EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

Update on approved and candidate COVID-19 vaccines in the EU

Dr. Marco Cavaleri
Head of Biological Health Threats and Vaccines Strategy, EMA

An agency of the European Union

Outline

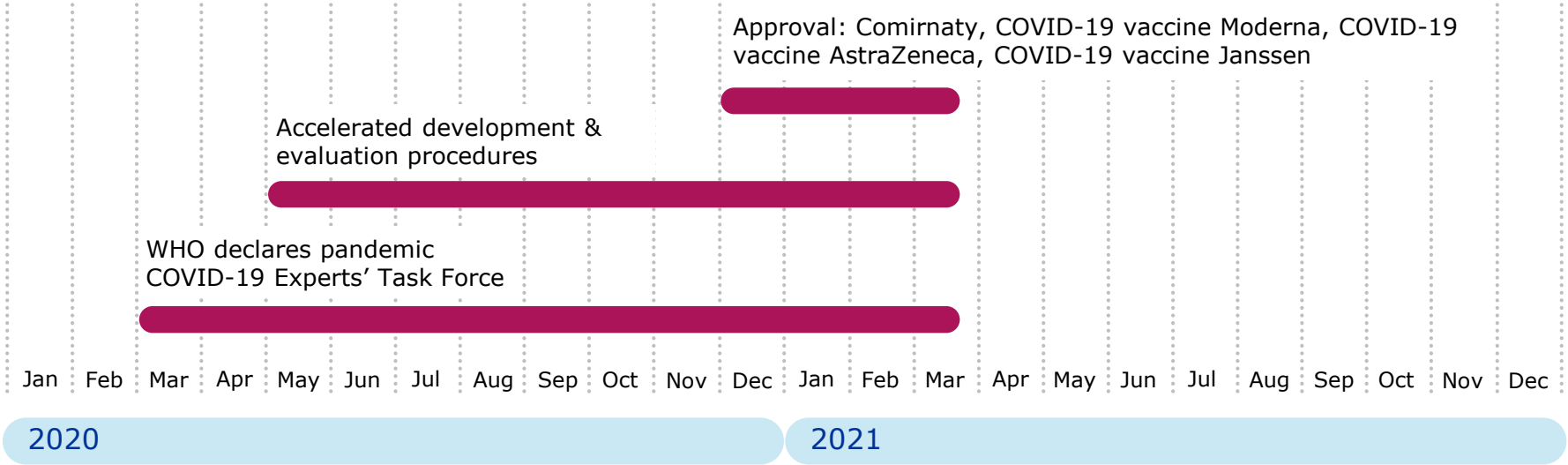
1. EMA response to COVID-19 pandemic - milestones
2. COVID-19 vaccines approved in the EU
3. Benefits and risks of COVID-19 vaccines
4. Real world evidence on effectiveness
5. Studies in children
6. Vaccines under review by EMA
7. Adapting COVID-19 vaccines to variants
8. Additional information

Milestones in the fight against the pandemic

Scientific & regulatory mobilisation

Rapid development & evaluation

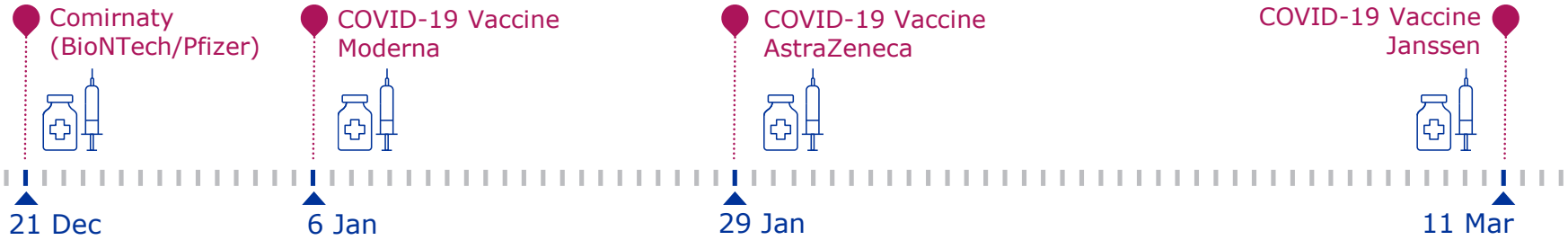
Transparency & outreach



COVID-19 vaccines approved in the EU

4 vaccines **authorised in the EU**

- **Comirnaty and Moderna** vaccines contain a molecule called **messenger RNA (mRNA)** with instructions for producing the spike protein from SARS-CoV-2, the virus that causes COVID-19
- The **AstraZeneca and Janssen** vaccine uses a **non-replicating adenovirus** as a carrier that has been modified to produce the spike protein from SARS-CoV-2.
- The vaccines do not contain the SARS-CoV-2 virus causing COVID-19 itself and **cannot cause the disease.**



Efficacy of COVID-19 vaccines in trials

All COVID-19 vaccines approved in the EU have a positive benefit-risk balance in prevention of COVID-19 disease.

- **mRNA vaccines** show very high efficacy in trials in preventing symptomatic COVID of any severity
- **Viral vectored vaccines** also demonstrated protection against symptomatic COVID
- Since vaccines have been studied in different trials, **it not possible to make direct comparison of the efficacy rates reported**
- Data on **prevention of severe disease, hospitalisation and death** from clinical trials are limited but all **showing a trend towards high level of protection**
- Currently there are **limited information from clinical trials** with respect to protection against emerging **variants**
- Some **Real World data** with respect to **prevention of infection** have been reported but **more data are needed** for proper estimation

Positive benefit risk for COVID-19 vaccines

Good safety profile, comparable to vaccines for other diseases

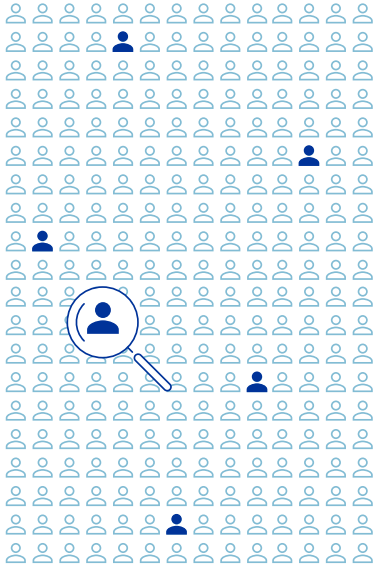
- **Most common** side effects are usually **mild or moderate and temporary.**
- These include pain and tenderness at injection site, headache, tiredness, muscle pain, general feeling of being unwell, chills, fever, joint pain and nausea.
- **Very rare but severe allergic reactions** have occurred in people receiving the vaccine (in **less than 1 in 100,000 people**)
- **Very rare events of severe thrombosis combined with thrombocytopenia** after Astra Zeneca vaccination have occurred **in around 1 in a million people**, and are under investigation
- **Long term safety** is being monitored.

Full **scientific details and product information**:

Comirnaty | COVID-19 Vaccine Moderna | COVID-19 Vaccine AstraZeneca | COVID-19 vaccine Janssen

Data from the real world to complement clinical trial data

- EMA plans to use **Real World Evidence (RWE)** from clinical practice to **monitor** the **safety** and **effectiveness** of COVID-19 vaccines
- Real-world monitoring complements EMA's regular safety-monitoring activities
- RWD can inform vaccination campaigns and changes in current practise
- These studies will provide information:
  - on **how long protection lasts**
  - how well the vaccine **prevents severe COVID-19**
  - how well it protects **immunocompromised people and pregnant women**
  - whether it **prevents asymptomatic cases and blocks transmission**



Preliminary studies on COVID-19 vaccine effectiveness

4 effectiveness studies available from Israel and UK

- **Preliminary assessment by EMA's** COVID-19 Task Force - early data **promising:**
  - Comirnaty: **prevention of infection in Israel** (92% effectiveness after 2 doses)
  - **Astra Zeneca and Comirnaty:** Substantial reduction in risk of hospitalisation in UK (>80%), but more data awaited
- **Comirnaty:** data confirm the efficacy from the clinical trials and the booster effect of the second dose
- **COVID-19 Vaccine Astra Zeneca**:

  Initial data show high protection from COVID-19, including severe disease, after first dose
  - In addition, emerging data from large clinical trial pointing to high efficacy including in the elderly

Studies in children

- The vaccines are currently **not approved for younger children:**
  - **Comirnaty** can be given above **16 years of age**
  - **Moderna , Astra Zeneca and Janssen** can be given above **18 years of age**
- Vaccines will be **first tested in adolescents** and then progressively in children below 12 years of age down to the youngest ages
- It is not known at the moment when these data will be submitted because the studies are still ongoing.
- The two authorised mRNA vaccines are recruiting adolescents at a fast pace into clinical studies

Novavax (NVX-CoV2373)

- Start of **rolling review**: 03/02/2021
- **Protein-based vaccine** containing tiny particles made from a laboratory-grown version of the spike (S) protein found on the surface of SARS-CoV-2 coronavirus.
- It also contains an **adjuvant** to help strengthen the immune responses to the vaccine

COVID-19 VACCINES UNDER REVIEW BY EMA

CureVac (CVnCoV vaccine)

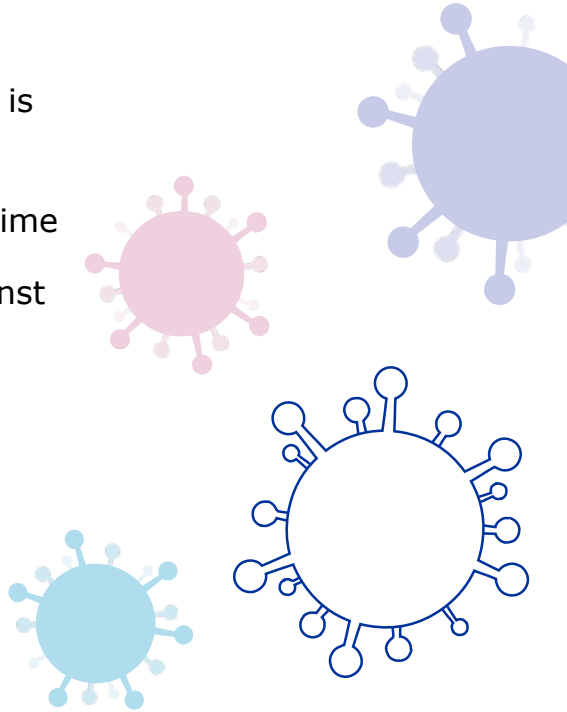
- Start of **rolling review**: 12/02/2021
- CVnCoV contains **mRNA in lipid nanoparticles**
- Large clinical **trial ongoing** at the moment

Sputnik Vaccine

- Start of **rolling review**: 04/03/2021
- Contains two different viruses belonging to the adenovirus family, Ad26 and Ad5
- These adenoviruses have been modified to contain the gene for making the SARS-CoV-2 spike protein; they **cannot reproduce in the body and do not cause disease**
- The two adenoviruses are **given separately**: Ad26 is used in the first dose and Ad5 is used in the second to boost the vaccine's effect

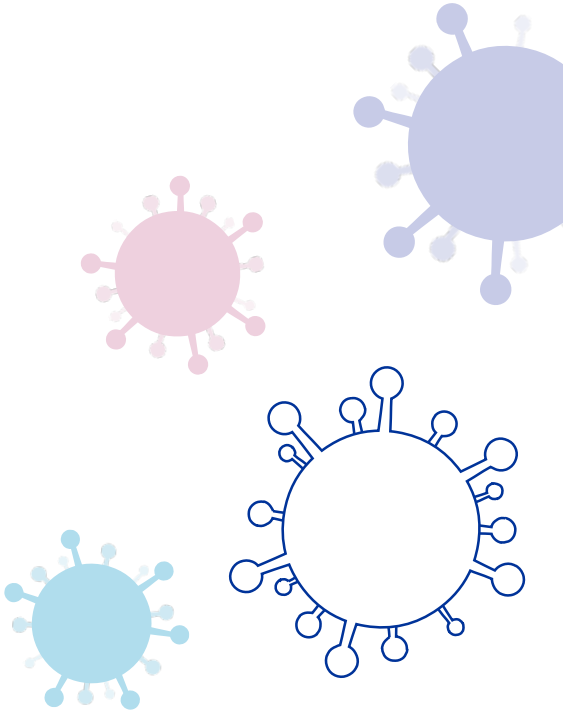
Adapting COVID-19 vaccines to variants

- Sars-CoV-2 **variants are emerging** and will continue to emerge if the virus is not stopped
- This requires continuous **monitoring of the vaccines' performance** over time
- Regulators and developers are anticipating **vaccine updates** to protect against variants
- This can be done **reasonably quickly** – based on existing knowledge with annual flu vaccines - **no need for large scale trials**
- Studies needed to approve 'variant vaccines' will look at comparing immune responses between people vaccinated with the parent vaccine and people vaccinated with 'variant vaccine'
- EMA has provided **guidance to vaccine developers**



Data from clinical trials on how COVID-19 vaccines protect from variants

- Based on published studies, the vaccines authorised in the EU are expected to provide **protection against the UK B.1.1.7 variant**
- In terms of mild disease, **protection against the South African variant B.1.351 may vary depending on the vaccine;** studies are needed to define extent of protection against severe disease and hospitalisation
- For **Brazil variant P.1 –** no data available



Pending questions on COVID-19 vaccines

- Need for two doses for individuals who had a history of COVID-19
- Interval between the doses
- Possibility to boost with different vaccines
- Use in immunocompromised subjects and selected special population

How vaccines help to beat the pandemic

- **Immediate benefit** for people who will be protected against COVID-19 symptoms
- **If fewer people are getting sick** (develop symptoms of COVID-19), particularly among high risk individuals such as older people, this will **alleviate the huge burden of COVID-19 disease on healthcare systems**
- **Preliminary data** from Israel, with high vaccination rate and infection rates are falling, providing **first evidence of vaccines reducing spread.**
- COVID-19 vaccines that reduce symptomatic disease **will be essential to beat the pandemic**
- At least initially, vaccines alone will not allow us immediately to return to 'normal' life, and other public health measures such as **face masks, hand hygiene and social distancing will remain essential**

Ongoing activities

- **54** vaccine developers have interacted with EMA so far
- **~30** vaccine companies have interacted with COVID-ETF
- **42** rapid scientific advice procedures for vaccines
- Guidance for developers issued on variant vaccines
- Discussions ongoing for approval of additional vaccines
- Post-authorisation studies for effectiveness and safety
- International collaboration with WHO and regulators worldwide

Conclusions

- All approved vaccines in the EU have been shown to offer **good level of protection against COVID-19 disease**
- **Preliminary real world data** suggest vaccines also **reduce transmission, severe disease and hospitalisation**
- **Most side effects are mild to moderate** in severity and are gone within a few days
- Vaccines granted conditional marketing authorisation - companies must provide more evidence to EMA
- Variant strains are emerging and **vaccines may need to be updated**
- Regulators and developers are working to ensure the necessary updates can be made rapidly and efficiently to **ensure vaccines remain effective**
- **Vaccination remains critical** to control the pandemic