FINVAC webinaari – Ilmanvaihdon rooli koronaviruspandemiassa 7.10.2020

COVID-19 sairauden leviäminen:

Mitä tutkimuksen valossa tiedetään?

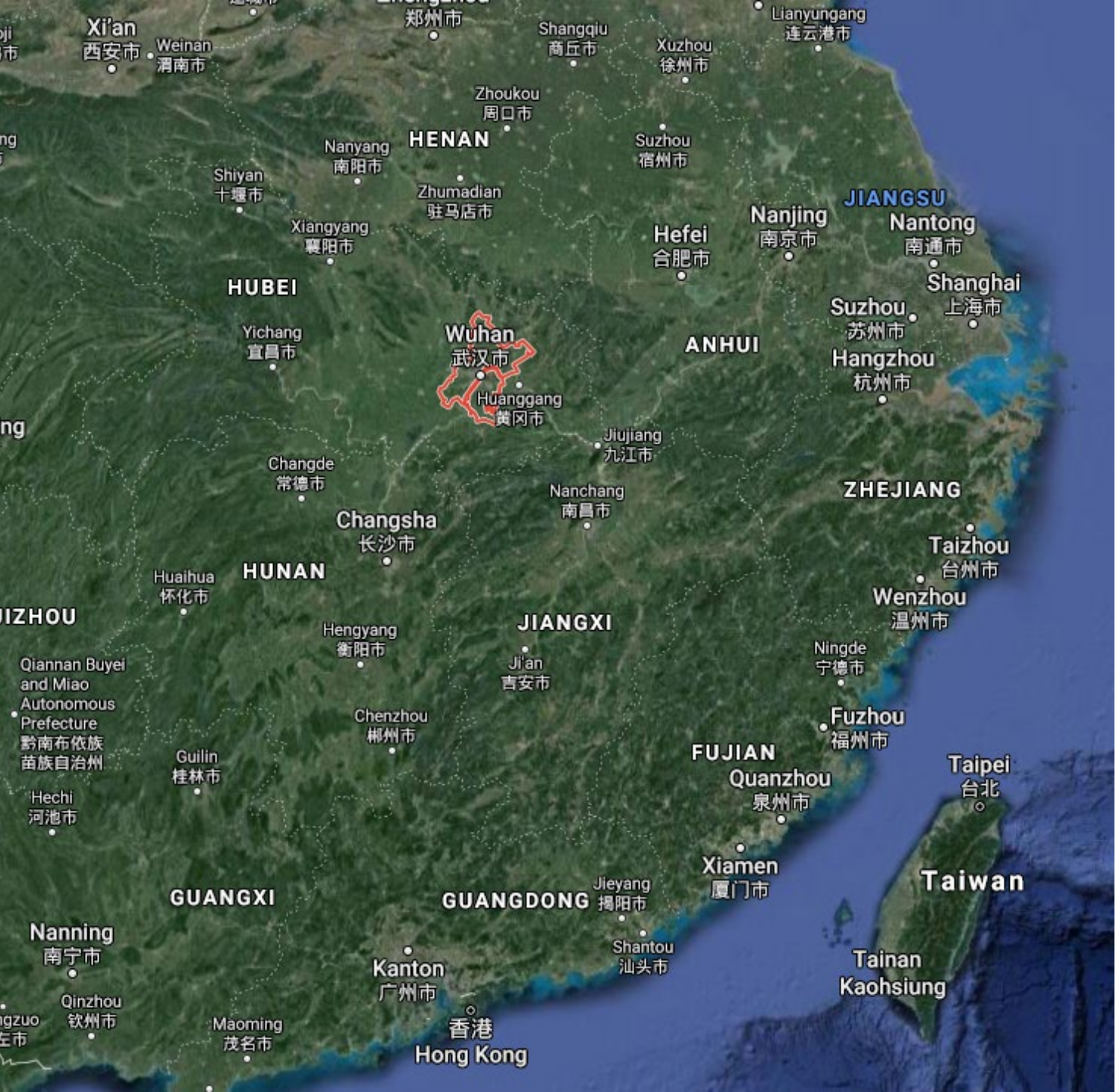
Keuhkosairauksien erikoislääkäri, Alexander van Assendelft

Aerosolivälitteinen SARS CoV-2-tartunta –

aliarvioitu vaara

10 Mölsä S. Ilmanvaihto voi ehkä levittää koronaa tai torjua sen leviämistä. Rakennuslehti 17.3.2020.

11 Lu J, Gu J, Li K ym. COVID-19 Outbreak associated with air conditioning in restaurant, Guangzhou, China, 2020.



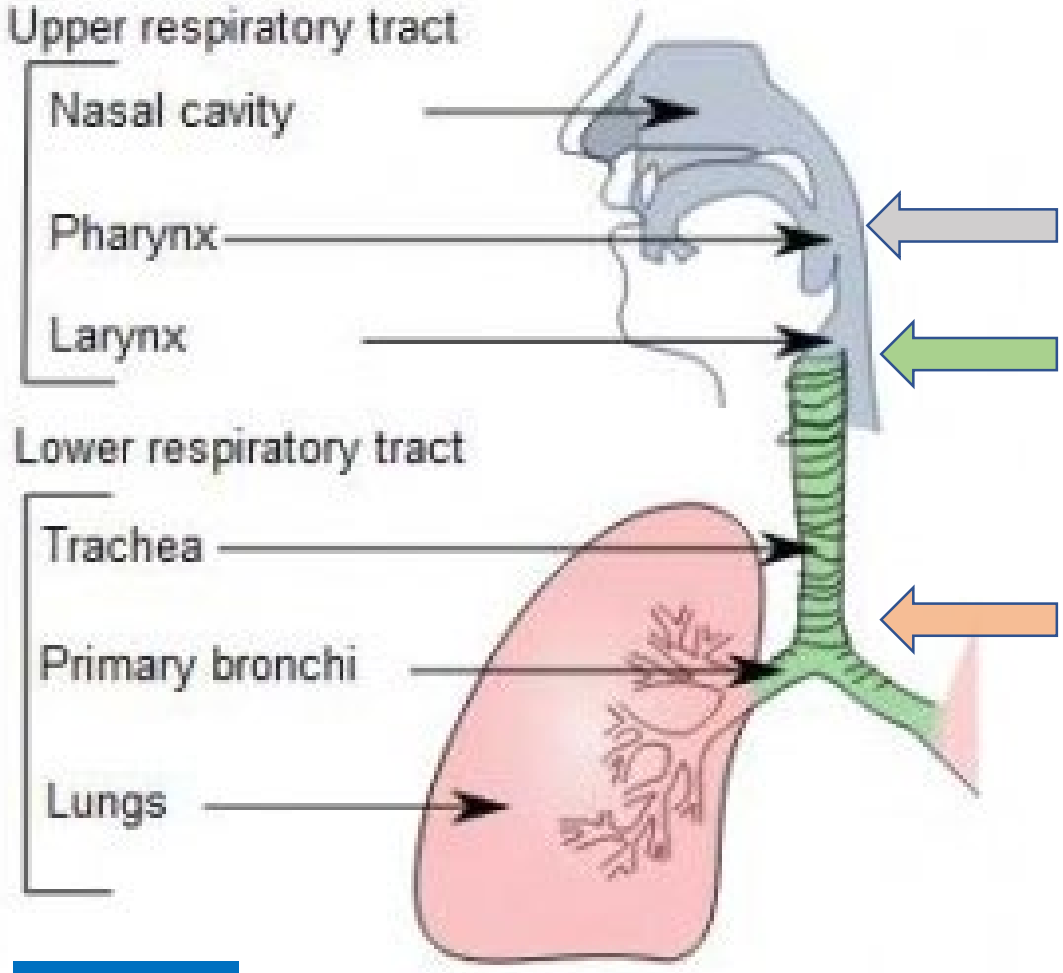
Wuhan, Guangdong (Guangzhou)

- WUHAN
- Meri eläinmarkkinat

- Muurahaiskäpy

- Li Wenliang, silmälääkäri, 33

The source: particle atomization in respiratory activities



Salvia in **mouth** is aerosolised during infection of the tongue, teeth palate and lips during speech articulation

Fluid bathing the larynx is aerosolised during voicing due to vocal fold vibrations

Fluid blocakages from in respiratory **bronchioles** during exhalation

The **burst** during susequent inhalation produce the particle

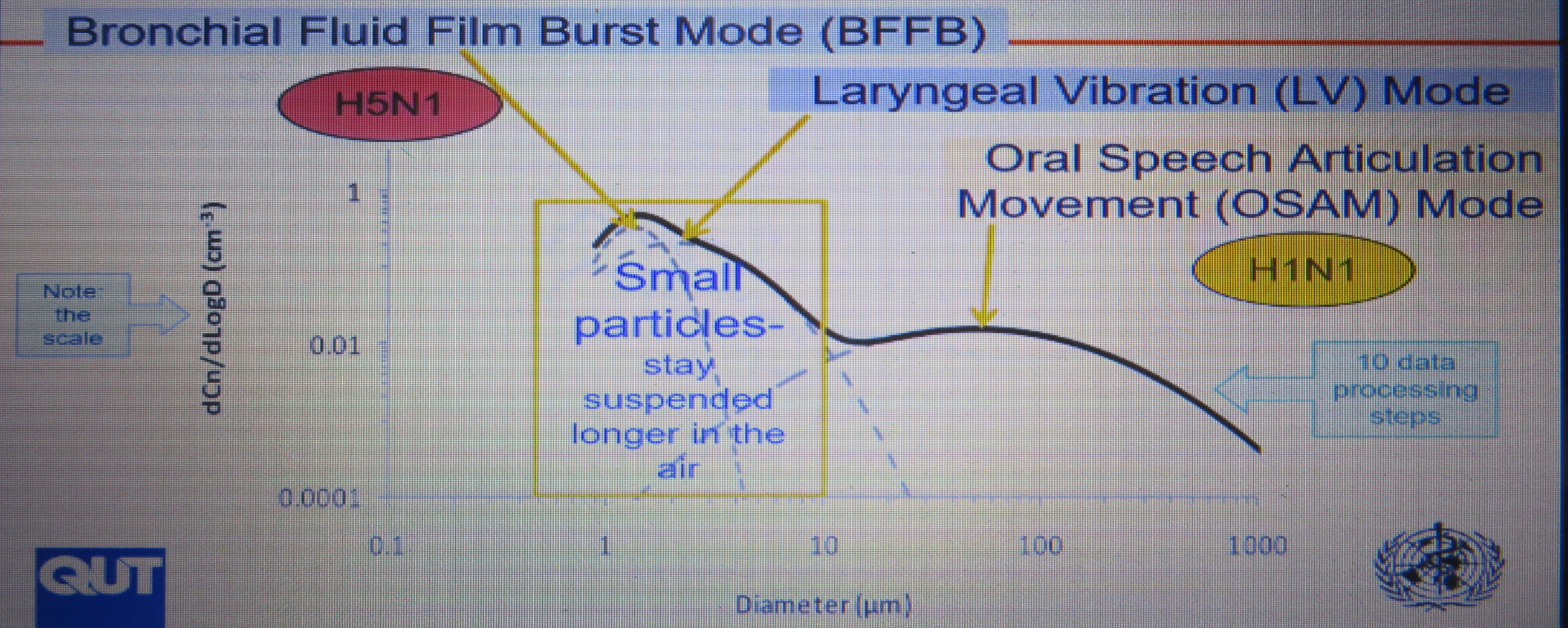
Ater the formation, the particles undego processes in the respiratory trackt before they are respired

Deposition – changing intitial size distribution

Surface deformation (Oratis et al. 2020 A new wrinkle on liquid sheets. Turning the mechanism of viscous bubble collapse uside down. Science. 369-6504. 2020)

QUT

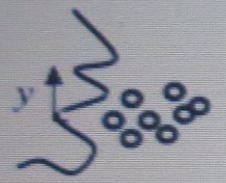
Number size distribution: speech + breathing



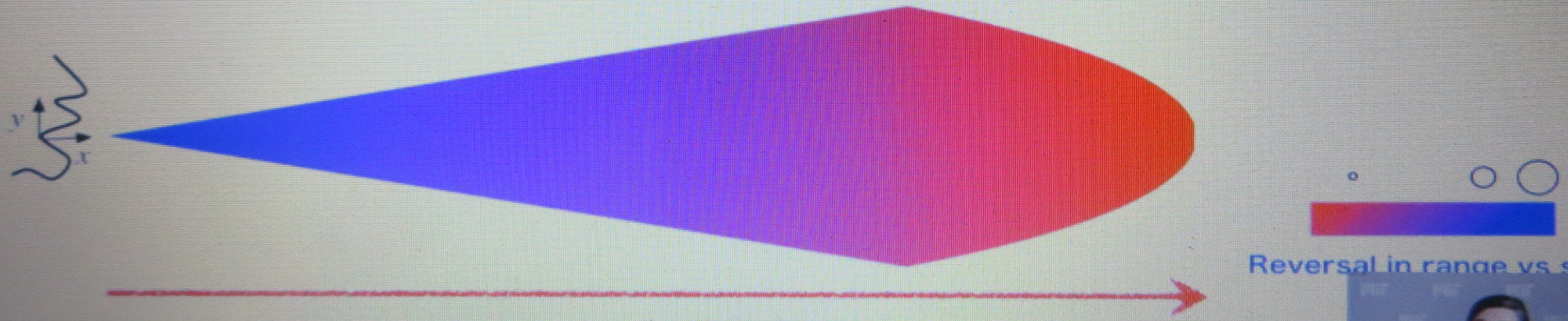
Morawska et al. (2009) Distribution and sizes of bioaerosols generated during respiratory activities. Journal of Aerosol Science, 40, 256–271, 2009

Paradigm shift

Current WHO, CDC physical picture, from Wells 1930s



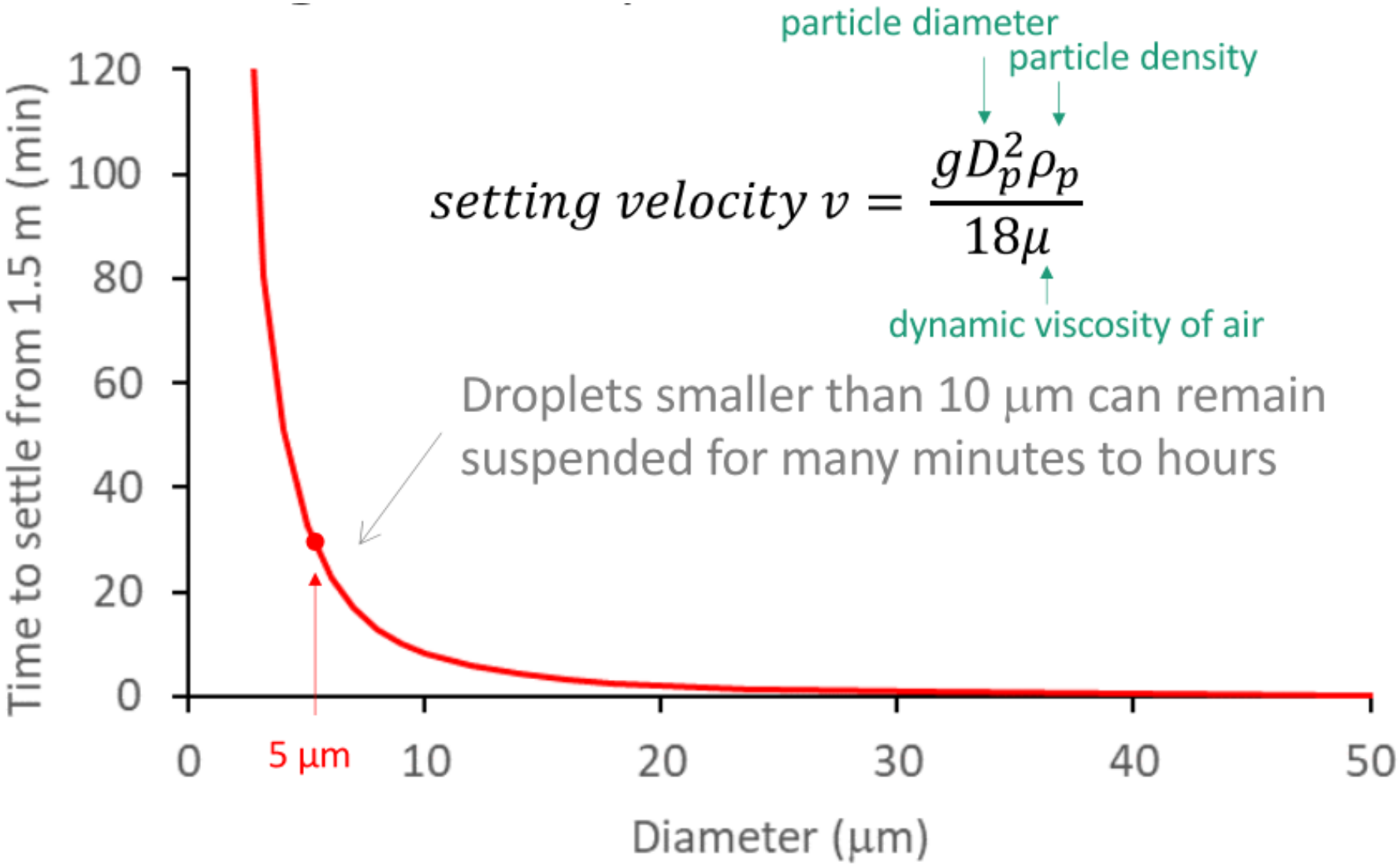
New physical picture (Bourouiba et al JFM 2014, NEJM2016)



Extension of range by a factor of more than 200 for the < 10 microns drople

Bourouiba Annual Review of Fluid Mechanics (2021)

Settling Velocity and Time



Linsey Marr, Virginia Tech, July 2020

Linsey Marr
@linseymarr

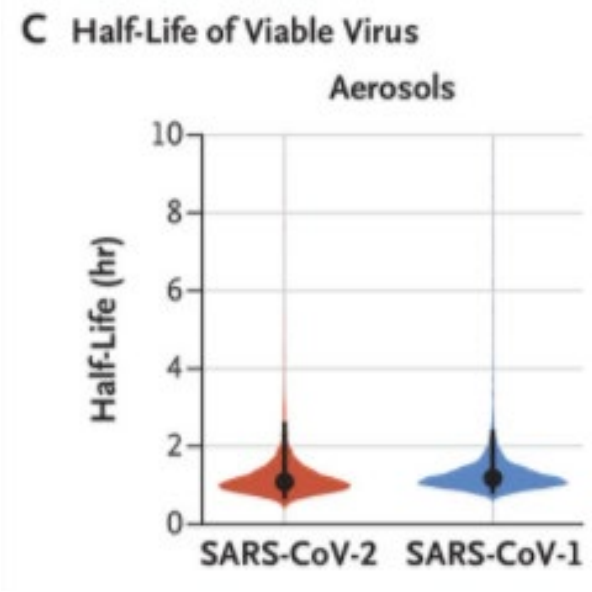
Wow, CDC acknowledges that inhalation of droplets/aerosols is thought to be the main way the virus spreads! cdc.gov/coronavirus/20... Now, let's get on with effective interventions: masks, ventilation, distance!

Kimberly Prather, Ph.D. @kprather88

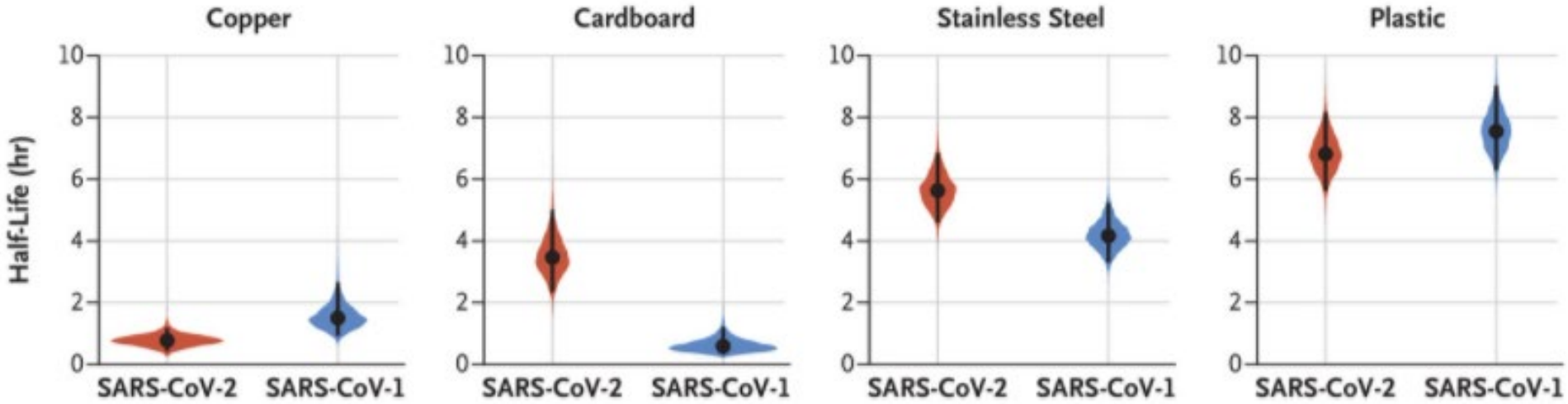
Oh my....was beginning to think I would never see the day. I have a feeling this was helped along by Dr. Fauci. Finally clear guidance--now let's get the message to schools and businesses so they can safely re-open! Congrats to everyone--what a huge team effort this has been! twitter.com/jljcolorado/st...

9:41 AM · Sep 21, 2020

SARS –CoV – Survival in Aerosols



Half-life is 1.1 hours in culture medium at 65% RH.

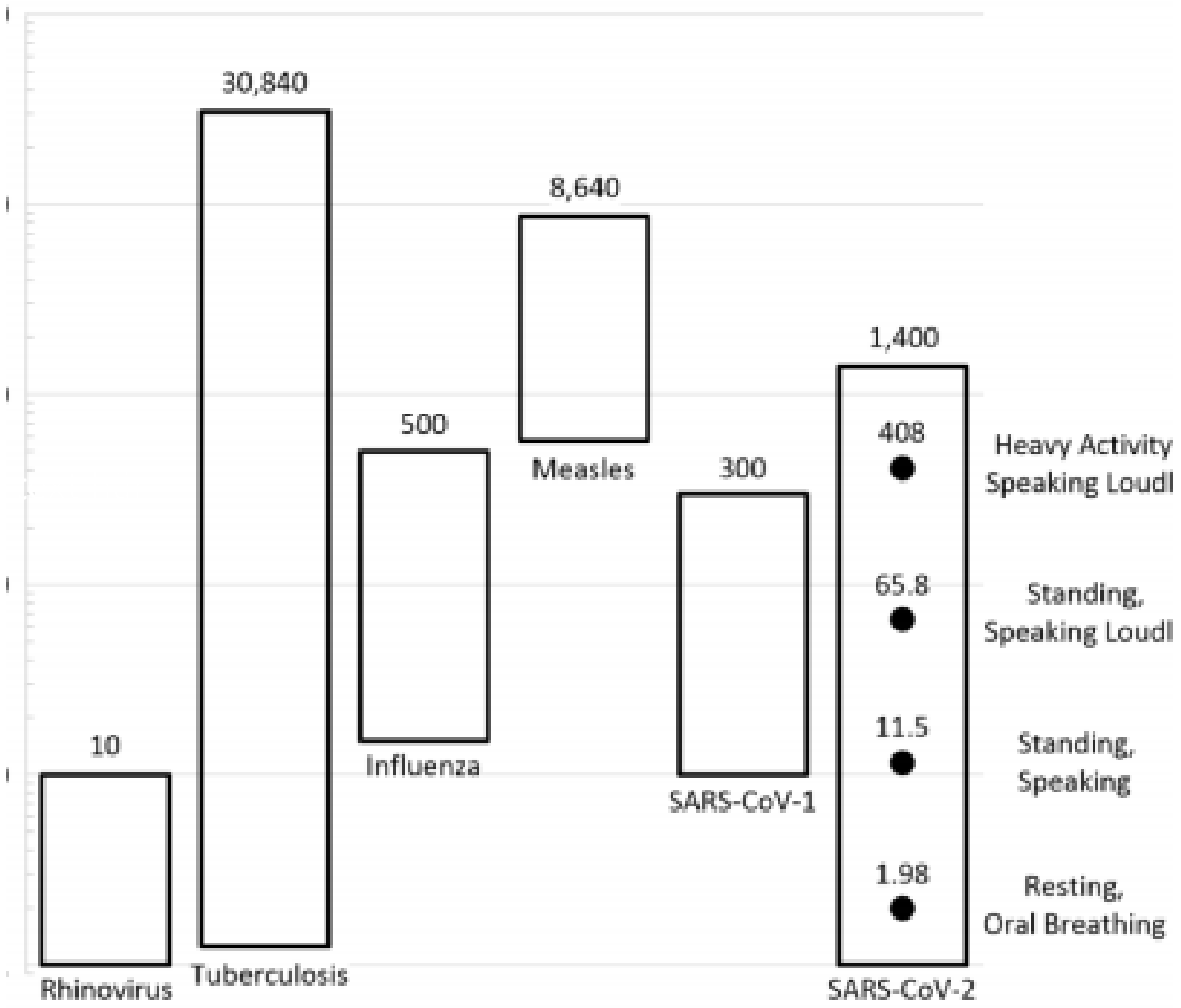


Linsey Marr, Virginia Tech, July 2020

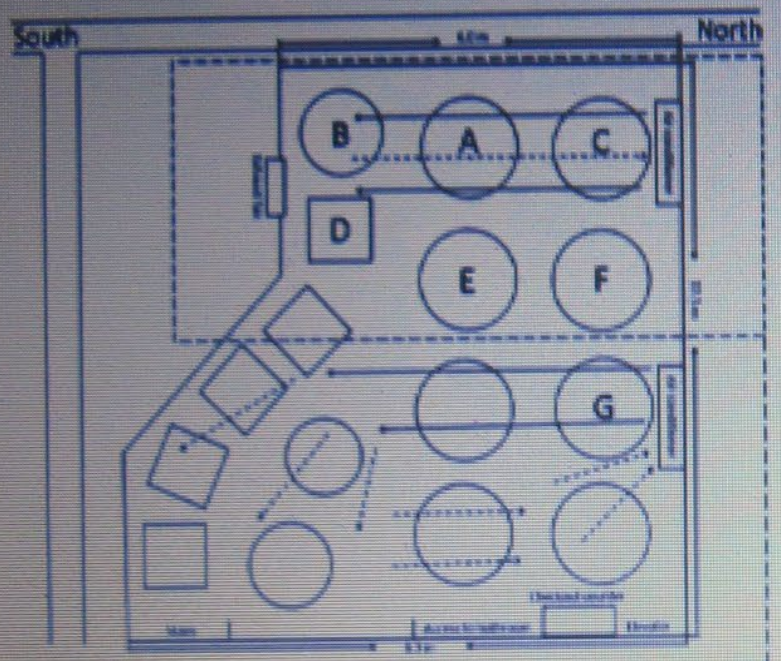
van Doremalen et al., 2020, *NEJM*, https://www.nejm.org/doi/full/10.1056/NEJMc2004973

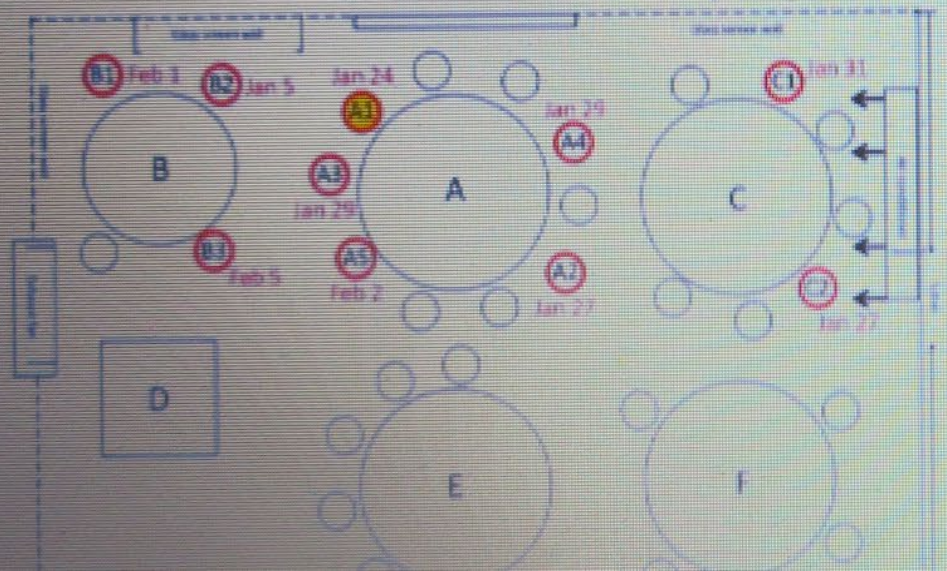
Taudinaiheuttajan määrä/tunti (Quanta) hengitettäessä sekä puhuessa

- Range of published quanta emission rates for six pathogens. Ranges for rhinovirus, influenza, and SARSCoV-1 from Azimi and Stephens (2013). Range for tuberculosis from Riley et al. (1962) and Gammaitoni and Nucci (1997), and range for measles from Riley et al. (1978) and Remington et al. (1985). For SARS-CoV-2, the 85th percentile values for different activities are presented for comparison from Buonanno et al. (2020b).



Guangzhou, China Restaurant Outbreak





NO outside air supply

Strong air currents from air conditioner

Early Release - COVID-19 Outbreak Associated with Air Conditioning in Restaurant

Skagit Choir, Mount Vernon, Washington
Living Spirit United Church, Calgary, Canada

COVID-19 Is Airborne: Here Is What You Can Avoid

COVID-19 Avoid

What Does This Mean?

- "Aerosol" (aka as "airborne") transmission is similar to droplet transmission (that we can see)
- But the bits of fluid are tiny
- And they can linger in the air for minutes to hours

Think of smoke to help your risk assessment & risk reduction strategies. Just imagine that others you encounter are all smoking: the goal is to breathe as little smoke as possible, and avoid those "smoke filled areas."

Full article: www.time.com/5883081/covid-19-transmitted-aerosols

COVID-19 Is Airborne: Here Is What You Can Do

COVID-19 Do

Do as many activities outdoors as possible, but outside is not magic!

Do wear masks - they are essential, even when we are able to maintain social distance - make sure they fit snugly!

Do think about ventilation and air cleaning by filtration!

We should continue doing what has already been recommended: wash hands, keep six feet apart, etc.
But that is not enough - follow @jljcolorado on for more
Source: www.time.com/5883081/covid-19-transmitted-aerosols

Eroon koronasta
työryhmä
14.8.20

www.eroonkoronasta.fi

Alexander van Assendelft

Eroon koronasta vähentämällä puheen muodostamaa aerosolia

KUVALUETTELO

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3. Wikipedia
4. Google
5. Wikipedia ja CNN 7.2.2020

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10. CDC 18.9.2020 Linsey Marr'in kommentti
11. van Doremalen et al. Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. N Engl J Med 2020;382:1564-67
12. Mikszewski A, Buonanno G, Stabile L, Pacitto A, Morawska L. Airborne Infection Risk Calculator. User's Manual Version 1.0 July 2020
13. Lu J, Yang Z. COVID-19 outbreak associated with air conditioning in restaurant, Guangzhou, China, 2020. Emerg Infect Dis. Nov 2020
14. Morawska L. The Airborne Infection Spread in Buildings – It's Time to Stop it! Spread of Infectious Diseases in Indoor Environments. ISIAQ Webinar May 26, 2020

15. Jimenez JL. Summary of the Evidence For and Against the Routes of Transmission of SARS-CoV-2. 18-Sept-2020
16. van Assendelft A. Eroon koronasta vähentämällä puheen muodostamaa aerosolia. Eroon koronasta työryhmä 14.8.2020. www.eroonkoronasta.fi