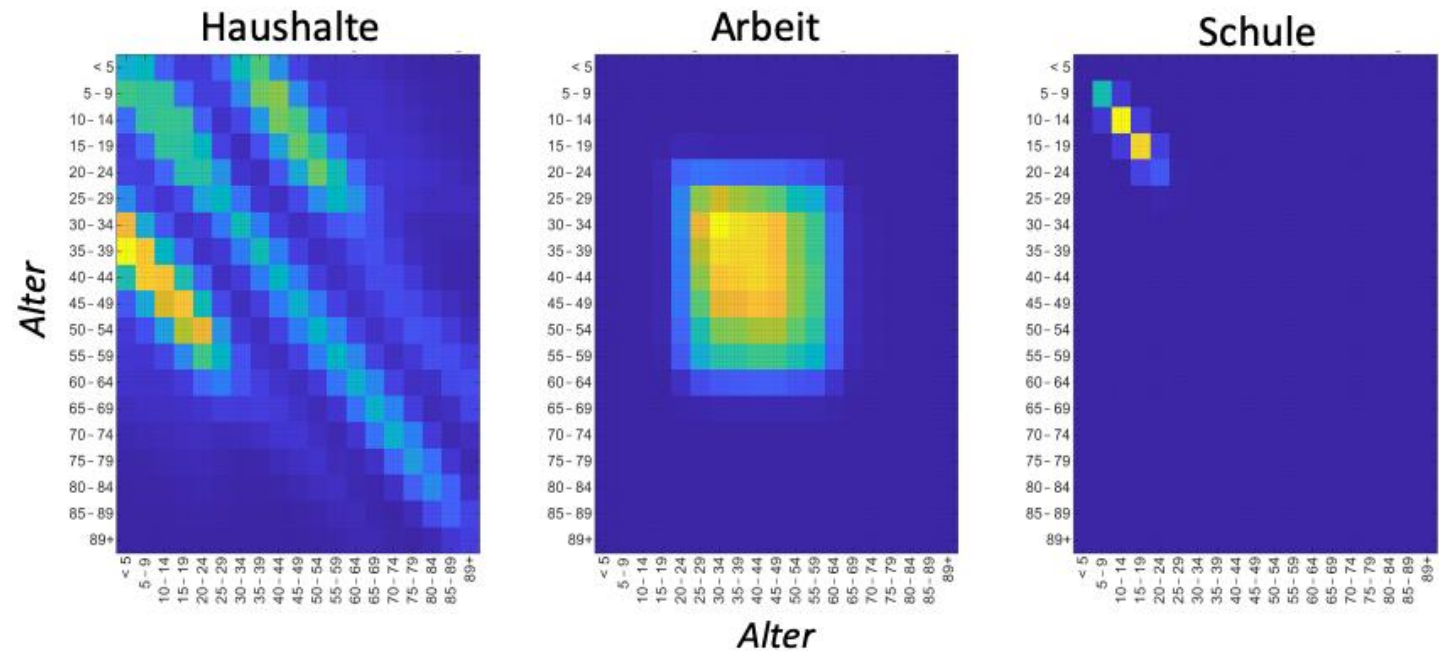


Model basiert auf IGSS generierten Netzwerken

Subnetzwerke



Altersabhängige Interaktion in den Subnetzwerken



- 630k Agenten (Bevölkerung) und 190k für Pendler
- Zufällige Interaktionen auf dem Netzwerk
- Daten-basierte Parametrisierung

Referenzszenario: Deconfinement-Maßnahmen

(Daten bis zum 20.06.2020)

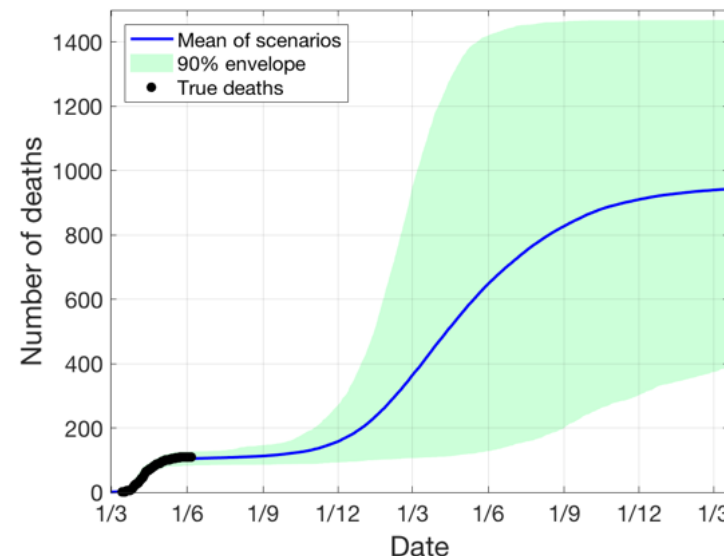
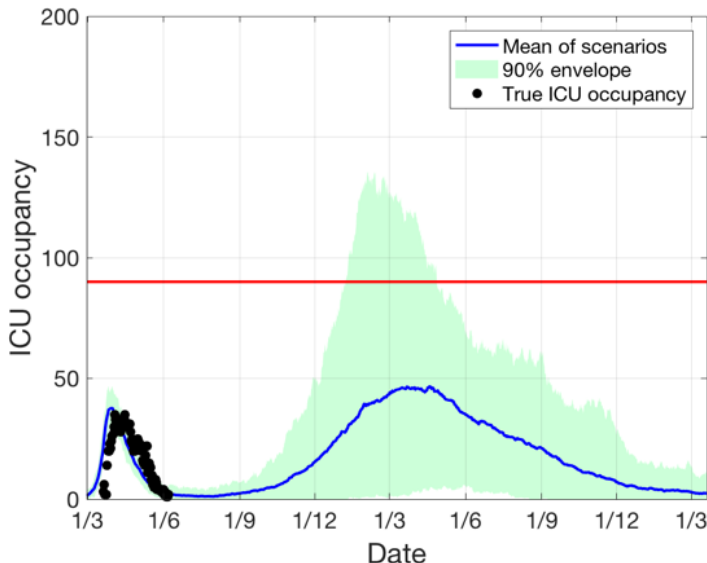


Berücksichtigt:

- Geschäfte, Restaurants und Sektoren wie bisher geöffnet
- Private Abendessen (mit 6 Gästen)
- Verbleibende Firmen ab 1. Juli geöffnet (1/3 home office)
- Baugewerbe im August geschlossen
- Generelles social distancing wird eingehalten (Masken, etc.)
- Schulbetrieb in ganzen Klassen mit sozialer Distanzierung

Einschränkung:

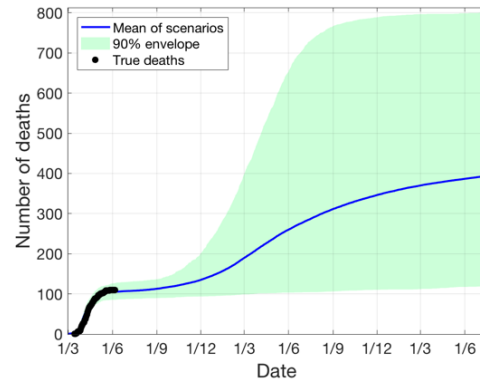
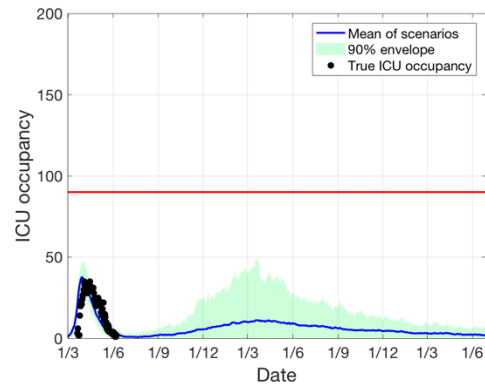
- Effekt der Urlaubszeit nur ungefähr abschätzbar.
- Einhaltung social distancing nur bedingt abschätzbar.



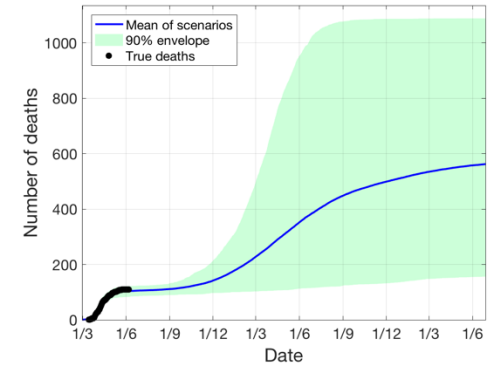
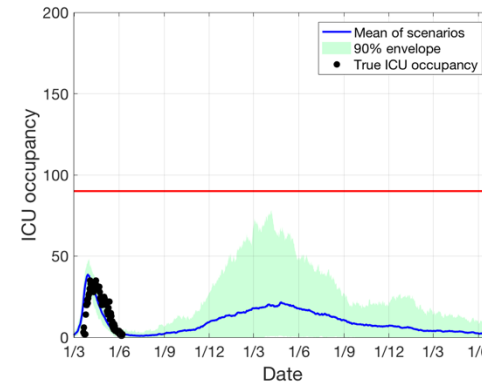


Effekt vom LST mit Maschen-Test Modalität

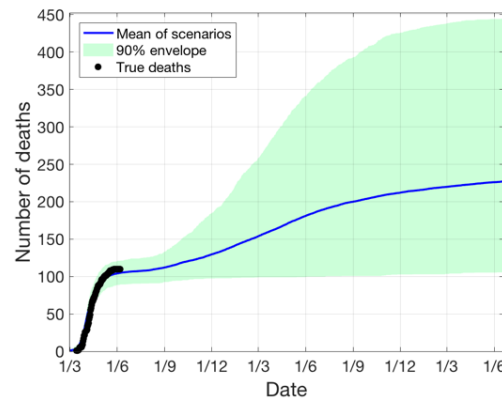
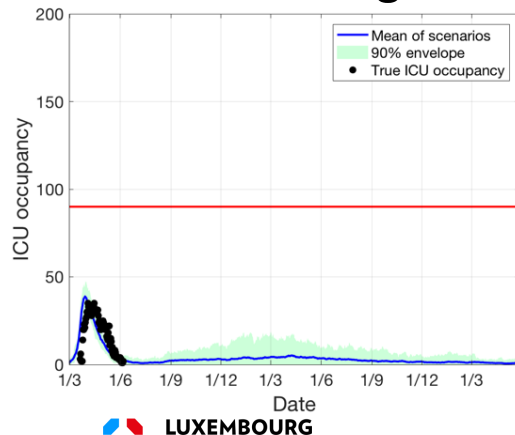
Mit 53k Tests auf Arbeitsplatz basierenden Maschen



Mit 53k Tests auf Haushalt basierenden Maschen



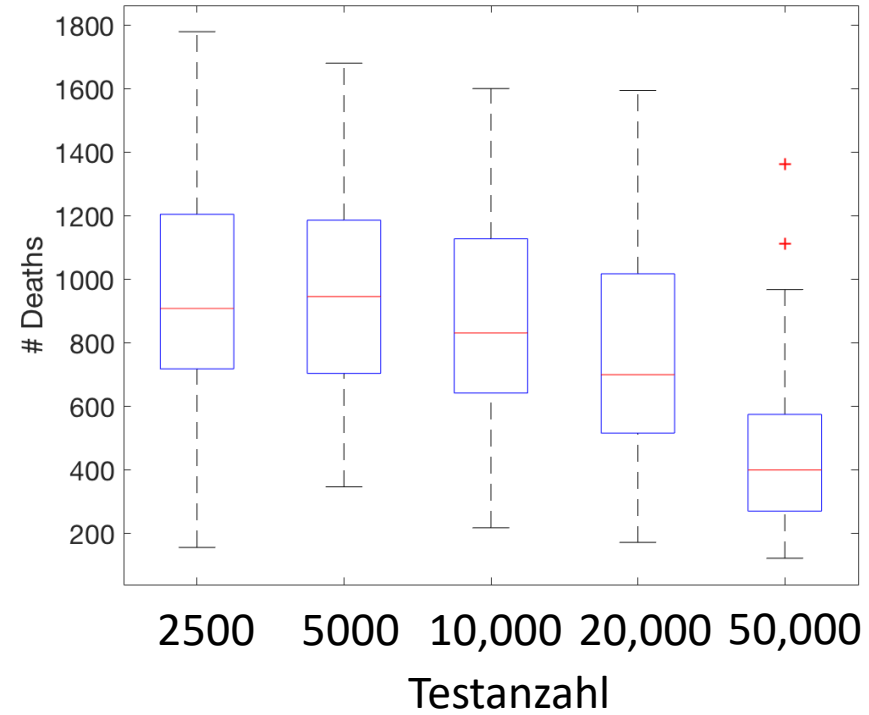
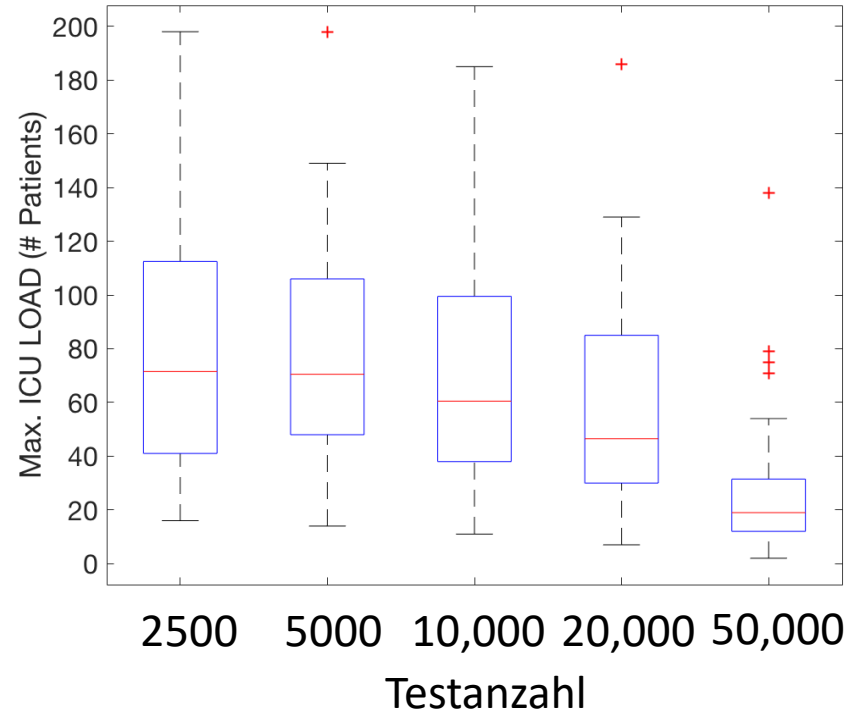
Mit 95k Tests mit gemischten Maschen



- LST reduziert Amplitude der 2. Welle
- Für 95k/Woche werden Fälle effizient isoliert
- Effizienz hängt auch vom contact tracing ab



Abhängigkeit von LST Kapazität

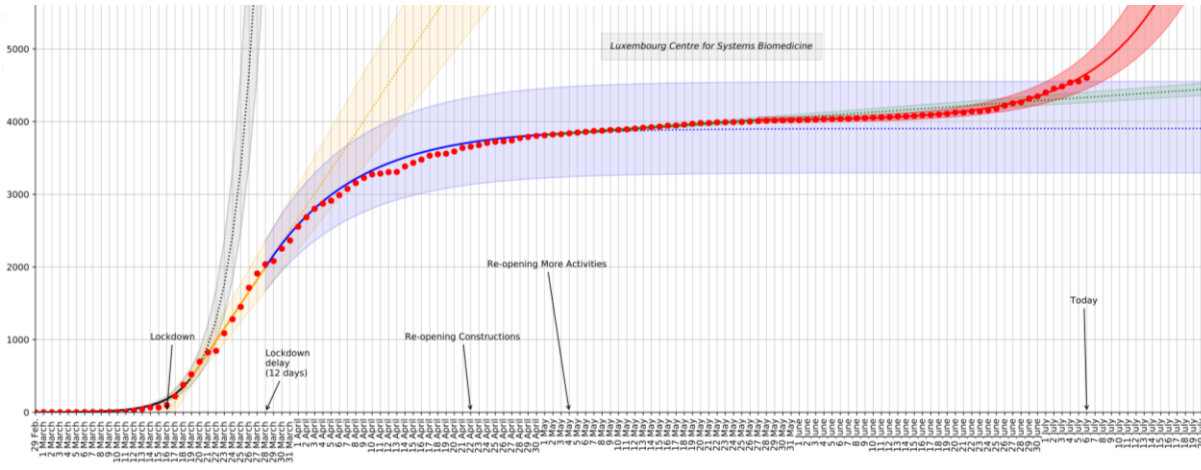


- Unterdrückung der 2. Welle benötigt > 20k Tests / Woche
- Dunkelziffer wird von einem Faktor 3 auf 2,8 (20k Testes) bzw. auf 2,5 reduziert (50k Tests).

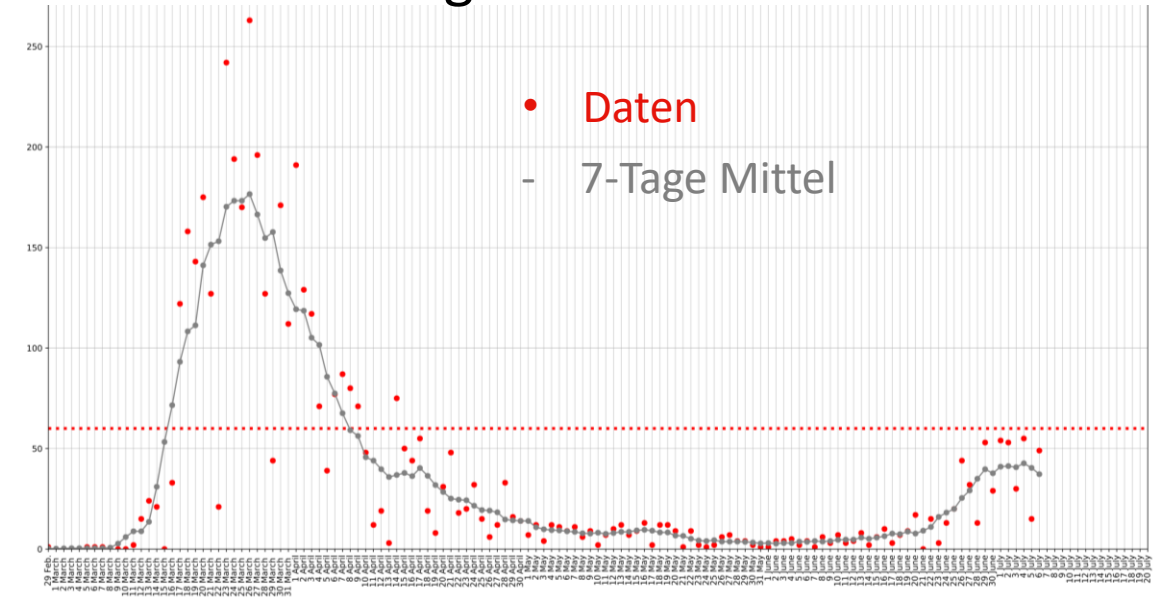


Momentane Zahlen: Indikator für eine 2. Welle?

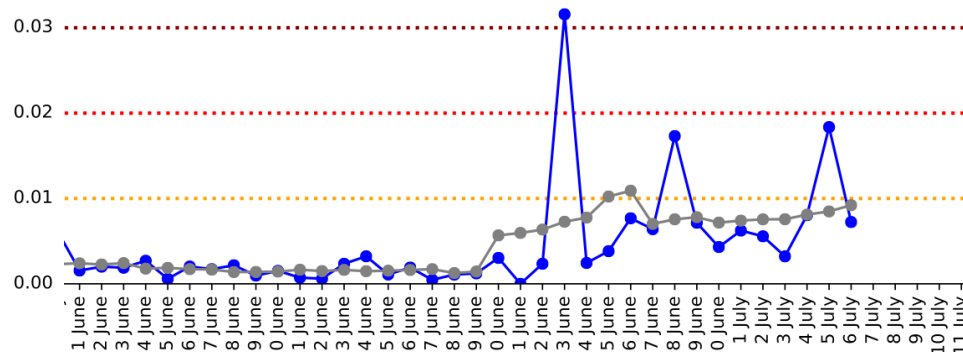
Kumulative Fallzahlen



Tägliche Fallzahlen



Normalisierte Fallzahlen



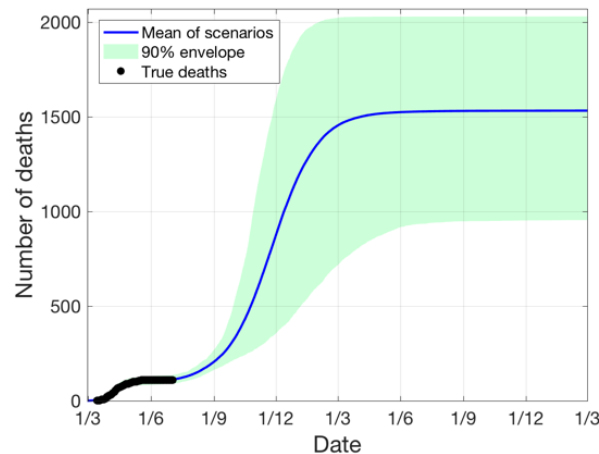
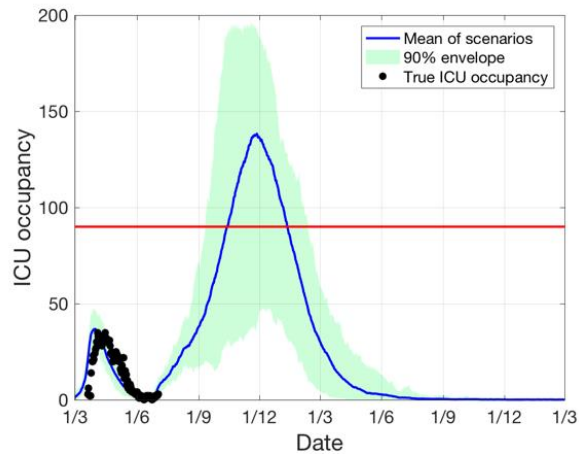
- Kritische Phase
- Contact Tracing essenziell
- Nicht LST getrieben



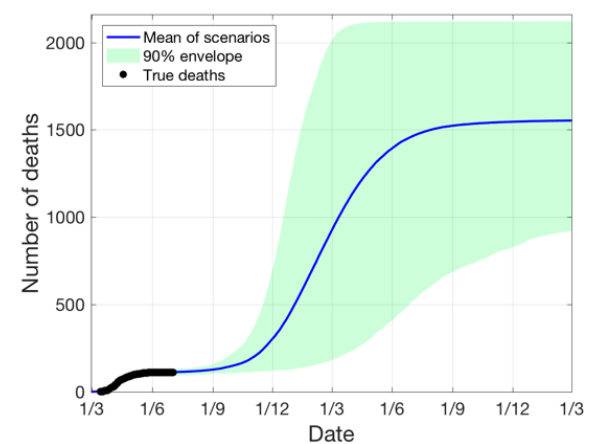
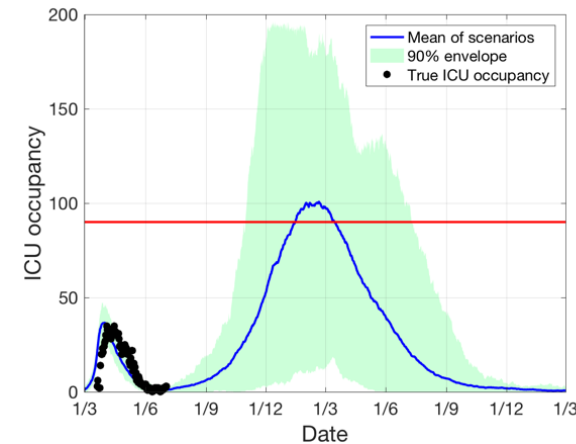
Adaptierte Projektionen (basierend auf Daten bis 07/02)

Interpretation der gestiegenen Fallzahlen:

Diffusive Prävalenz



Cluster getriebene Prävalenz



- Falls momentanen Fallzahlen eine allgemein Prävalenz widerspiegeln, führt dies zu eine stärkeren und früheren 2. Welle
- Für eine Cluster-getriebene Prävalenz zeigt sich eine abgeschwächte Welle



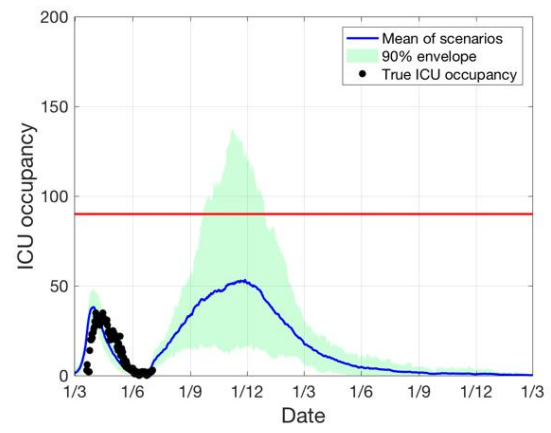
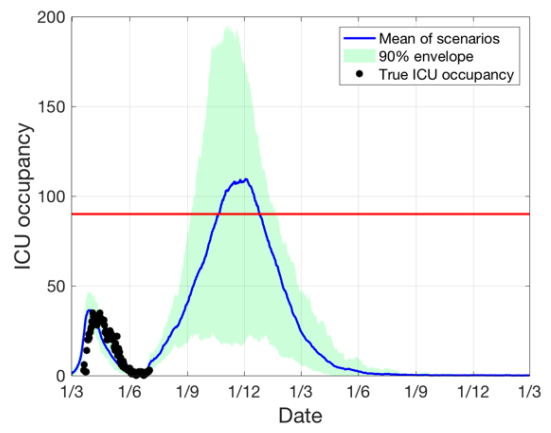
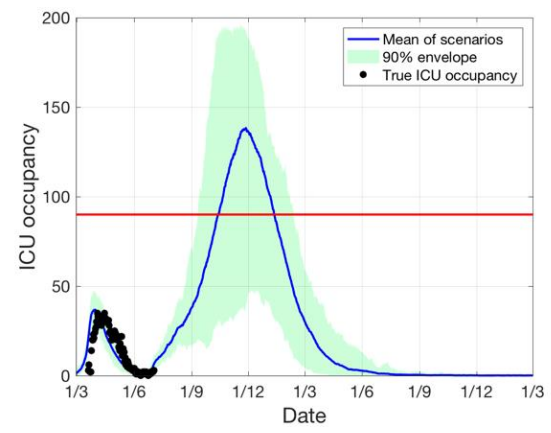
LST 2.0 (53k Tests) und Contact-Tracing Effekte

Ohne LST, CT mit 60 Fällen/Tag

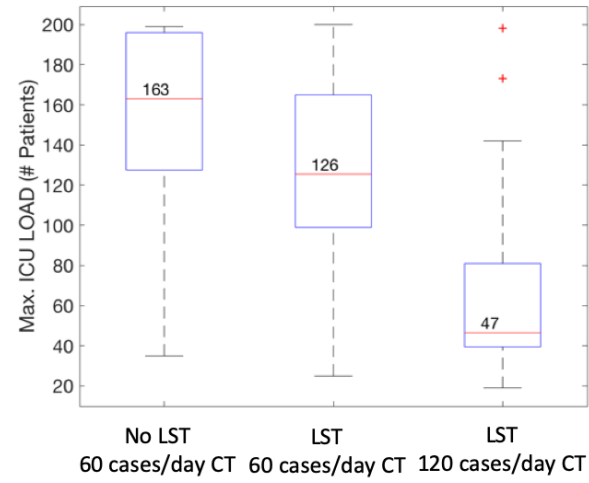
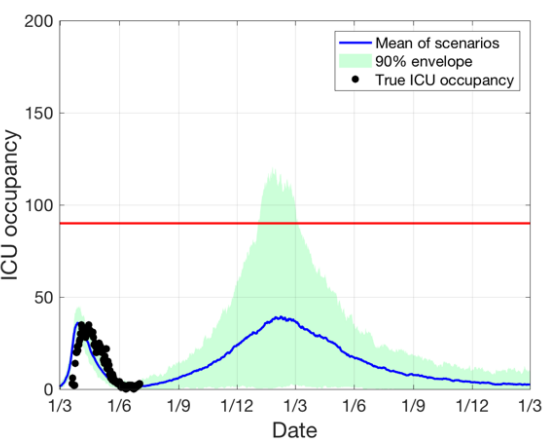
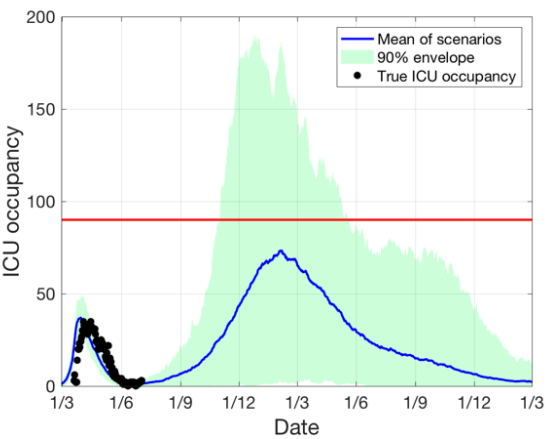
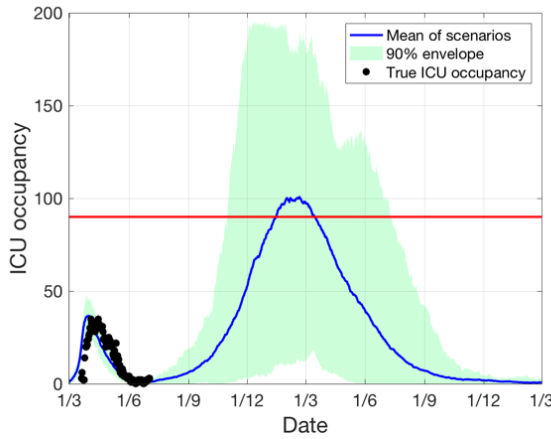
Mit LST, CT mit 60 Fällen/Tag

Mit LST, CT mit 120 Fällen/Tag

Diffusive



Cluster-getrieben





Schlussfolgerungen

1. Interaktionsnetzwerke sind der treibende Faktor der Epidemie.
2. Gruppengröße und Soziale Distanzierung sind entscheidend um 2. Welle zu mitigieren.
3. Momentane Zahlen sind alarmierend und können auf eine 2. Welle hindeuten.
4. Striktes Monitoring (LST) und effiziente Kontaktverfolgung können eine 2. Welle unterdrücken bzw. minimieren.
5. Aktive Beteiligung der Gesellschaft an diesen Maßnahmen ermöglicht normaleres Leben.

Diagnostic Methods for COVID-19 in Luxembourg R&D and Quality Aspects



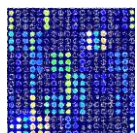
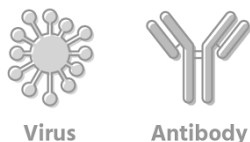
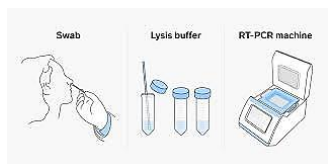
Prof. Dr. med. Markus Ollert



Director, Department of Infection and Immunity

Lead Scientists involved: Chantal Snoeck, Christiane Hilger, Carole Devaux, Danielle Perez-Bercoff, Judith Hübschen, Andy Chevigne, Dirk Brenner, Jonathan Turner, Feng He, Mahesh Desai, Xavier Dervillez

Diagnostic Methods for COVID-19 in Luxembourg R&D and Quality Aspects



Diagnostic Assay Development and Quality Control:

1. RT-PCR assays for detecting SAR-CoV-2 viral RNA.

1. Sensitivity, specificity, reproducibility, head-to-head comparison of tests.

2. RT-PCR evolution for large-scale testing (LST) by using pooling.

1. Suitability and feasibility of the LST approach using the FTD RT-PCR system

3. Antibody testing for SARS-CoV-2

1. Quality aspects of immunoassays for antibody detection
2. Field test within the national CON-VINCE cohort

4. Novel tests and competitive advantage

1. Novel multiplex antibody test developments
2. Competition and neutralization tests to assess antibody quality

Diagnostic Methods for COVID-19 in Luxembourg

RT-PCR for SARS-CoV-2 – Quality Aspects LST



ORF1ab-, N-genes/FTD, Esch-Alzette

Std dilution copies/well (10ul)	FastTrack, FTD SARS-CoV-2 (RUO)					
	-	1:10	1:20	1:100	1:200	1:1000
	2000	200	100	20	10	2
repli 1	27.19	30.51	31.36	33.87	34.85	36.4
repli 2	27.09	30.59	31.37	33.45	34.6	38.17
repli 3	27.22	30.36	31.31	33.52	34.82	36.65
repli 4	27.12	30.44	31.28	33.46	35.16	37.45
repli 5	27.16	30.36	31.35	33.63	34.42	37.87
repli 6	27.13	30.39	31.39	33.56	35.03	36.35
repli 7	27.16	30.34	31.48	33.45	34.47	37.46
repli 8	27.26	30.34	31.24	33.54	35.03	37.35
repli 9	27.19	30.54	31.45	33.84	34.63	36.18
repli 10	27.13	30.41	31.3	34.24	34.65	38.05
mean	27.17	30.43	31.35	33.66	34.77	37.19
stdev	0.048	0.085	0.071	0.242	0.239	0.705

E-gene/Charité, Berlin

Std dilution copies/well (5ul)	Generic E gene (Charité, Berlin)					
	-	1:10	1:20	1:100	1:200	1:1000
	1000	100	50	10	5	1
repli 1	28.43	31.51	32.46	35.97	36.04	45
repli 2	28.33	32.21	32.73	35.68	37.22	45
repli 3	28.35	31.42	32.81	35.05	37.03	37.76
repli 4	28.44	31.48	32.64	35.16	35.1	45
repli 5	28.39	31.59	32.21	36.69	35.62	36.64
repli 6	28.16	31.43	32.62	33.95	36.4	45
repli 7	28.26	31.66	32.83	35.02	37.63	37.47
repli 8	28.16	31.26	32.48	36.01	35.12	45
repli 9	28.2	32.02	32.61	35.06	36.93	45
repli 10	28.31	31.37	32.54	34.97	35.17	45
mean	28.30	31.60	32.59	35.36	36.23	42.69
stdev	0.099	0.284	0.175	0.717	0.902	3.543

N-gene/CDC, Atlanta

Std dilution copies/well (5ul)	Generic N gene (CDC)					
	-	1:10	1:20	1:100	1:200	1:1000
	1000	100	50	10	5	1
repli 1	27.04	30.13	31.37	34.35	34.43	35.71
repli 2	27.04	30.34	31.24	33.97	34	45
repli 3	26.96	30.07	31.25	33.54	35.24	45
repli 4	26.82	30.29	30.8	33.36	34.14	36.8
repli 5	27.05	30.15	31.06	34.19	35.52	45
repli 6	26.91	30.1	31.17	33.14	35.82	36.08
repli 7	26.78	29.83	30.72	33.48	33.67	37.83
repli 8	27.03	30.14	31.3	33.06	36.34	37.65
repli 9	26.89	30.15	30.92	33.38	33.99	36.64
repli 10	27.01	29.89	31.2	33.15	34.16	36.7
mean	26.95	30.11	31.10	33.56	34.73	39.24
stdev	0.093	0.148	0.209	0.432	0.874	3.817

Limit of detection (LoD) of the generic N & E gene assays are 5 RNA copies/reaction

Limit of detection (LoD) of the FTD assay is below 2 RNA copies/reaction using standard RNA

Through its set-up and design as a single well and dual-target assay, the FTD SARS-CoV-2 (CE-IVD; FDA-EUA) assay is ideally suited for population-based and large-scale screening due to its high sensitivity paired with no compromise in specificity and technical reliability.

Diagnostic Methods for COVID-19 in Luxembourg

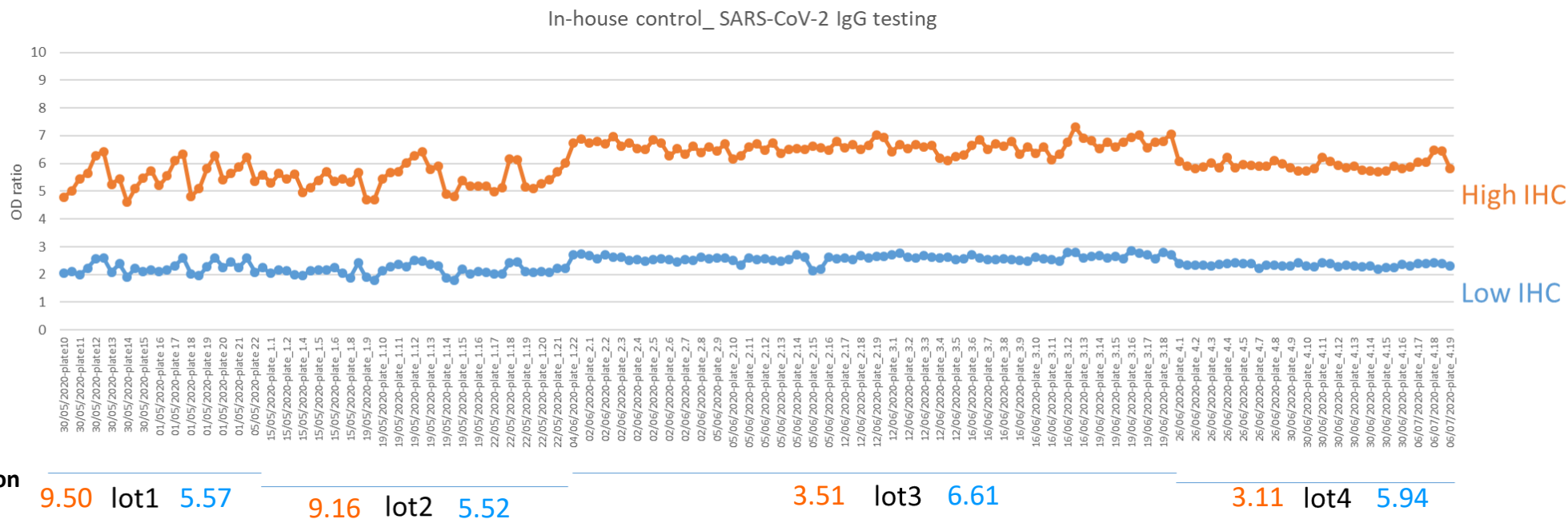
SARS-CoV-2 Antibody Tests – Quality Aspects



Virus



Antibody

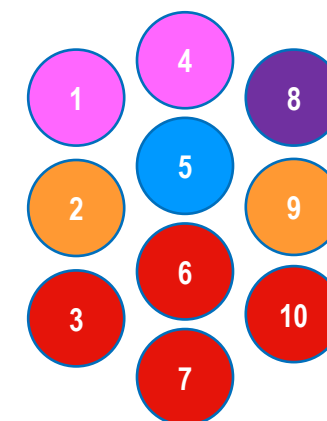
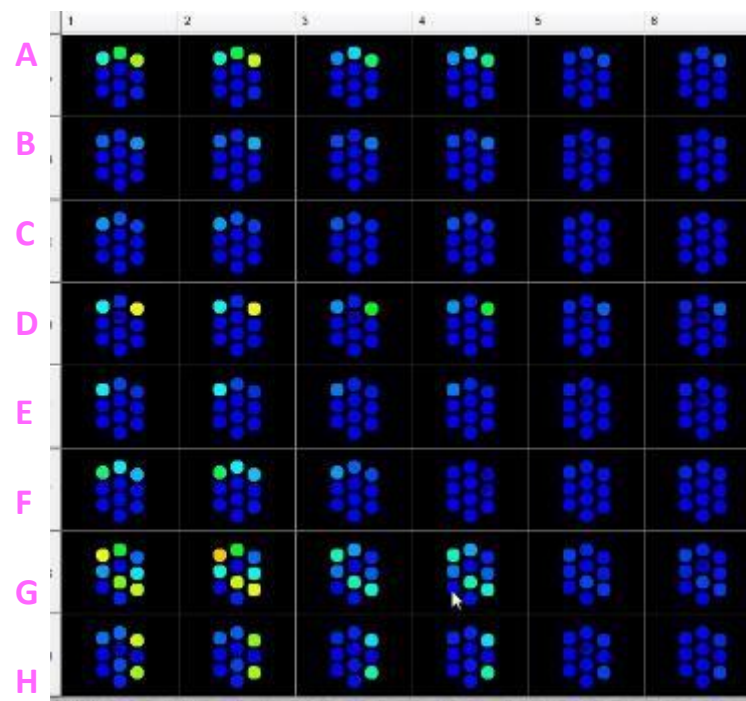


1. The antibody test used in the national CON-VINCE cohort provides high quality and robust data sets for both, IgG and IgA testing
2. The coefficients of variation, indicating the precision of the test, are constantly below 10% CV since May 2020 and improve over time

Diagnostic Methods for COVID-19 in Luxembourg SARS-CoV-2 Antibody Tests – Novel Immune Test



	1	2	3	4	5	6
A	2019 neg 1		2019 neg 1		2019 neg 1	
B	2019 neg 2		2019 neg 2		2019 neg 2	
C	2019 neg 3		2019 neg 3		2019 neg 3	
D	2019 neg 4		2019 neg 4		2019 neg 4	
E	2019 neg 5		2019 neg 5		2019 neg 5	
F	pool neg FW	pool neg FW	blank	pool neg FW		
G	Covid03		Covid03		Covid03	
H	Covid04		Covid04		Covid04	
serum dilutions		1/500		1/1000		1/5000



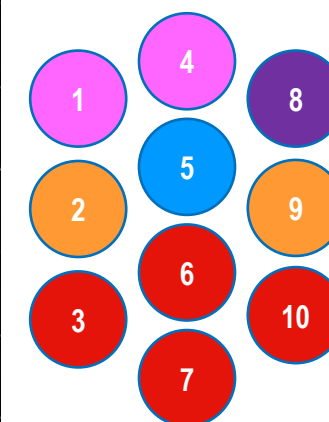
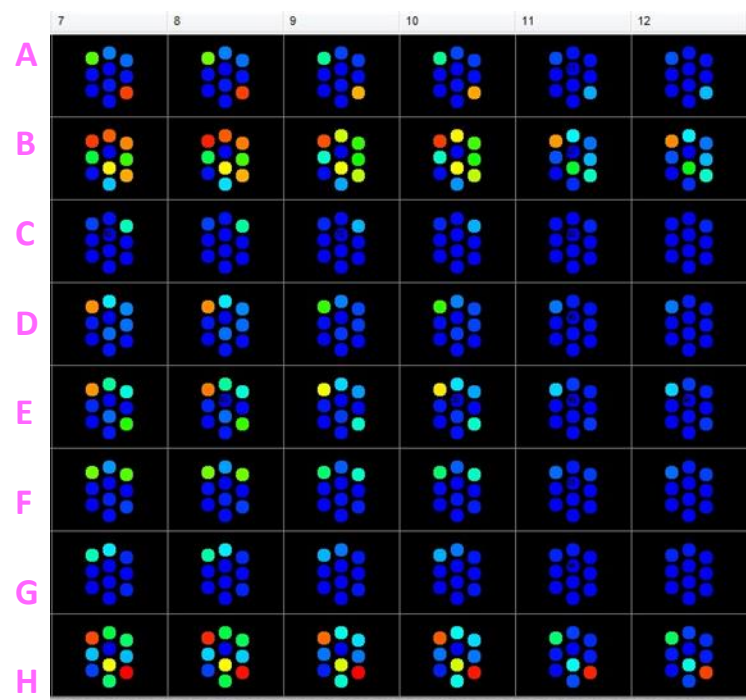
1. OC43 S
2. CoV-1 S
3. CoV-2 NTD
4. HKU1 S
5. BSA
6. CoV-2 S
7. CoV-2 RBD
8. H3/Hongkong
9. MERS S
10. CoV-2 N

1. A novel multiplex antibody test enables unprecedented possibilities to analyze the immune response against various antigens of the new SARS-CoV-2 in parallel with other Co-viruses and the flu virus
2. The assay has been evaluated at the LIH and will be field-tested in the national COVID-19 patient- and population-based cohorts

Diagnostic Methods for COVID-19 in Luxembourg SARS-CoV-2 Antibody Tests – Novel Immune Test



	7	8	9	10	11	12
A		Covid13		Covid13		Covid13
B		Covid17		Covid17		Covid17
C		Covid26		Covid26		Covid26
D		Covid32		Covid32		Covid32
E		Covid34		Covid34		Covid34
F		Covid37		Covid37		Covid37
G		Covid39		Covid39		Covid39
H		pool positif		pool positif		pool positif
serum dilutions		1/500		1/1000		1/5000



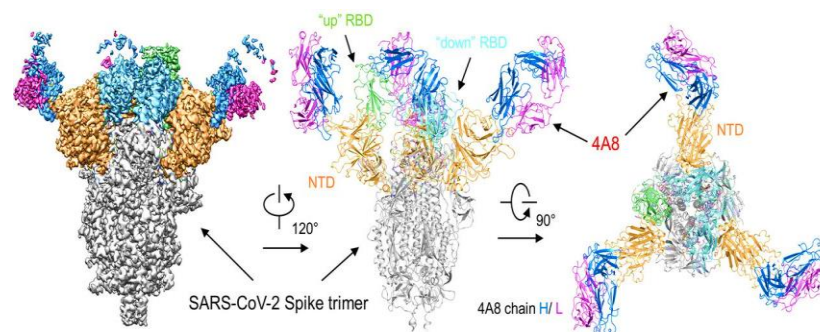
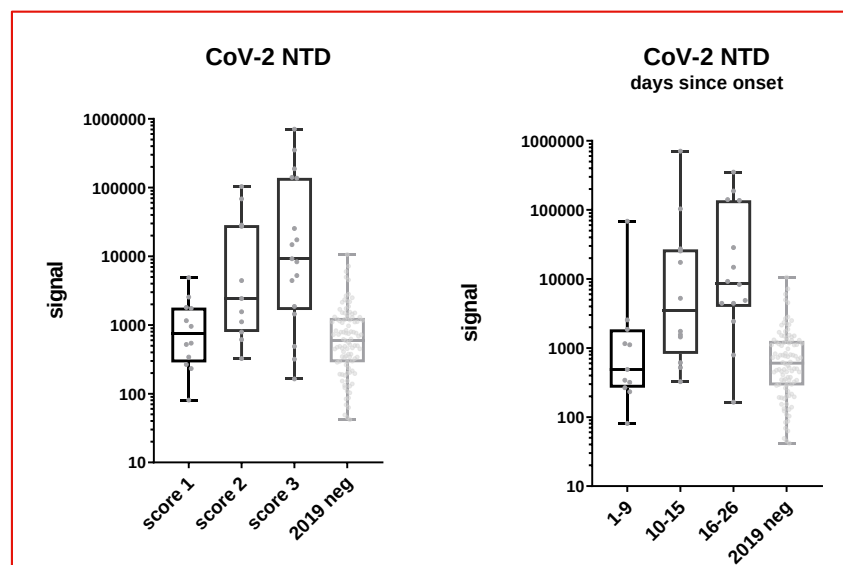
1. OC43 S
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Diagnostic Methods for COVID-19 in Luxembourg SARS-CoV-2 Antibody Tests – Novel Immune Test

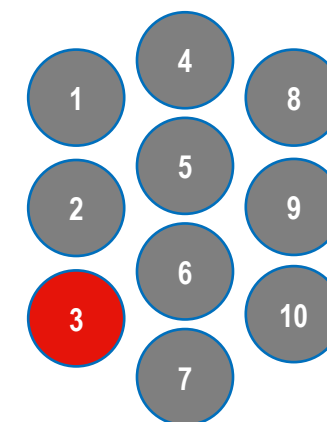


COVID-19 patients/CHL and negative specificity cohort 2019/LNS



Science 22 Jun 2020: eabc6952
DOI: 10.1126/science.abc6952

CoV-2 **NTD**: N-terminal protein
domain of the SARS-CoV-2 spike (S)
protein

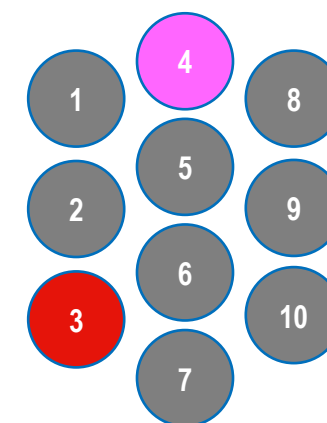
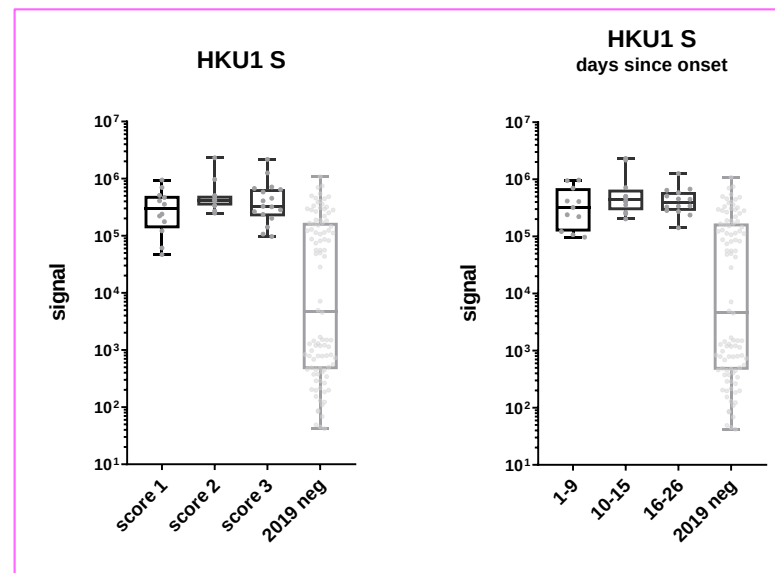
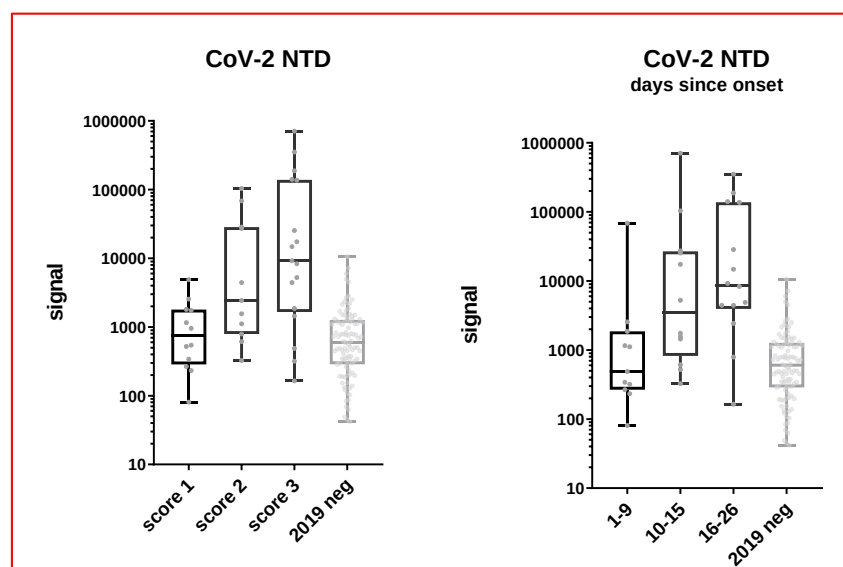


1. OC43 S
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3. **CoV-2 NTD**
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5. BSA
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Diagnostic Methods for COVID-19 in Luxembourg SARS-CoV-2 Antibody Tests – Novel Immune Test



COVID-19 patients/CHL and negative specificity cohort 2019/LNS



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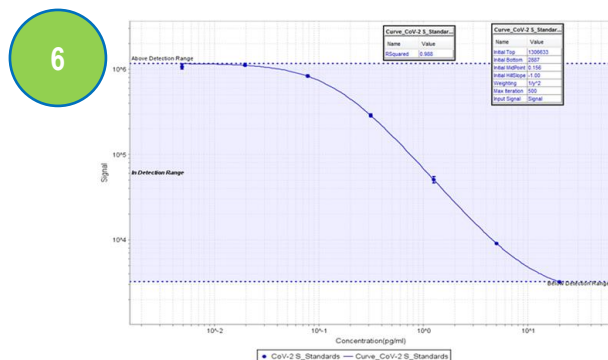
1. The novel multiplex antibody test offers the potential for disease- and symptom-specific stratification of immune responses
2. Together with neutralizing and binding competition antibody tests, this will allow to define functional individualized antibody profiles

Diagnostic Methods for COVID-19 in Luxembourg SARS-CoV-2 Antibody Tests – Novel Immune Test

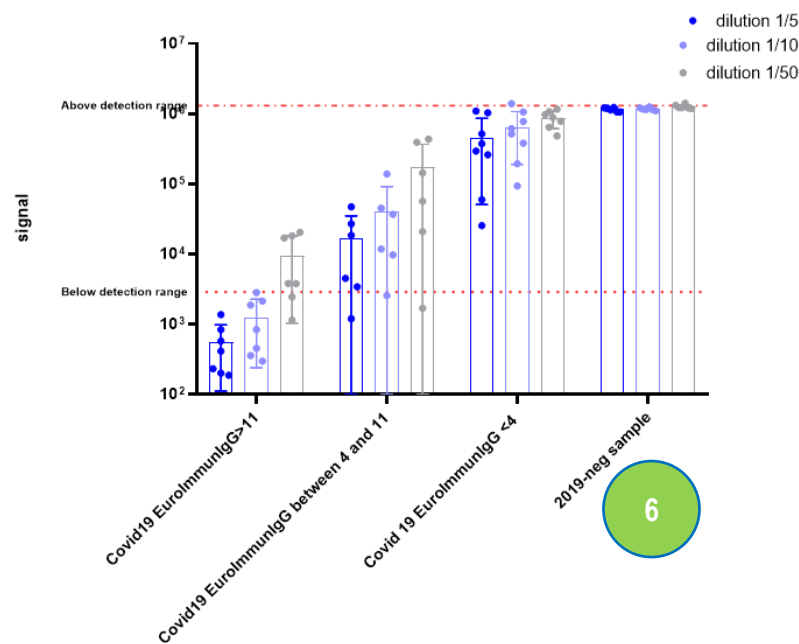


COVID-19 patients/CHL and negative specificity cohort 2019/LNS

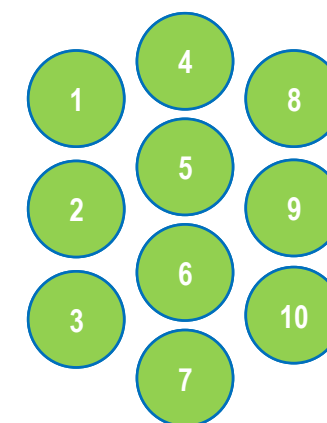
Standard Curve



200207 Custom competition assay : spot CoV-2S : dilution comparison



Labelled human
ACE-2 receptor



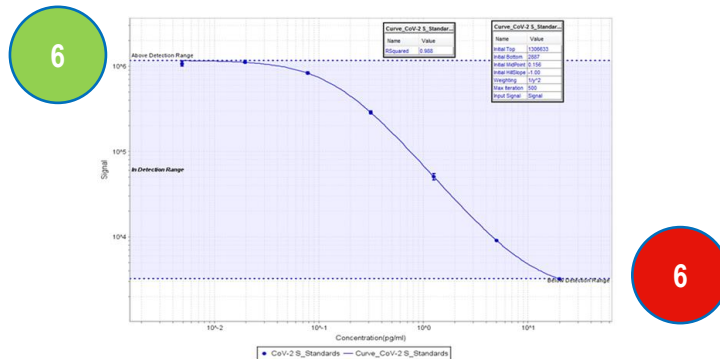
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Diagnostic Methods for COVID-19 in Luxembourg SARS-CoV-2 Antibody Tests – Novel Immune Test

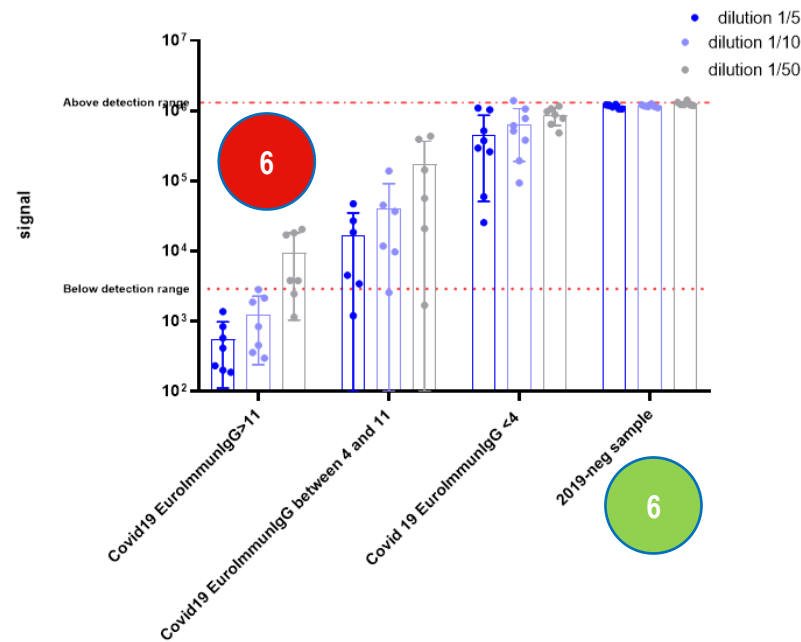


COVID-19 patients/CHL and negative specificity cohort 2019/LNS

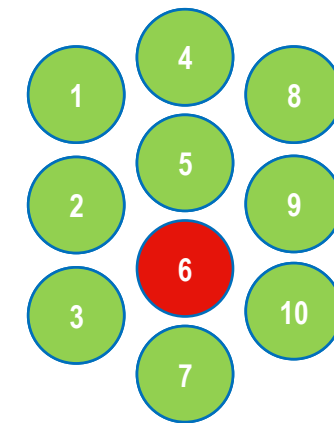
Standard Curve



200207 Custom competition assay : spot CoV-2S : dilution comparison



Labelled human
ACE-2 receptor



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10. CoV-2 N

The novel multiplex antibody test offers a functional antibody binding surrogate measurement that allows quantification of antibodies, which are inhibiting the interaction of the SARS-CoV-2 Spike antigen with its human receptor ACE-2



Zusammenfassung

1. Die Qualität von RT-PCR Diagnoseverfahren, die in Luxemburg für Forschung und klinische Routine verwendet werden, ist sehr hoch.
2. Der im Large-Scale-Testing LST derzeit verwendete RT-PCR-Test von FTD zeigt eine besonders gute analytische Sensitivität.
3. Nachweisverfahren von Antikörpermessungen gegen SARS-CoV-2, die für die nationale Kohorte CON-VINCE eingesetzt werden, sind sehr verlässlich.
4. Neue Multiplex-Antikörpertests für SARS-CoV-2 und andere Viren eröffnen erstmals die Möglichkeit, ein funktionelles Antikörperprofil zu erfassen.

CON-VINCE

Covid-19 National survey for assessing Viral
spread by Non-affected Carriers

Prof. Rejko Krüger

Director of Transversal Translational Medicine, LIH



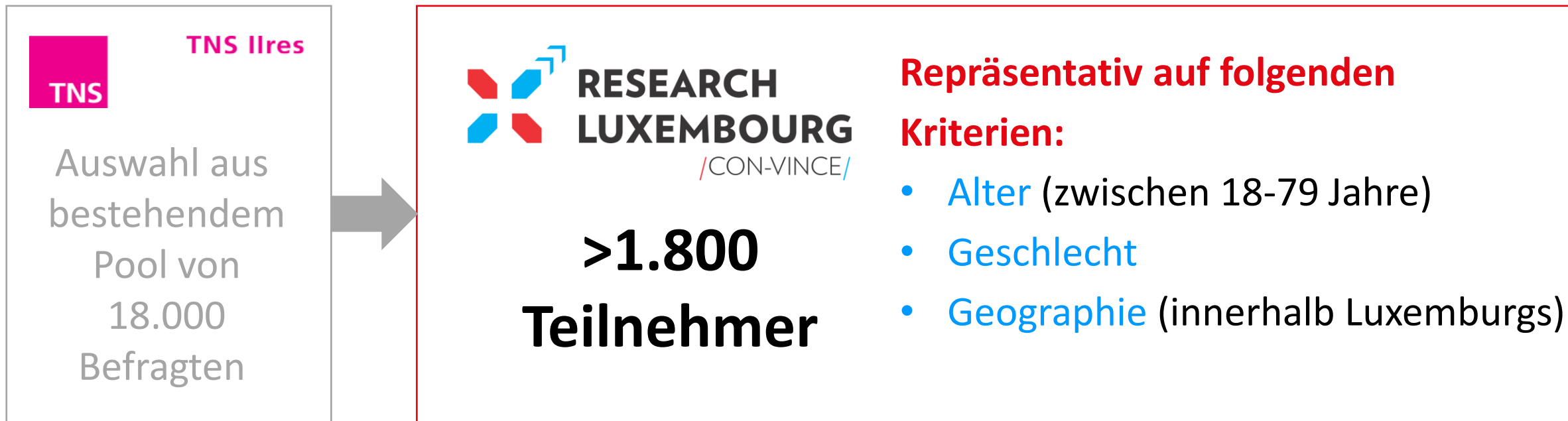
Ziele der CON-VINCE Studie

Folgende SARS-CoV-2 Effekte in Luxemburg verstehen:

- **Prävalenz:** Wie viele Menschen infiziert sind?
- **Dynamik:** Wie sich diese Zahlen über die Zeit verändern?
(inklusive Entwicklung einer Immunität)
- **Durchdringung:** Wie viele hatten Kontakt mit dem Virus?

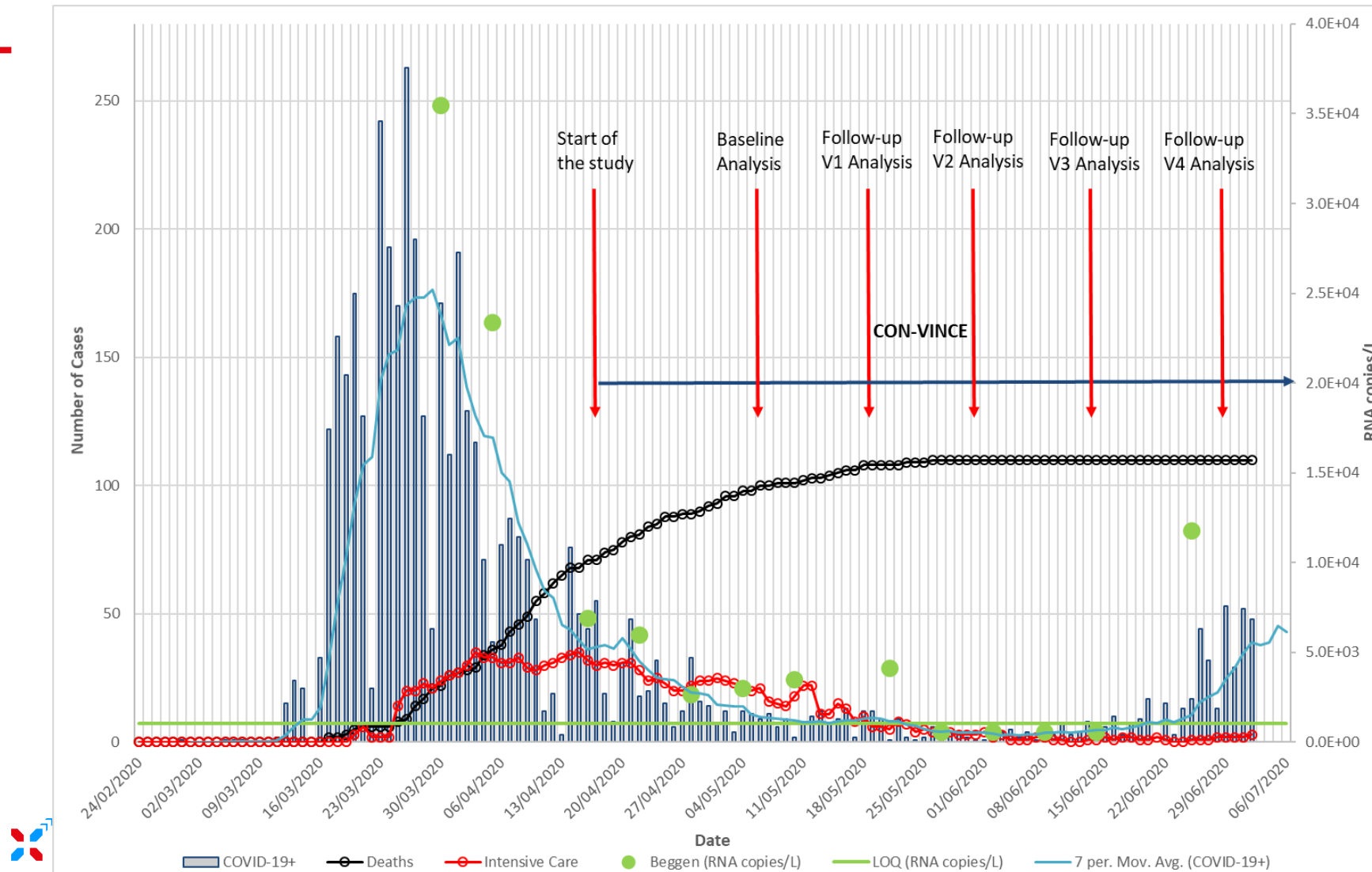


Teilnahme basierend auf repräsentativem Panel der Bevölkerung Luxemburgs



>88% aller Teilnehmer unterstützen die Studie regelmässig

Kontext der CON-VINCE Studie



Danach noch eine weitere Teilnahme in 2021 vorgesehen

Follow-up 4 von
15.06 - 28.06.2020

Proben- und
Datensammlung
unmittelbar VOR dem
aktuellen Wiederanstieg
der Infektionszahlen ab
dem 28. Juni
(44 Positive/3506 Tests)



Was bedeutet dies für das gesamte Land?

Visit	Prevalence in the population 18-79 years		Seroprevalence in the population 18-79 years	
	Based on RT-PCR		based on IgG	
	% (Lower and Upper limit 95% confidence Interval)	Number (Lower and Upper limit 95% confidence Interval)	% (Lower and Upper limit 95% confidence Interval)	Number (Lower and Upper limit 95% confidence Interval)
V0	0.30% (0.03 ; 0.56)	1449 (145; 2754)	2.09% (1.37 ; 2.82)	10211 (6670; 13753)
V1	0.088% (0.01 ; 0.36)	402 (26; 1768)	2.65% (1.82 ; 3.72)	12909 (8848; 18151)
V2	0.09% (0.00 ; 0.50)	440 (11; 2446)	3.01% (2.10 ; 4.16)	14654 (10235; 20284)
v3	0.13% (0.02 ; 0.45)	612 (73; 2214)	2.66% (1.80 ; 3.77)	12968 (8796; 18385)
v4	-	0	2.91% (2.01 ; 4.06)	14169 (9775; 19811)



Prävelenzstudie und Clustererkennung?



Con-Vince participant negative



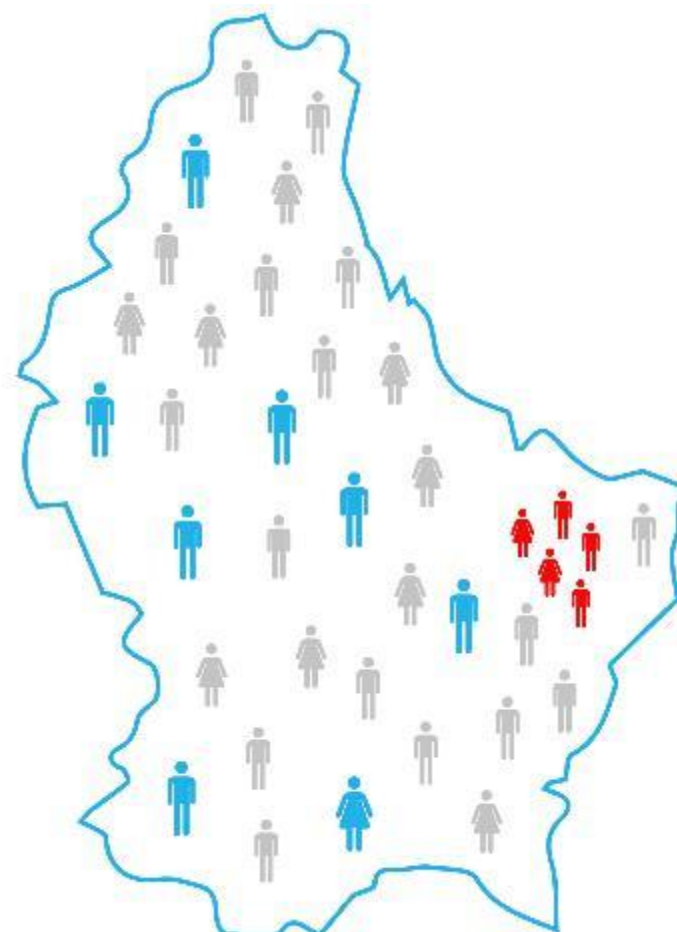
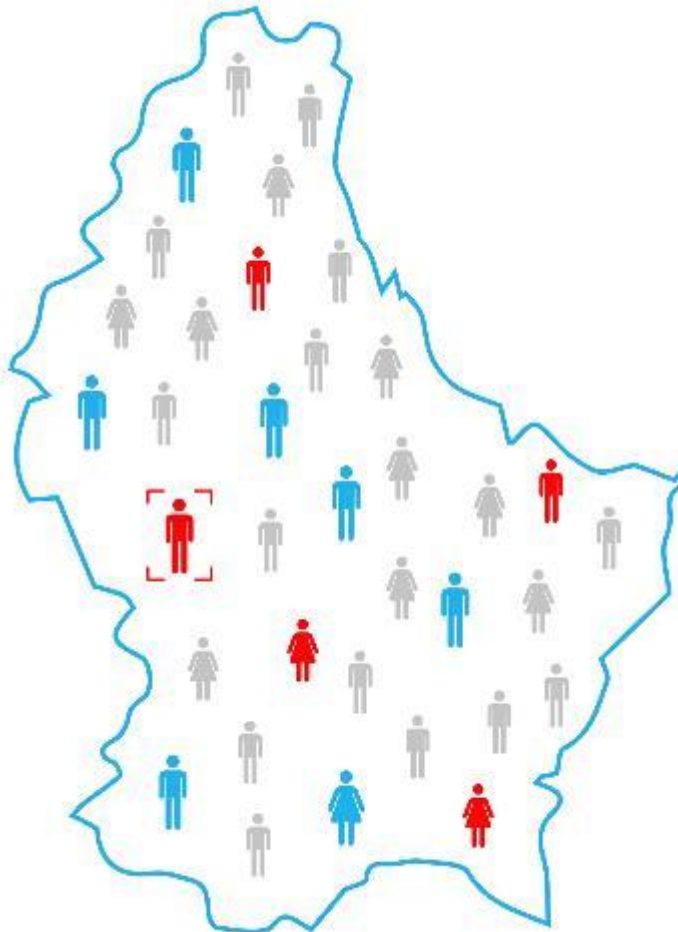
Con-Vince participant positive



Not captured positive clusters



General population





Partner der CON-VINCE Studie

CRF and study protocol establishment	Recruitment and data collection	Data integration and storage	Sample collection	Sample processing and storage
				
				Financial support
				



*Thank
you*

CORONASTEP

Update of the monitoring SARS-CoV-2 in wastewater



Henry-Michel Cauchie
Leslie Ogorzaly

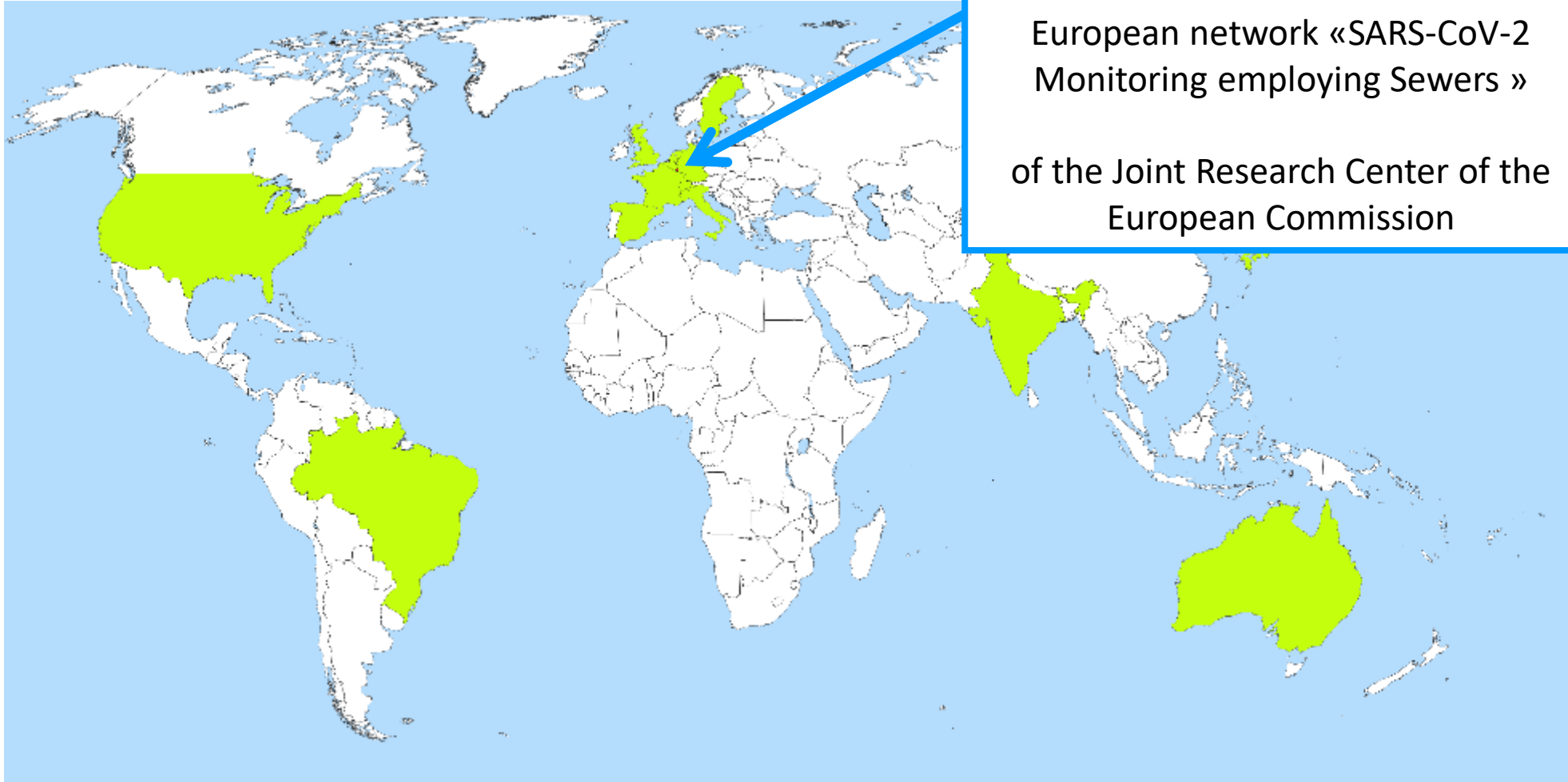
LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY



Environmental Microbiology Group

Monitoring SARS-CoV-2 in wastewater

An international effort



LIST involved in the

European network «SARS-CoV-2
Monitoring employing Sewers »

of the Joint Research Center of the
European Commission

Context and Rationale

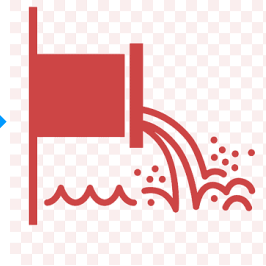
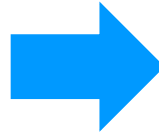
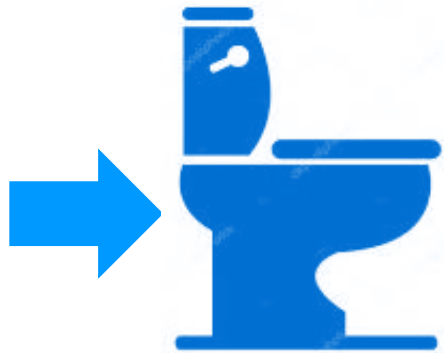
«Sewer epidemiology» is another way of looking at the prevalence in the population



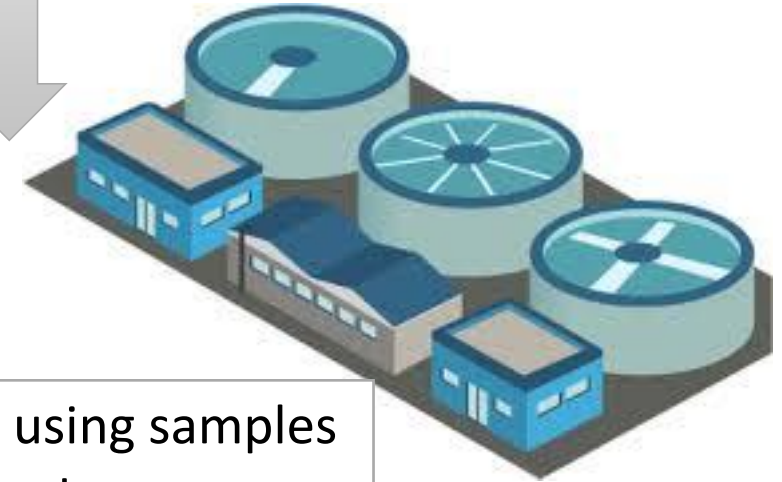
Symptomatic



Asymptomatic



Integrated sampling
of a large population



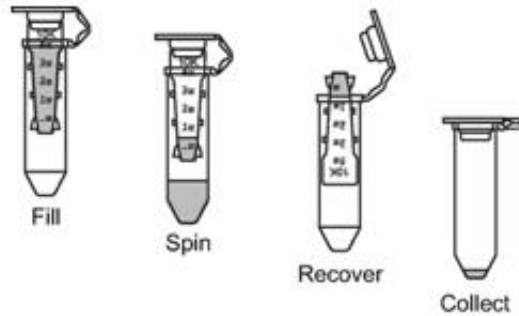
- Allows a coverage of 70% of the population using samples from only 7 major wastewater treatment plants
- Results obtained within two days
- Relatively inexpensive

Methodology

SARS-CoV-2 concentration and detection



1-litre composite sample collected over 24 hours by the wastewater treatment plant employees



Sequential centrifugation and ultrafiltration to concentrate the viruses and eliminate interfering substances

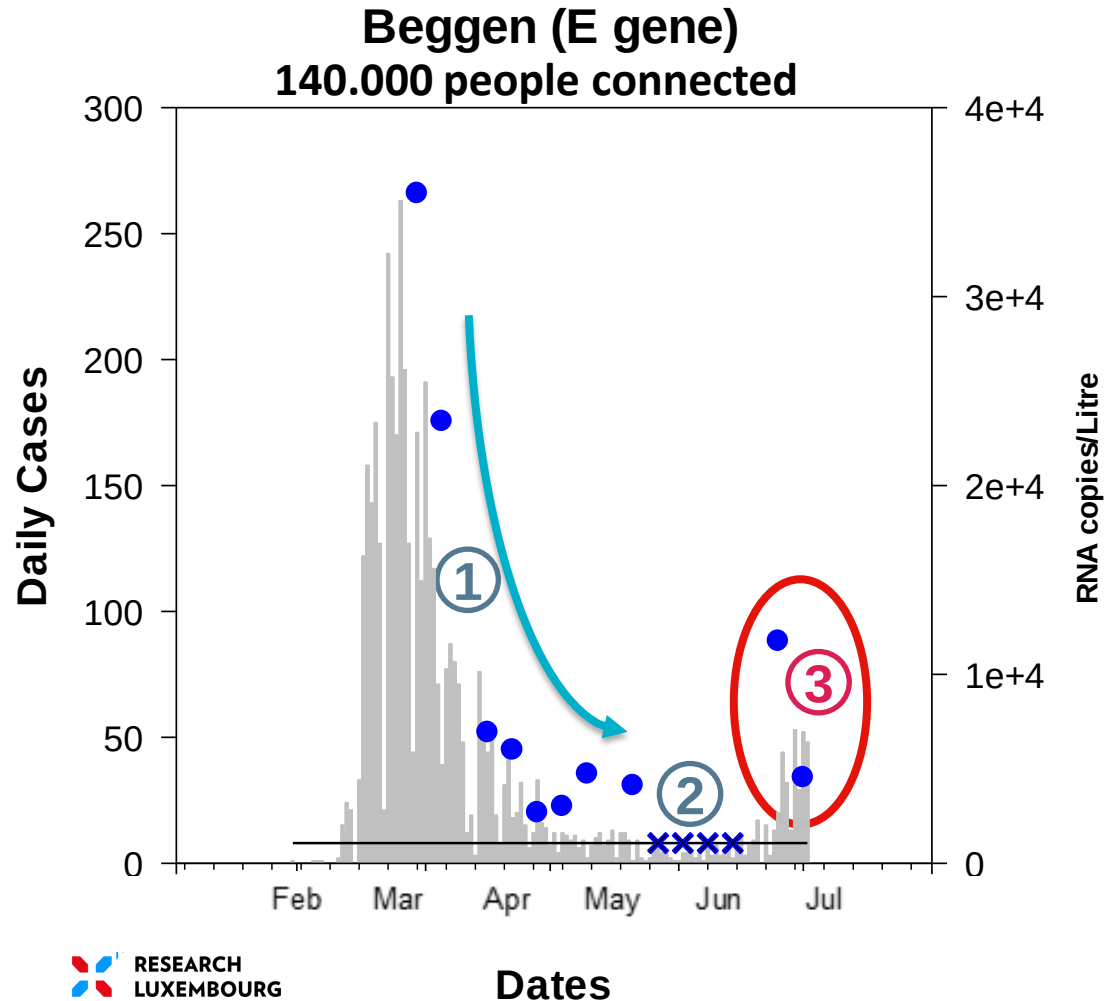


RT-qPCR targeting E and N genes (same protocols as this for clinical samples)

- Wastewater volume analysed: **120 mL**
- Concentration by **ultrafiltration**
- **RT-qPCR** targeting E and N genes (same protocol as at LIH)

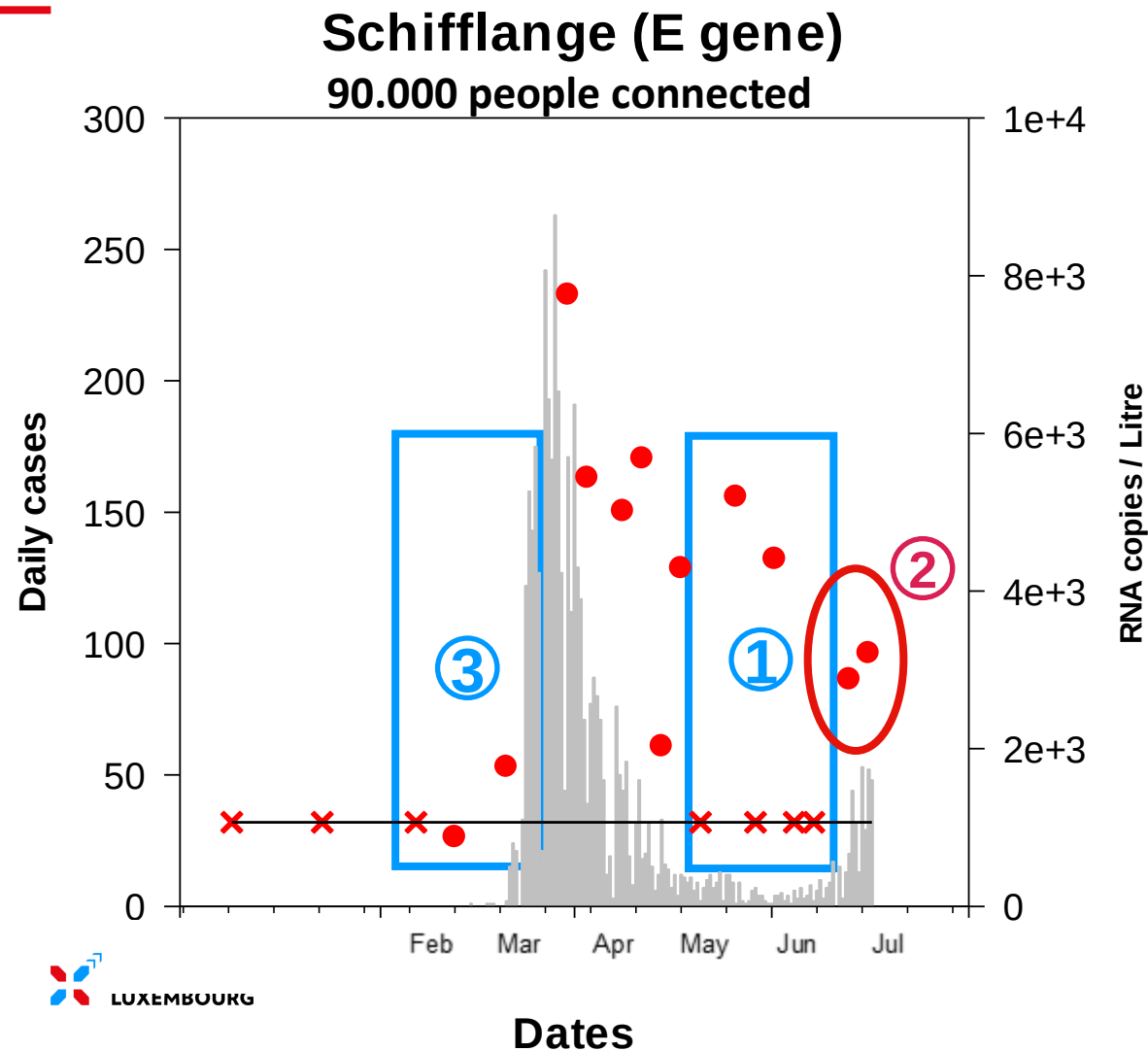
Results

Re-emergence of positive samples in wastewater in late June – early July

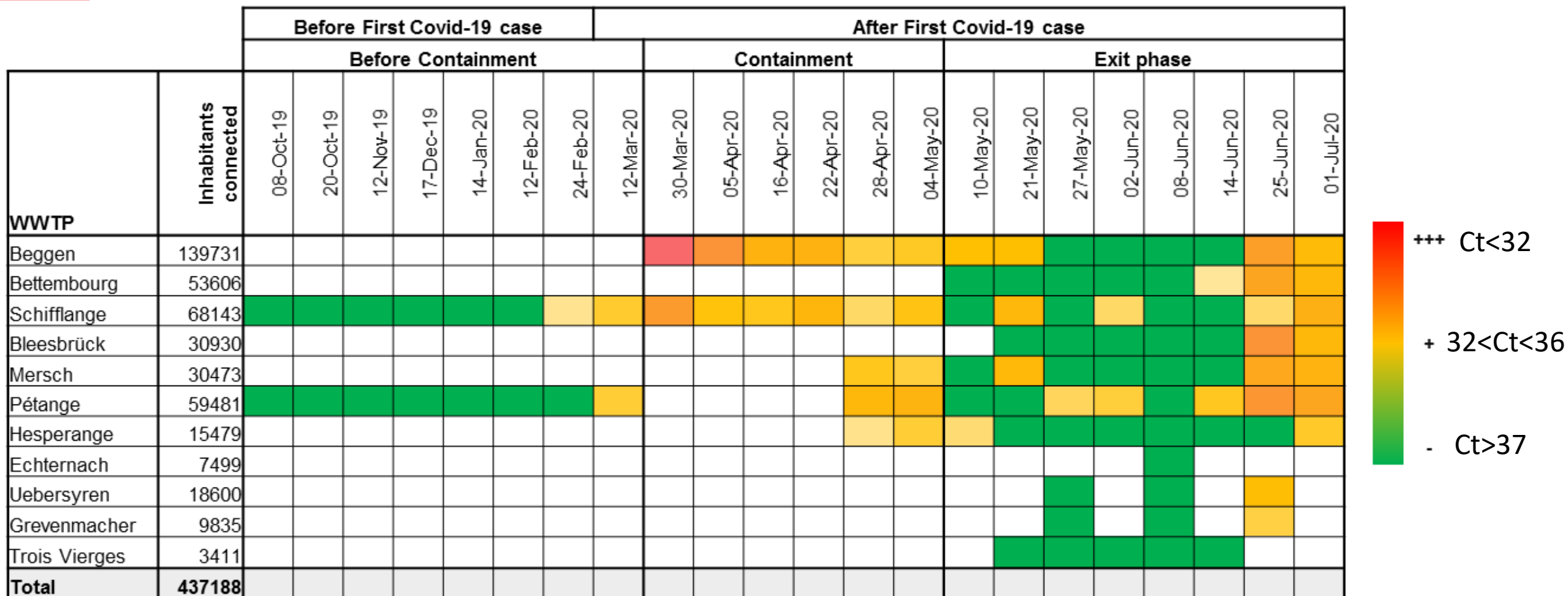


Results

Re-assessment of the beginning of the pandemics



Summary of the available SARS-CoV-2 data in wastewater





Conclusions

- The monitoring of SARS-CoV-2 in wastewater is a very sensitive technique that gives positive signals when the number of active cases are around 20-30 in the contribution zone of the wastewater treatment plant
- A re-emergence of positive samples has been observed during the two last weeks in the wastewater all over the country
- The archive samples prior to March 2020 have been reanalysed in collaboration with LNS. It confirms the first positive in wastewater on February 24th, 2020

Acknowledgements

• Environmental Microbiology Research Group LIST

- Leslie Ogorzaly
- Delphine Collard
- Christian Penny
- Cécile Walczak



• International collaboration



• Hospitals



• Wastewater treatment syndicates and Water administration



GRAND-DUCHÉ DE LUXEMBOURG
ADMINISTRATION DE LA GESTION DE L'EAU

RESEARCH LUXEMBOURG COVID-19 TASK FORCE

Eine Task Force zur Koordinierung der öffentlichen Forschung im Rahmen der
COVID-19 Pandemie