in collaboration with

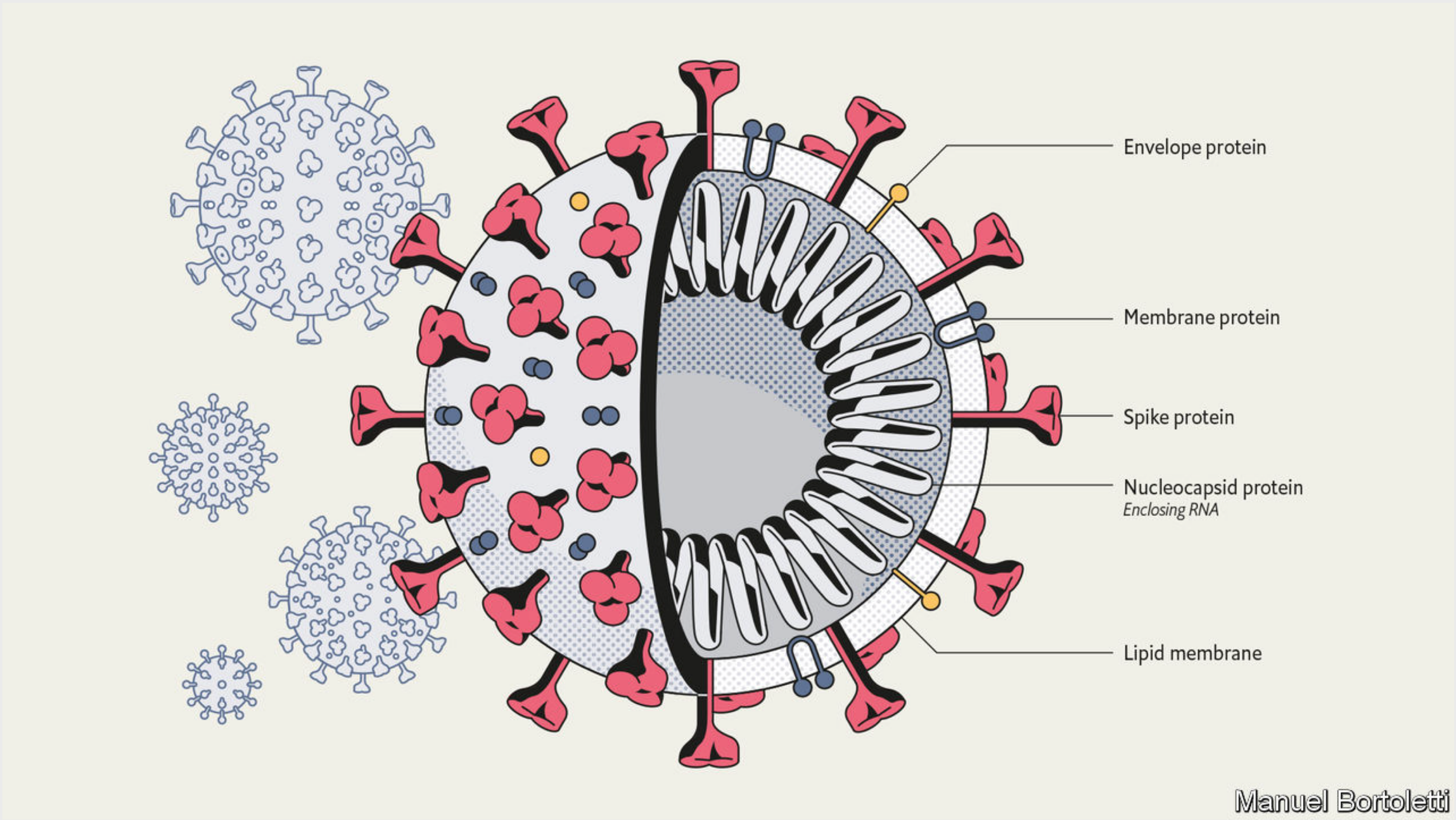
# SARS-CoV-2
# WHAT TO KNOW AND HOW TO MOVE FORWARD

## THE VIRUS & DISEASE
## ENVIRONMENTAL SAFETY
## STAFF WELL-BEING
## MONITORING AND TESTING

Dr Massimo Cristaldi

**Coronavirus size 120 nM**

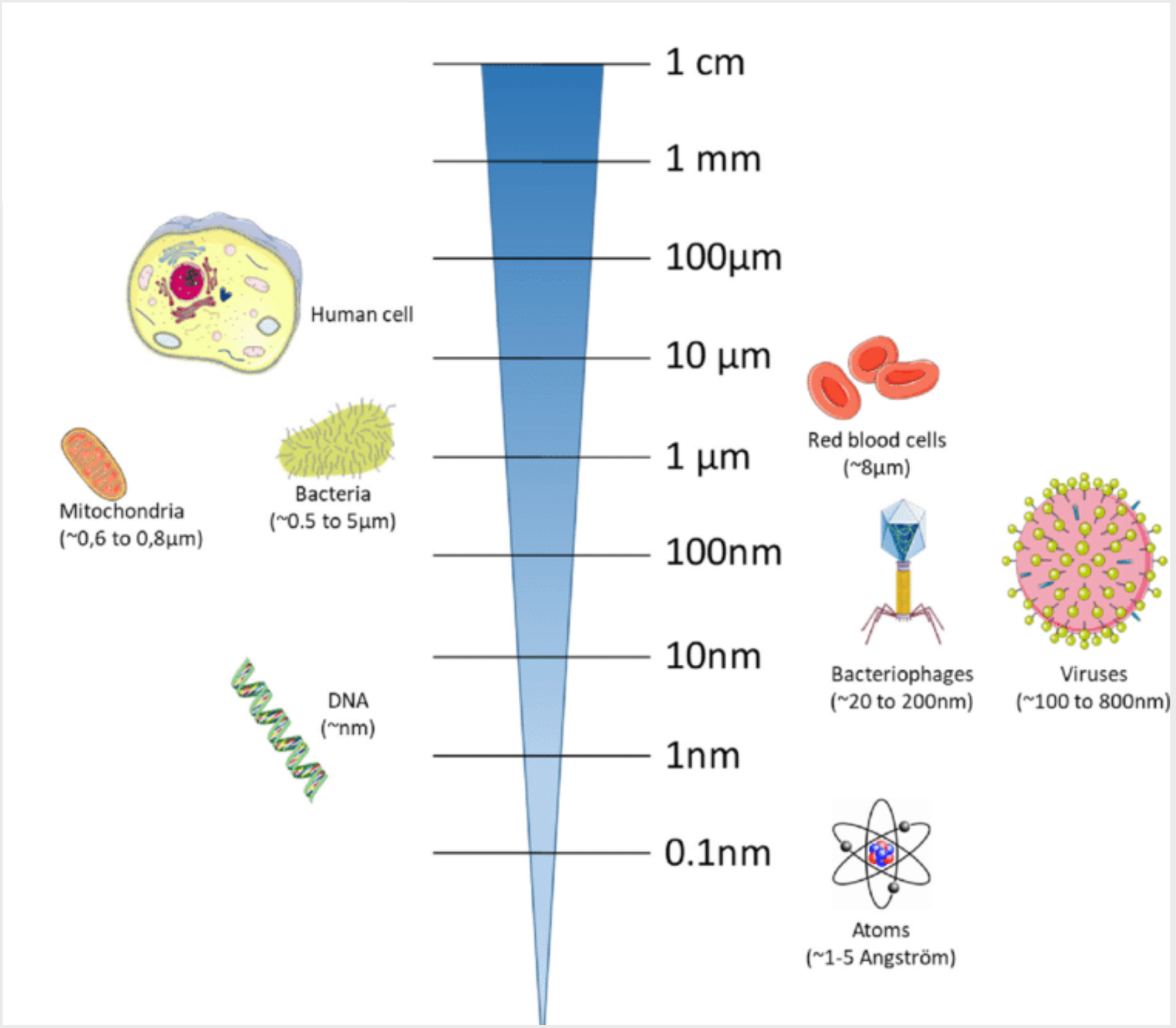
$1nM = 1x10^{-9}$




Made of 4 proteins and a strand of RNA (molecule which can store genetic information)

- One protein is the spike, which gives the crown-like appearance
- Two proteins sit in the membrane between the spikes to provide structural integrity
- In the membrane, the fourth protein is a scaffold around the genetic material

# COMPARATIVE SCALE



Enters through nose, mouth, or eyes. Attaches to cells in the respiratory tract producing a protein called ACE2

- It fuses with the cell and releases the RNA; the hijacked infected cell will produce proteins based on the “instructions” from the virus’ RNA

- Each infected cell can release millions of copies of the virus before dying

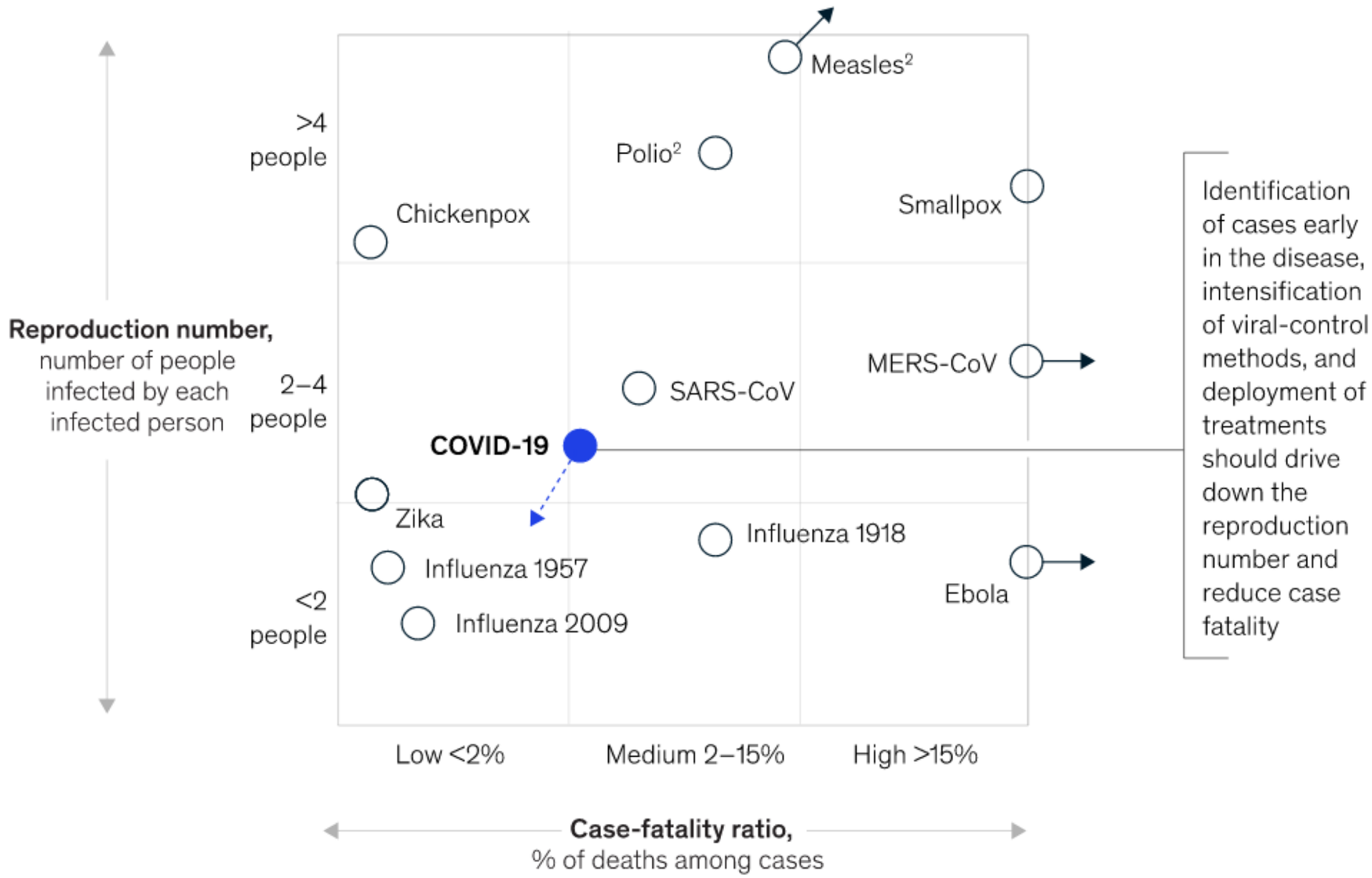
- Affects upper respiratory tract, can spread to lungs

- In serious cases, immune system can overreact and attack lung cells; in some cases, the infection leads to acute respiratory distress syndrome and possibly death

- The virus can also end up in droplets that escape the lungs through coughing/sneezing/ breathing - micro droplets but also possible airborne in certain condition - surface contamination

## COVID-19 is more infectious than influenza.

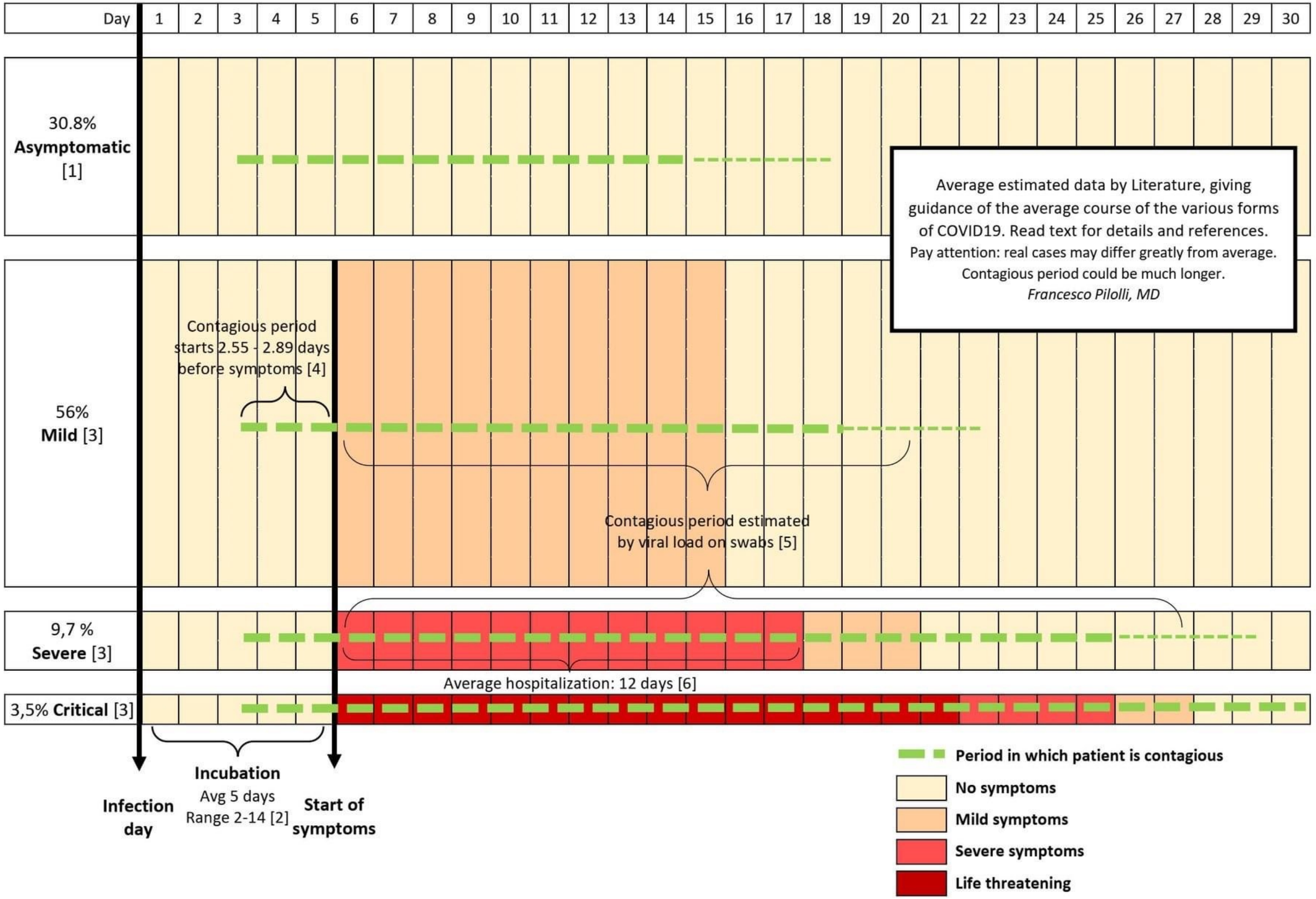
**Reproduction[1] and fatality[2] for selected human viruses**




[1]As determined at the beginning of an outbreak; can be reduced by effective intervention.
[2]Case-fatality numbers are reflective of the outbreak setting and depend on a number of factors, including patient's age, community immunity, health-system capabilities, etc. This graphic aims to offer a broad comparison.
Source: Expert interviews; World Health Organization; McKinsey analysis

R0 number of person infected by each infected individuals

R0=3 …….after 10 rounds = **62000 infected individuals**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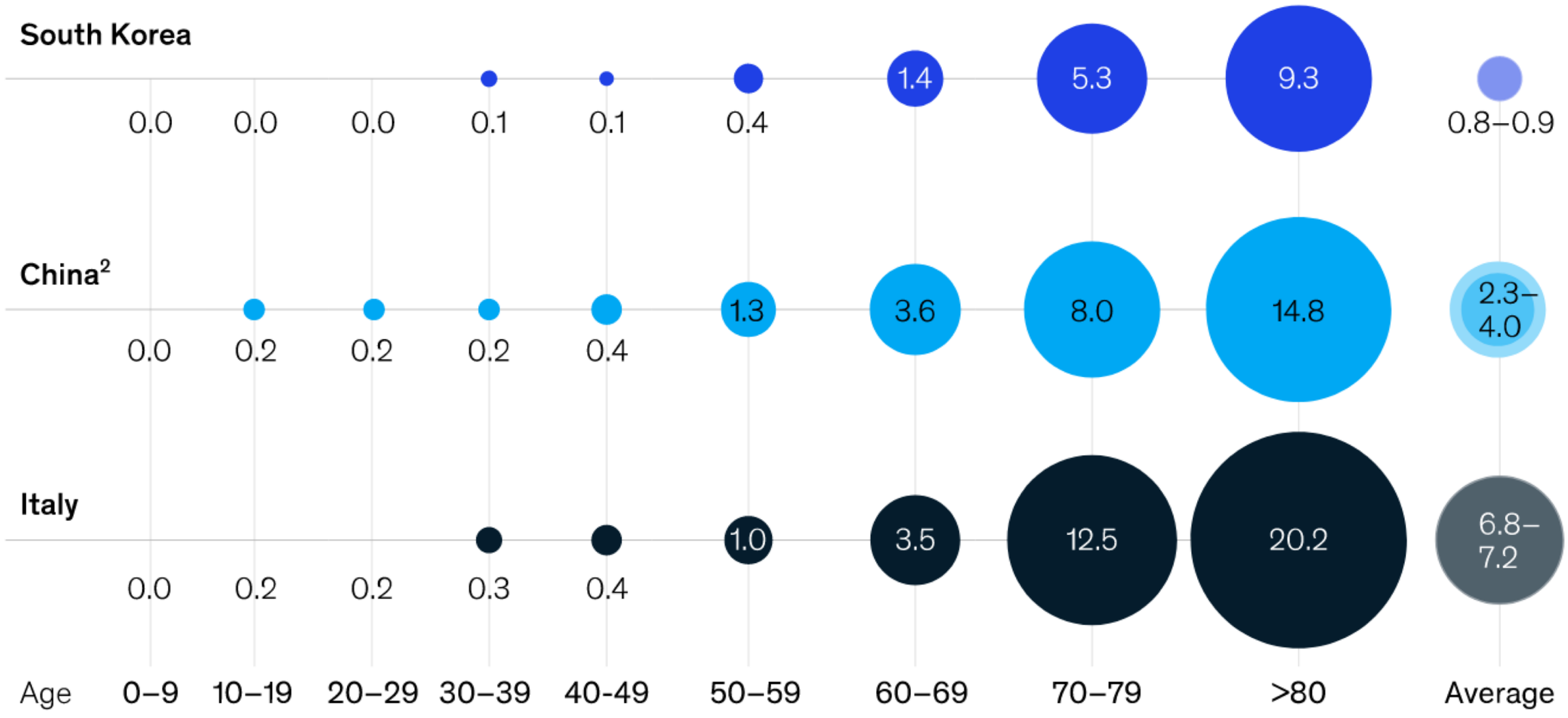
30.8%
Asymptomatic
[1]
Average estimated data by Literature, giving guidance of the average course of the various forms of COVID19. Read text for details and references.
Pay attention: real cases may differ greatly from average.
Contagious period could be much longer.
Francesco Pilolli, MD
56%
Mild [3]
Contagious period starts 2.55 - 2.89 days before symptoms [4]
Contagious period estimated by viral load on swabs [5]
9,7 %
Severe [3]
Average hospitalization: 12 days [6]
3,5% Critical [3]
Incubation
Avg 5 days
Range 2-14 [2]
Infection day
Start of symptoms
Period in which patient is contagious
No symptoms
Mild symptoms
Severe symptoms
Life threatening

# DEATH rate/age

## Data from three countries show that older populations are at greater risk.

**Case-fatality rate by age segment,**[1] % mortality




[1] As of data from Feb 11, 2020, in China and as of March 16 and 15, 2020, in South Korea and Italy, respectively.
[2] Data reported from China Feb 11, 2020, reports 2.3%, however latest deaths/cases from WHO indicate this may be higher.
Source: China CDC; Korea CDC; L'Istituto Superiore di Sanità (ISS) Italy; WHO; McKinsey analysis

# SARS-CoV-2

# PUBLIC HEALTH MEASURES
# CONTAINMENT

Identify infected - Isolate - Treat - Trace contacts and repeat

Why It does't quite work that way in SARS-CoV-2?

Up to 70% of individuals may be asymptomatic/minimal symptoms

- Identify infected - Isolate - Treat - Trace contacts and repeat

TESTING is CRUCIAL

3T's

# PUBLIC HEALTH MEASURES
# MITIGATION

- Social distancing
- Movement restriction
- Lock down
- Adequate/increase healthcare response

# SARS-CoV-2: THE “PERFECT WEAPON”

- Wide spectrum of disease
- “Stealth” transmission
- Infected are difficult to identify
- Long incubation and super-efficient transmissibility
- Very contagious - Mildly infective
- Very lethal in severe forms

# *SARS-CoV-2* TESTING

- Molecular Test  RT-PCR

  Complex - Long - High % of false negative - Early

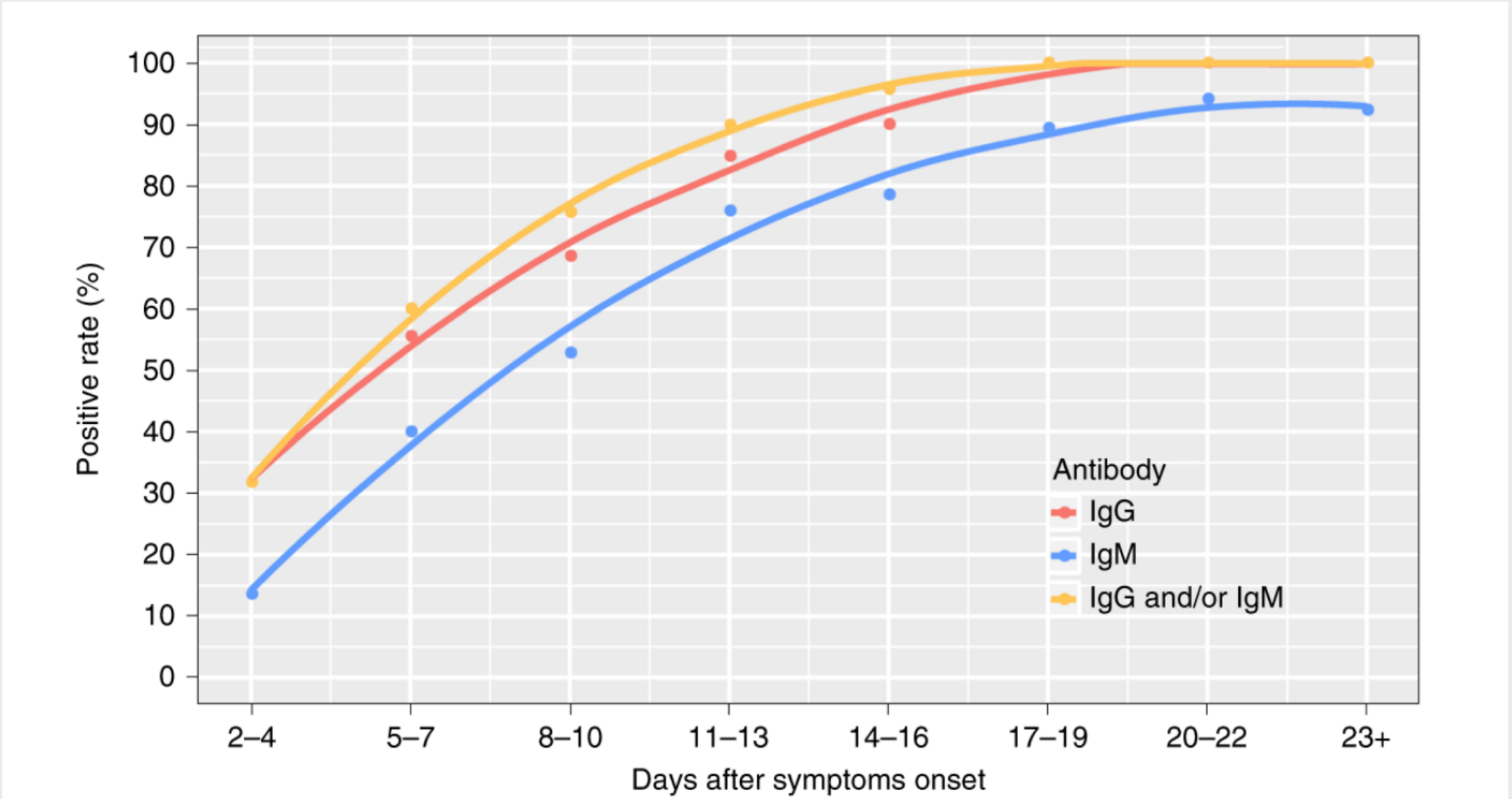
- Antigen Test

  Easy - Rapid - Higher % of false negative - Early

- Serology Test

  Easy - Rapid - Higher level of accuracy - Late

# SARS-CoV-2—SPECIFIC SEROCONVERTION




*IgG Sero-conversion is 100% within 19 days*

# SEROLOGY TESTING

- Serology Surveys

  3-60% immunes

- Seroconversion = Immunity?

- Does high AB levels (titre) matter?

- How long does the immunity last after infection?

# WHERE ARE WE NOW?

- Epidemics are Invisible threats

  Human psychology plays crucial role

- 3 Phases

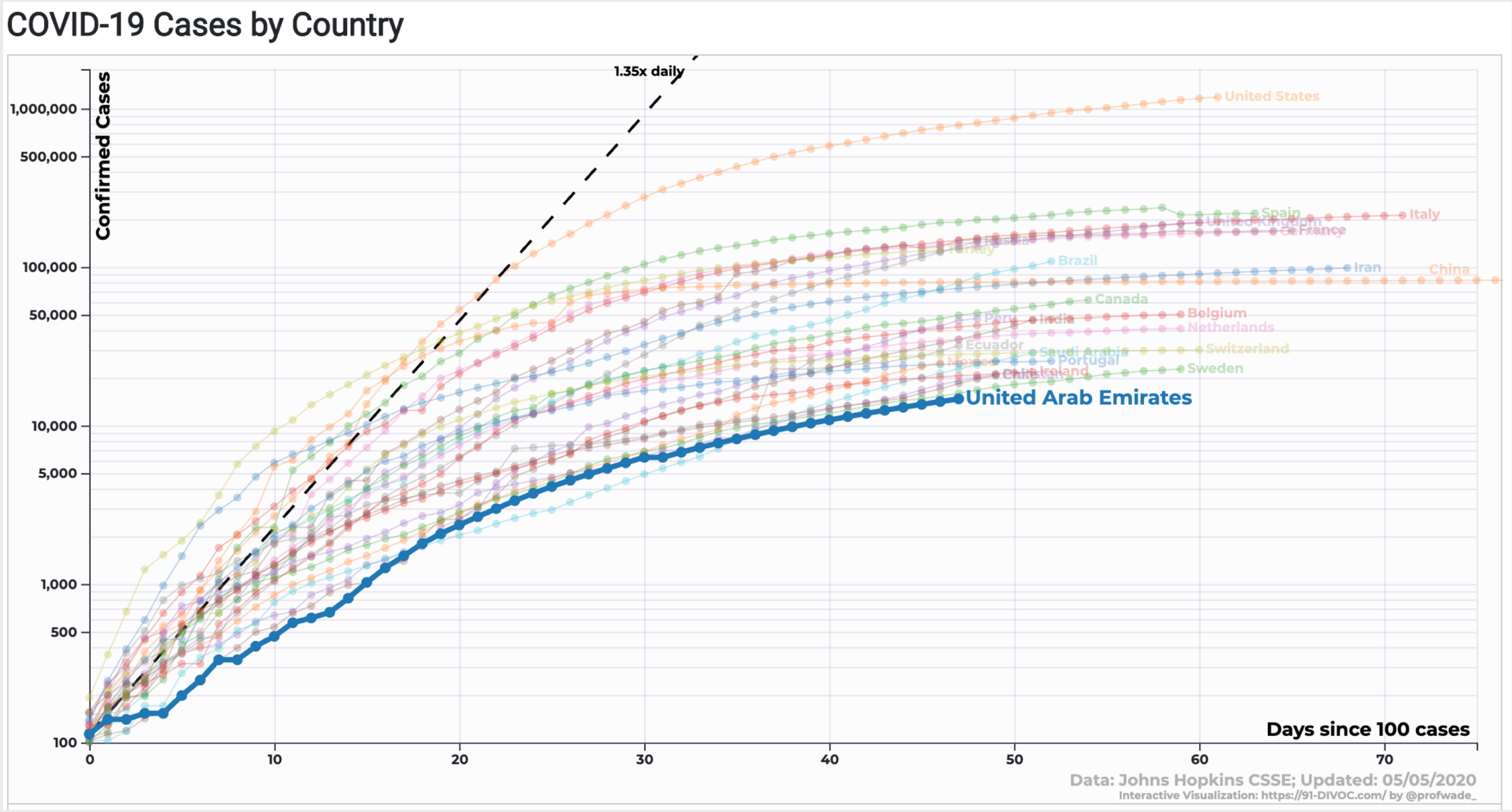
  Denial/Blaming/Over-reaction

- Currently different stages of the curve

  Some have Flatten the curve/ 2nd wave

- Psychological adapted and ↑ readiness

# WHERE ARE WE NOW?



> 32 millions/over 30 year

# SARS-CoV-2 is 5 months-old-baby

- A lot will be discovered in the next few months
- Acute cases treatment will be fine tuned but…
- There is no real prospect of definitive cure
- Most effective cure is vaccination
- Can we expect a vaccine soon?

# VACCINE 72 DIFFERENT ONGOING PROJECTS

- Real prospect as we have for similar viruses

- Developing it goes through very routinized phases

- Development

- Phase 1 - Safety - Tens - Weeks

- Phase 2 - Immunogenicy/Safety - Tens/Hundreds - Months

- Phase 3 - Efficacy - Thousands - Year(s) Challenge studies?

# STRATEGY FOR BUSINESS

# Pillars

- PPEM - Personal Protective Equipment/Safety Measures
- Environmental Safety
- Individual behaviors in/off work
- Testing strategies
- Monitoring

# PPEM - Personal Protective Equipment/Measures

- Daily prescreening before entering premises
  Temperature (IR-scanners) - Symptoms / Database

- Face Masks
  Surgical masks - How and When

- Hand Hygiene
  Proper washing - Hand sanitizer available on desks

- Surface decontamination
  How and When

- Avoidance of cross-exchanging tools/document

# Face Masks

**Laser Light-Scattering Experiment Showing Speech-Generated Droplets.**


Speech-generated droplets and their trajectories are shown while the speaker was unmasked and masked.

# "HERD PROTECTION"

# ENVIRONMENTAL SAFETY

- Avoid over-crowding
  No close contacts/meeting or gathering

- Environment hygiene
  Air circulation - Humidifier and Air Purifiers


- Implement and use video conference systems
  Webex meeting/Team - Microsoft Team

- No common canteen or coffee rooms - unless properly spaced

- Ad hoc and segregated staff accommodations

- Outdoor work policies/education (realistic policies)

# INDIVIDUAL BEHAVIORS

- Education

  Face mask / Hygiene / Personal interactions

- Team leaders

  Reinforcement / Monitoring

- Off work circumstances

  Single / Family / Kids at school ect

- Self discipline

  Education / Responsibility / Reinforcement

# TESTING STRATEGIES

- After social distancing and isolation

  Serology Surveys - PCR mass testing

- Individual at higher risk of complication or exposed to +ve

  PCR testing

- Interval serology surveys

  Immunity based License/Passport

- Risk Management - Isolate individuals at higher risks

# DEFINITION OF CLOSE CONTACTS

Exposure to individuals PCR +ve or with COVID related symptoms

- Time >15’
- Proximity <2 meters
- Face masks No - poor usage
- Individual circumstances Co-morbidities

# MONITORING

- Management of outbreaks
- Temporary closures of premises
- Contact tracing (3T)
- Interval Sero-surveys - 4/6 wks
- Management and support of +ve
- Periodical sanification of working places

# TECHNOLOGY

SafeTag  by KINEXION

# +ve Cases

- Medical Management
- Provide a Roadmap
- Psychological support
- Family management
- Testing close contacts

# Resuming work after COVID

- No symptoms and 2 serial -ve PCR tests

  7 days after first +ve PCR if No/Minimal symptoms

  14 days after +ve PCR in symptomatic patients

- Medical Fitness only after moderate/severe infection

  Interval chest x-rays/examination/Spirometry

- Serology testing

  Qualitative and Quantitative

# TRAVEL POLICY

- Reduce staff traveling unless necessary
- Define pre-condition for traveling
- Implement local Government policy

  Immunity Passport
- Set your own policy and safety standards

# SYNERGISTIC MEASURES

- Each measure adopted in isolation is going to FAIL
- Strong education and reinforcement
- Invest in education, safety and well-being of workforce
- Financial support during quarantine/work absence
- Moral and practical support for +ve - remove stigma

Education

Evidence-based Reassurance

Engagement

Self-Discipline

Discipline

**RESILIENCE**

# FINAL OUTCOME

We will all get infected or
Vaccinated*

** first come, first served*