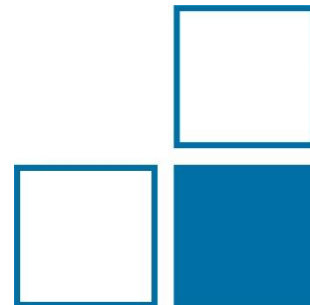
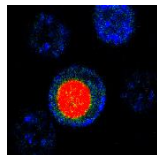
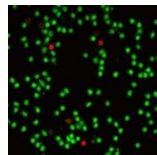
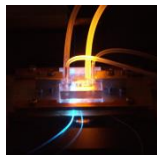
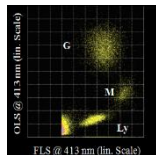


Metrology Support for Quality Assurance of Tests for Infectious Diseases Like COVID19 and Other Pandemics

Rainer Macdonald

Fachbereich Biomedizinische Optik

rainer.macdonald@ptb.de



Biomolecular Detection & Measurement of Pathogens

socio-economic relevance:

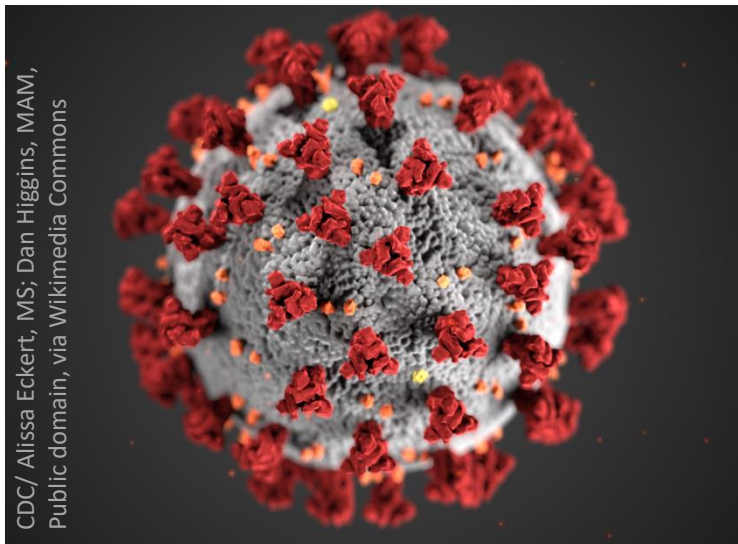
- biomedical / laboratory medical testing is highly important for coping with epidemics / pandemics
- test results have huge impact on
 - diagnostic
 - health policy
 - economic

decisions



➤ **quality and comparability of test results !**

The Enemy



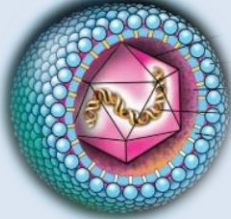
RNA - Virus

End 2019:	COVID-19 reported
Early 2020:	SARS-CoV-2 identified
Jan. 2020:	Epidemic (China)
Mar. 2020:	Pandemic

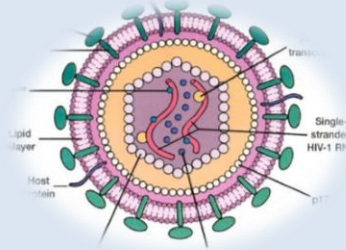
COVID-19 testing crucial

- | | |
|------------------|---------------|
| ➤ PCR tests | } infection |
| ➤ Antigen tests | |
| ➤ Antibody tests | immune status |

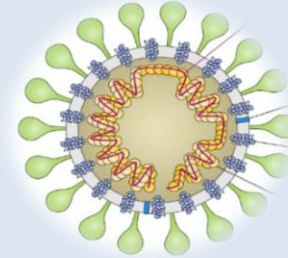
ddPCR for Virus Quantitation



Human
Cytomegalovirus
(CMV)
2018



Human
Immunodeficiency
Virus 1 (HIV-1)
2019



Severe acute respiratory
syndrome coronavirus 2
(SARS-CoV-2)
2020



CCQM
Pilot Studies

DNA & RNA
(copy number concentration)

EQA
Ringtrials

INSTAND-RINGVERSUCHE

BEGLEITHEFT

Fassung 08.04.2020



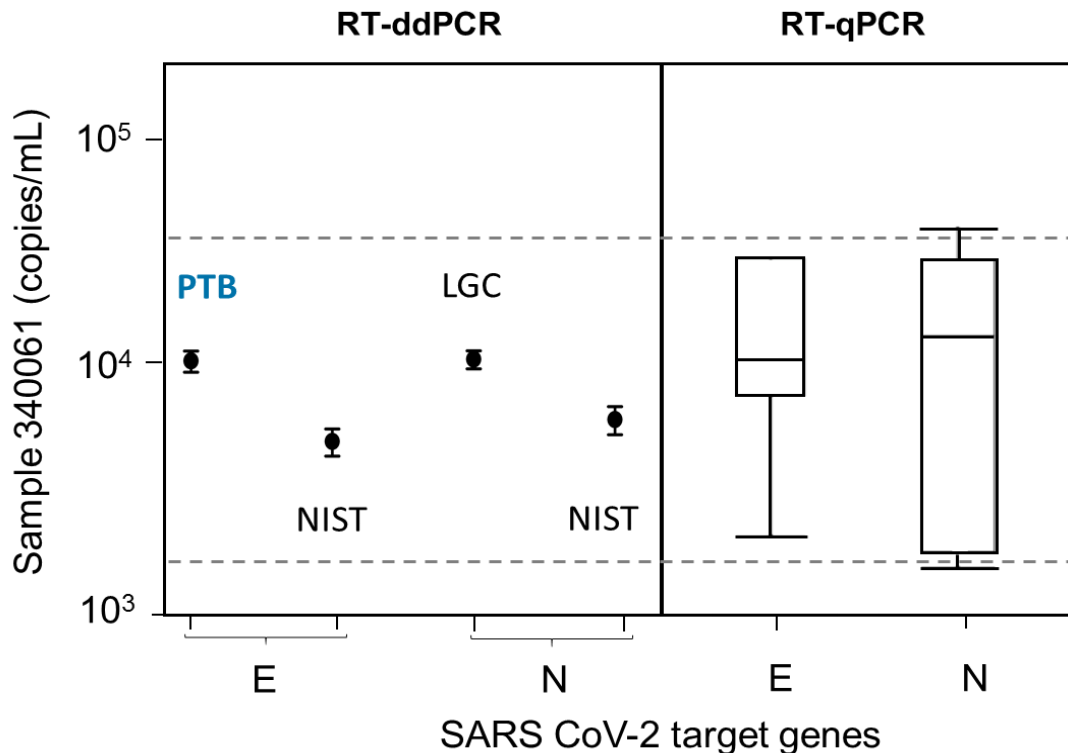
INStand

Extra-INStand-Ringversuch - Virusgenom-Nachweis (340) Coronavirus SARS-CoV-2

durchgeführt in Kooperation mit dem
Nationalen Konsiliarlaboratorium für Coronaviren,
Institut für Virologie, Charité - Universitätsmedizin Berlin,
Campus Charité Mitte, Prof. Dr. Christian Drosten,
Dr. Victor M. Corman, Dr. Daniela Niemeyer

- March/April 2020
- June/July 2020
- November 2020

Quantitative, copies/mL



INSTAND-RINGVERSUCHE

BEGLEITHEFT

Fassung 08.04.2020

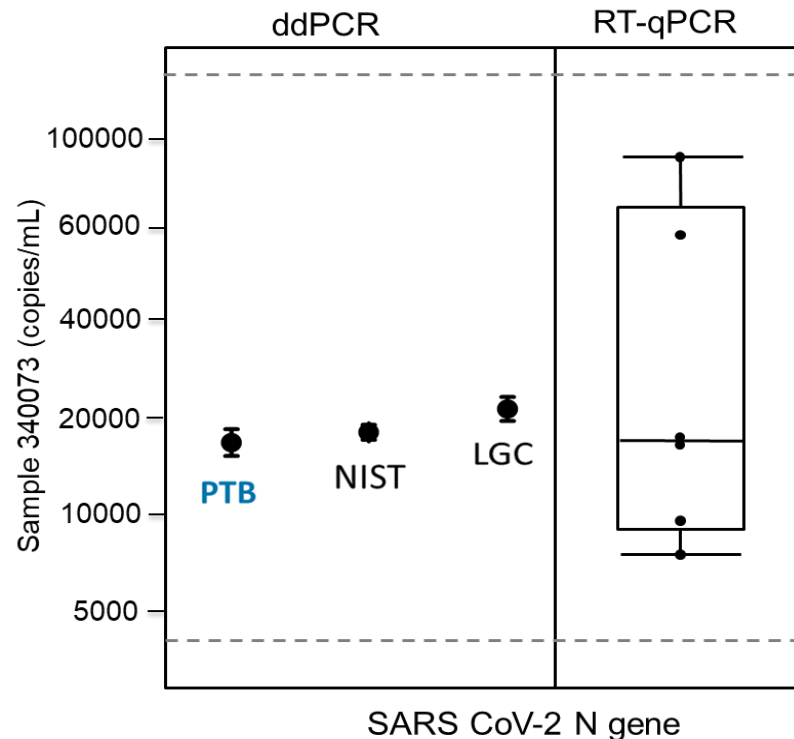


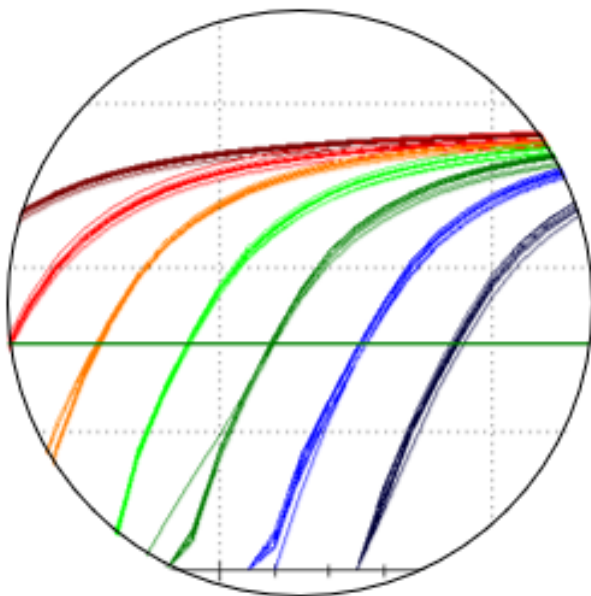
INISTAND

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Quantitative, copies/mL

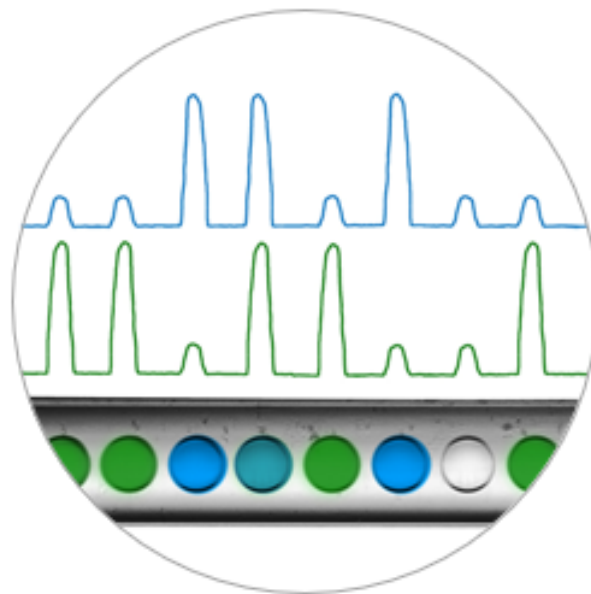




routine labs

qPCR

Relative Quantitation

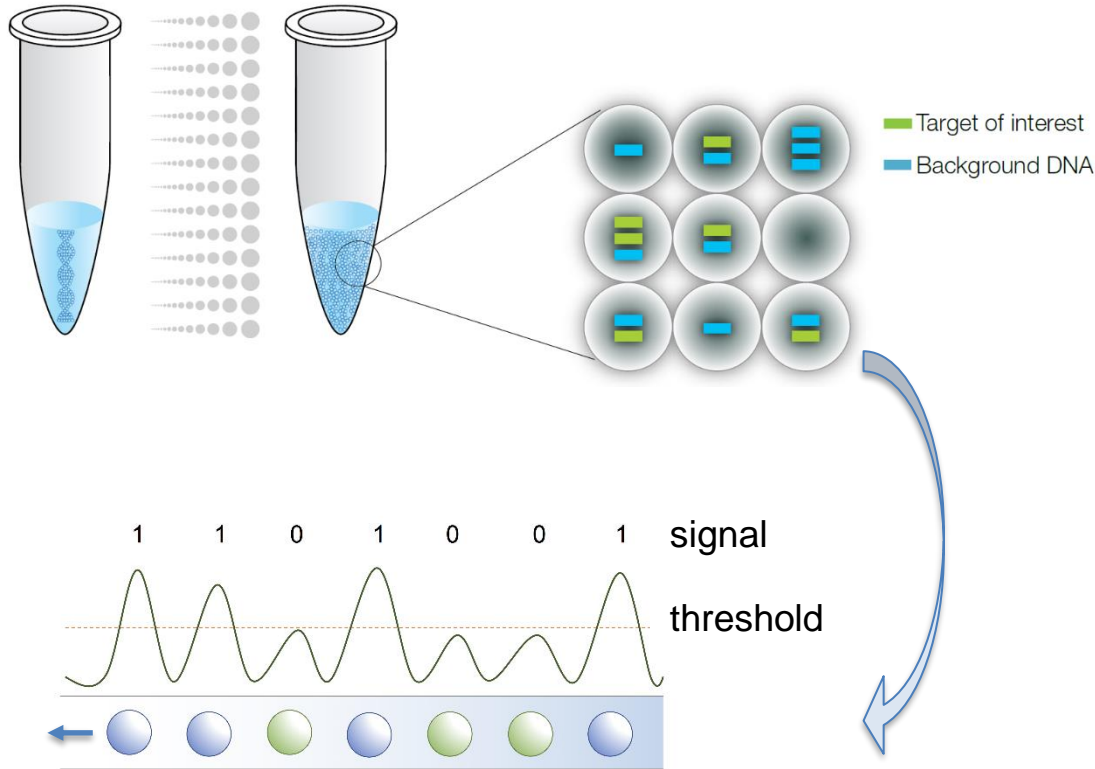


reference labs

dPCR

Absolute Quantitation

Digital PCR (dPCR)



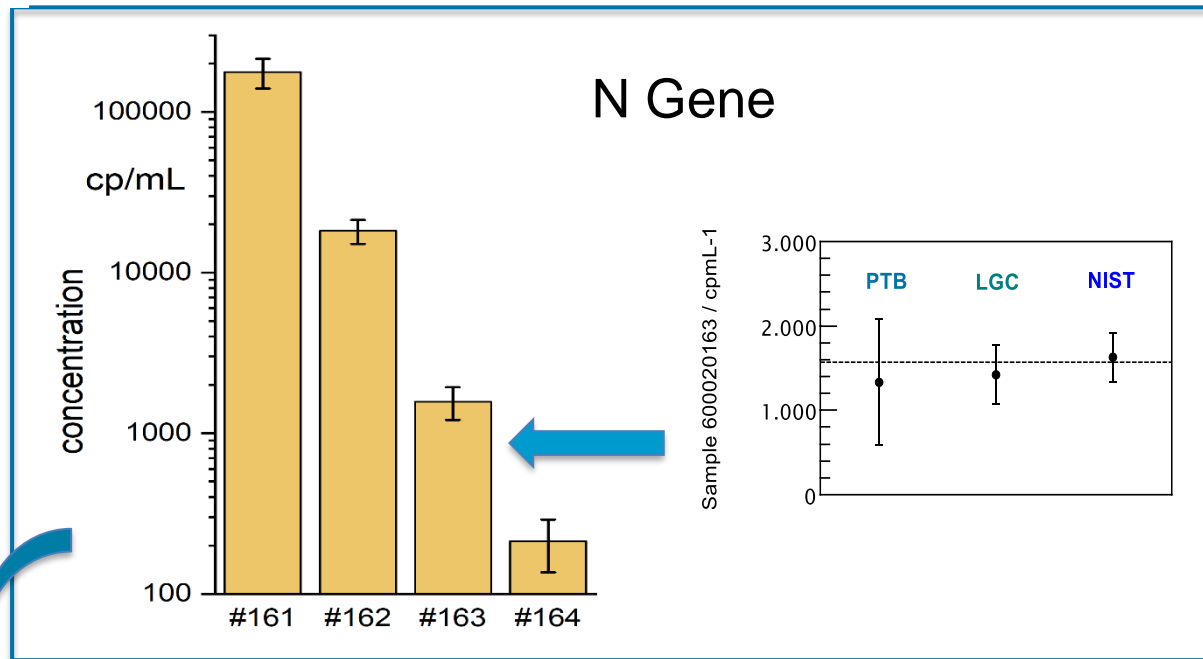
- 1 PCR reaction split up into e.g. 20.000 compartments
- Highly diluted samples
- Poisson statistics
- absolute quantification
- Less sensitive to competing reactions

*Reference procedure for
qPCR calibrators*

SARS-CoV-2 Standard: Value Assignment



July 2020



PTB
LGC
NIST

**Standard Curve,
standardisation of threshold for +/- decisions**

- **ISO 5798** QUALITY PRACTICE FOR DETECTION OF SEVERE ACUTE RESPIRATORY SYNDROME CORONAVIRUS 2 (SARS-CoV-2) BY NUCLEIC ACID AMPLIFICATION METHODS

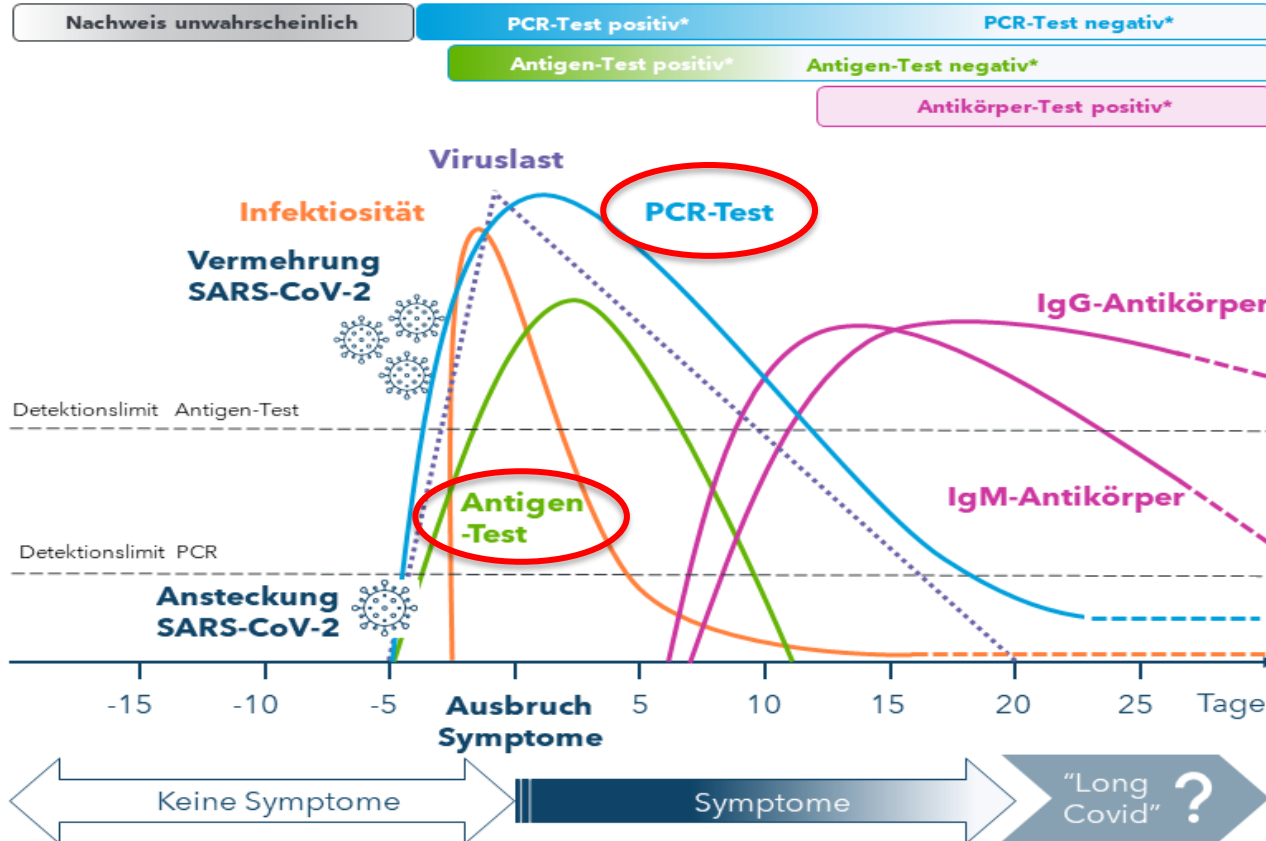


➤ Working draft completed for final voting!

TC212-TC276 JWG1

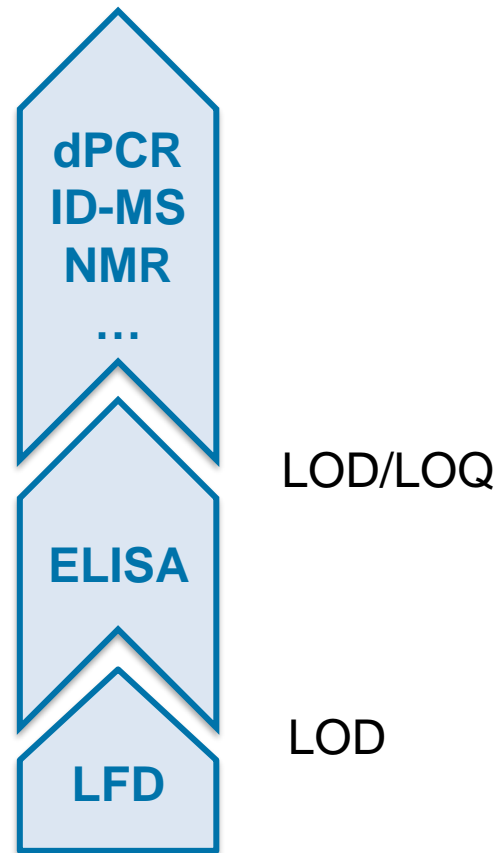
- Need of generalized concepts / approaches for rapid adaption / development of new reference procedures
- Prepare for early and fast pilot studies / key comparisons
- Need of methods & materials to validate extraction efficiency and RT efficiency
- Metrology support (ref. methods / materials) for clinical studies → external reference labs?
- Development of NA-POCT methods and/or methods & materials to validate POCT
- Methods / materials to validate virus-inactivation issues

Which Test? When?



*Die Wahrscheinlichkeit mit der die Tests korrekt positive oder korrekt negative Ergebnisse liefern, hängt von ihrer Sensitivität und Spezifität ab, die je nach Test und Hersteller unterschiedlich sind.

- Reference methods & materials to support EQA?
- Need of commutable reference materials
- Developing / providing a „traceability chain“
- Pilot studies / key comparisons
- Methods / materials to validate virus-inactivation issues



Thanks



PTB

Samreen Falak
Esmeralda Valiente
Annabell Plauth
Andreas Kummrow

LGC

Jim Huggett
Denise O' Sullivan
Alison Devonshire
Eloise Busby

NIST

Megan Cleveland
Peter Vallone

GBD

Heinz Zeichhardt
Hans Peter Grunert
Martin Kammel

EMPIR



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INSTAND

