

Ask-the-Expert: COVID-19 & Vaccines

DM & COVID-19

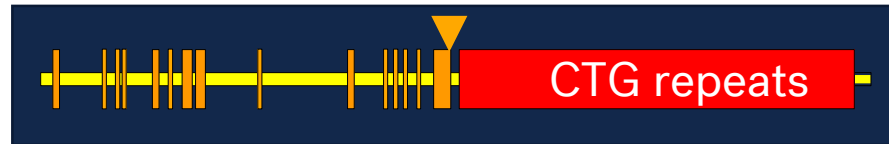
Ami Mankodi, MD



Myotonic dystrophy

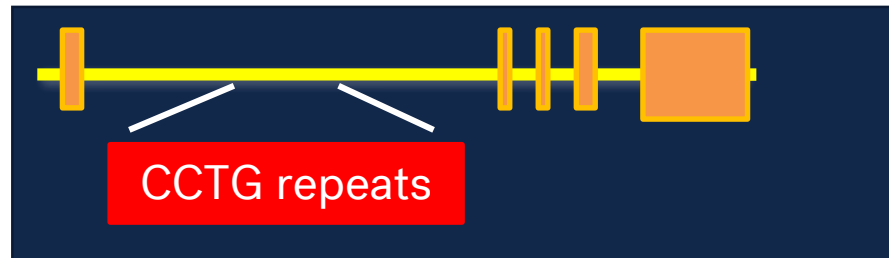
- Myotonic dystrophy (DM) is an inherited multisystem disease
- At least two types exist
- Each type is caused by distinct gene defects

DM Type 1 :



DMPK

DM Type 2 :



CNBP

Myotonic dystrophy types 1 and 2

Myotonic dystrophy type 1 (DM1)	Myotonic dystrophy type 2 (DM2)
<ul style="list-style-type: none">➤ Can occur from birth to old age	<ul style="list-style-type: none">➤ Symptoms manifest only in adults
<ul style="list-style-type: none">➤ Symptoms vary from minor muscle pain to life-threatening disease	<ul style="list-style-type: none">➤ Less severe than DM1
<ul style="list-style-type: none">➤ Multiple systems involved (serious respiratory and heart conditions)	<ul style="list-style-type: none">➤ Fewer systems are affected (respiratory system uncommon)

Myotonic dystrophy: disease mechanism

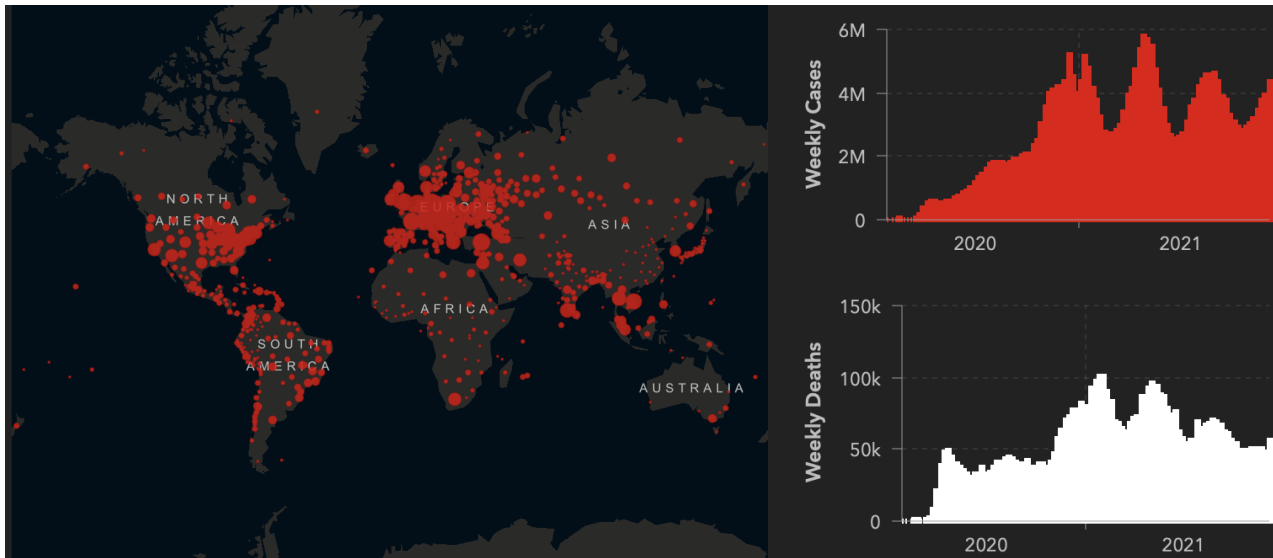
- In myotonic dystrophy type 1 and 2, an expanded repeat leads to a disturbance in the processing of other RNA (splicing)

The expanded repeat is not expected to affect the mRNA in the COVID-19 vaccine.

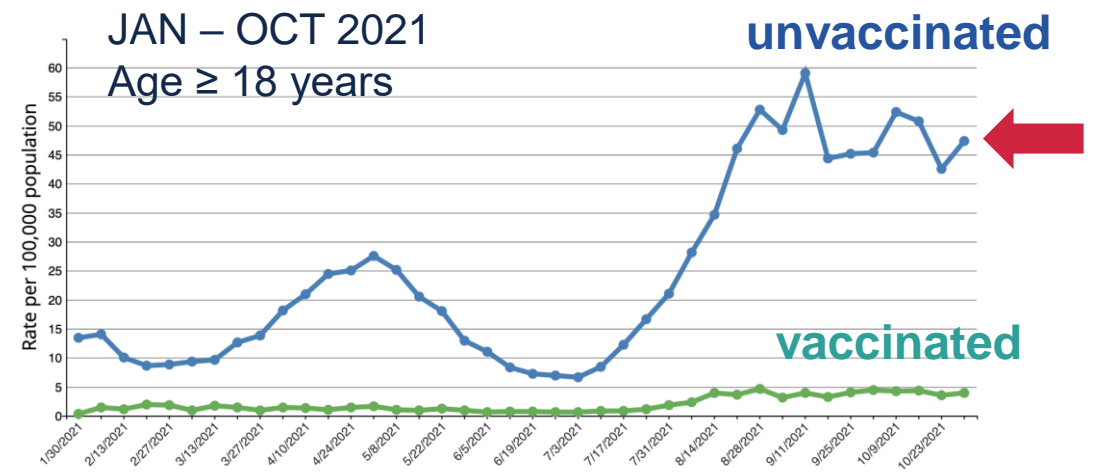
The COVID-19 vaccine's mRNA is fully processed –does not need to be spliced.

Coronavirus disease 2019 (COVID-19)

- COVID-19 pandemic has affected millions of people in several countries
- Vaccines are the most effective at preventing hospitalization



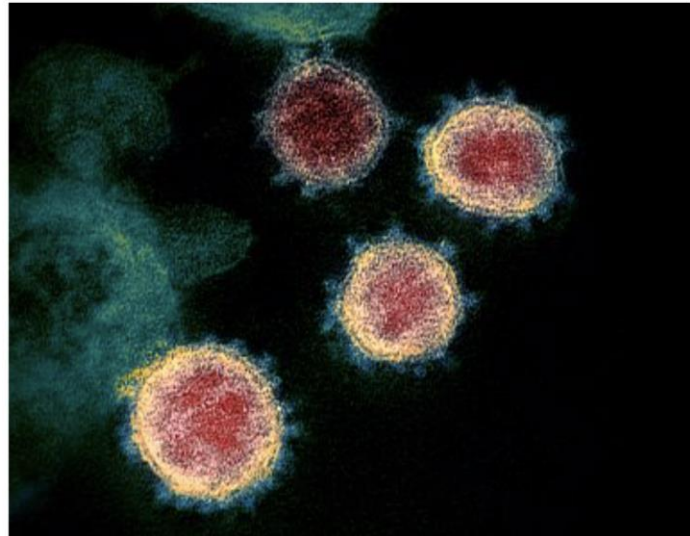
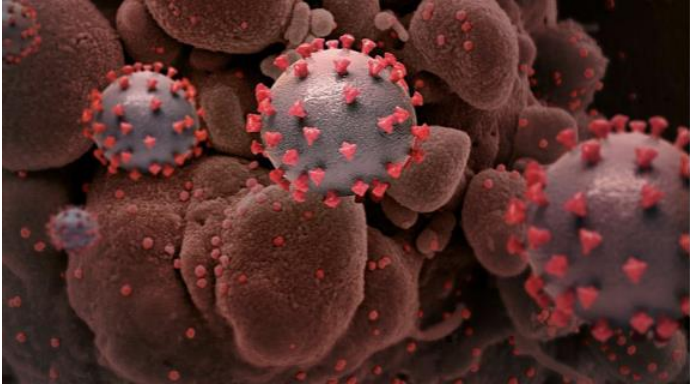
Johns Hopkins University



Hospital admission rates were 8 times higher in unvaccinated persons

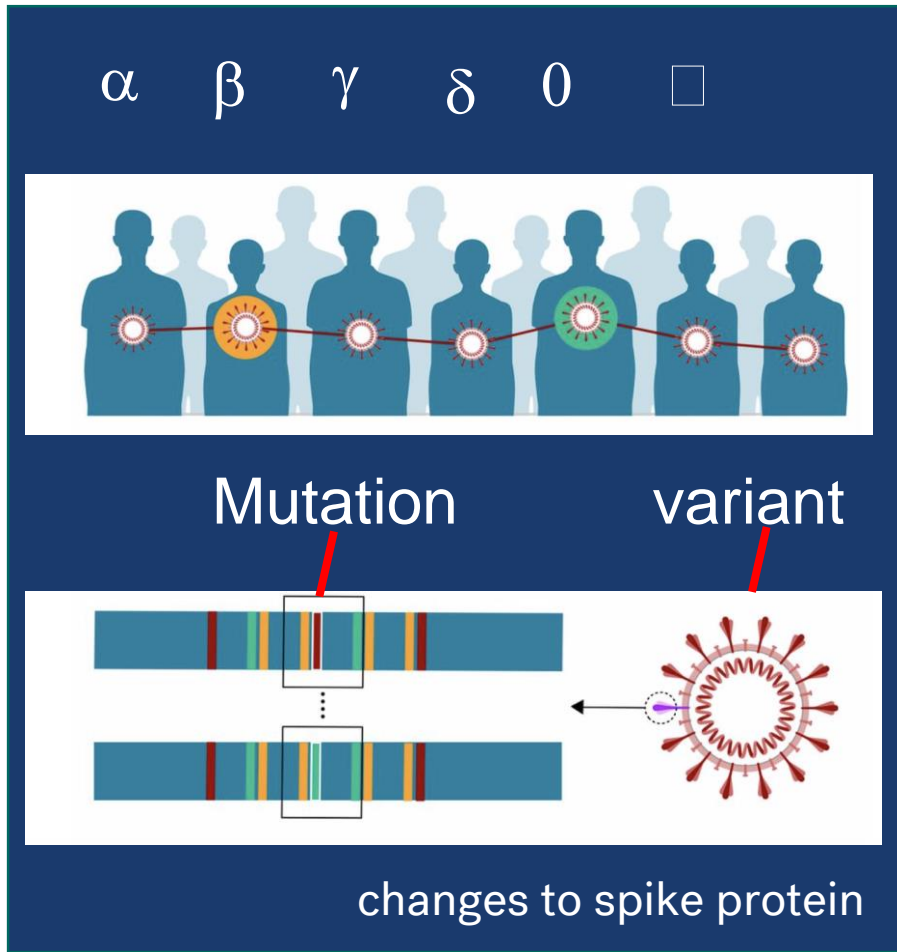
CDC.gov

COVID-19: the novel coronavirus, SARS-CoV-2



- Spherical and spikes protruding from the surface
 - The spikes give a crown-like appearance – coronavirus
 - The virus uses the spikes to enter cells
 - This coronavirus is named SARS-CoV2
- ← SARS-CoV2 viral particles isolated from a patient are emerging from the surface of cells cultured in the lab

COVID-19: variants



CDC.gov

The more the virus circulates, the more they may change. Most have little impact.

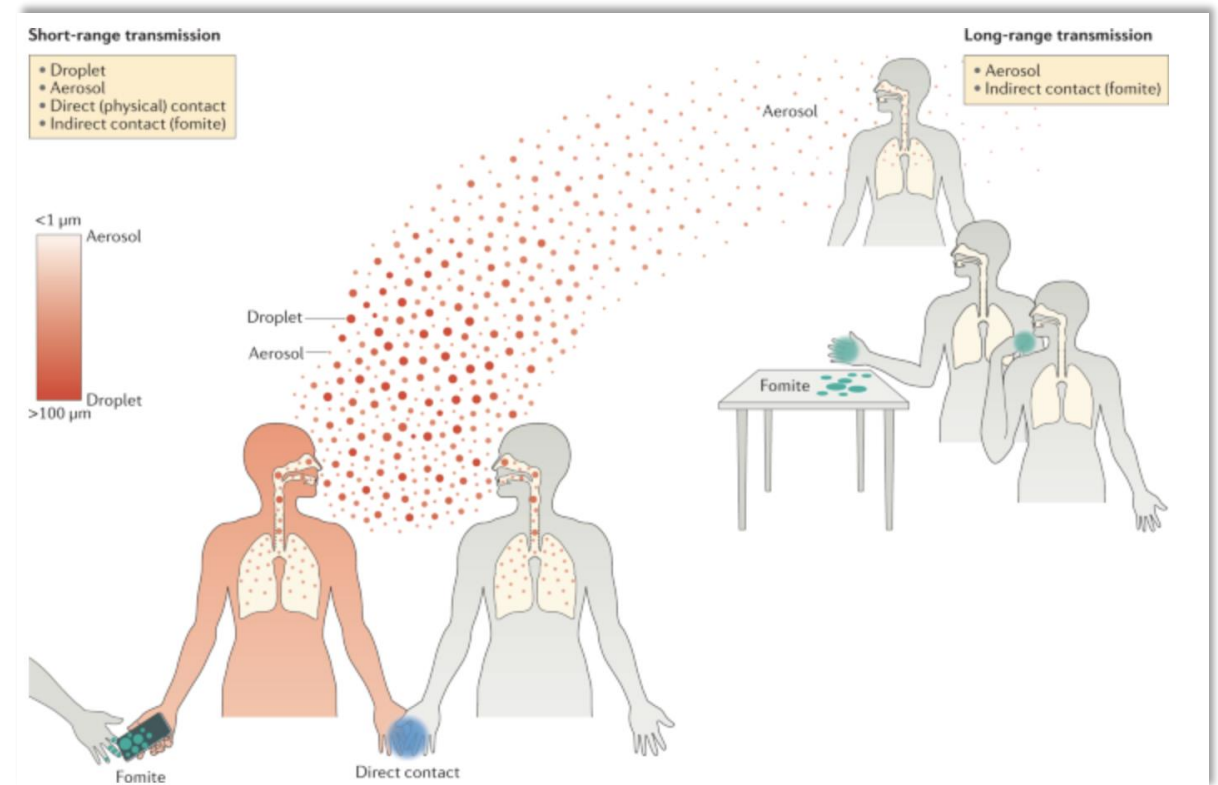
Mutations: When a virus makes copies of itself, it sometimes changes a little bit

Variants: A virus with one or more mutations

- Spread the disease more easily
- Change in clinical disease (more severe disease)
- Decrease effectiveness of treatment, vaccines, and social measures

COVID-19: spread of infection

- COVID-19 spreads through respiratory droplets and aerosols or by physical contact with the person or through contaminated objects
- People with mild or no symptoms can spread the virus.



Leung NH. Nature Rev Microbiol 2021

COVID-19: symptoms

- Range of symptoms

Mild → Severe

- Most cases are mild

- 20% admitted to hospital

- 5% ICU



COVID-19: warning signs



Trouble breathing

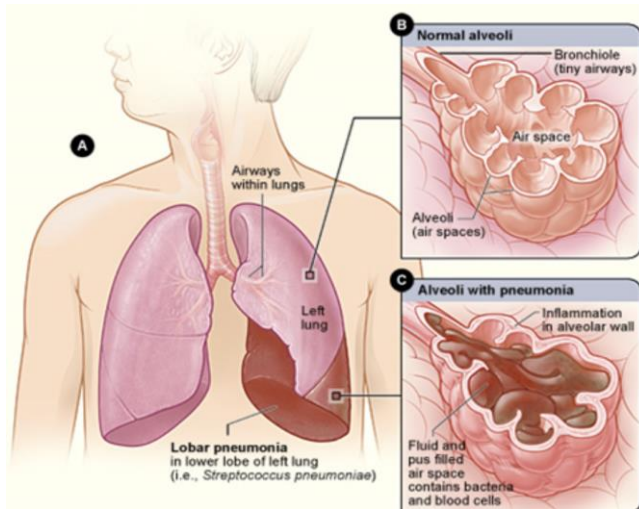
Chest pain

Confusion

Inability to wake or
stay awake

Blue/gray/pale –
colored skin, lips, nail
beds

COVID-19: can affect breathing in all, even healthy persons



Pneumonia
NIH.gov

COVID-19 Pneumonia :

Tends to affect both lungs



Air sacs filled with fluid



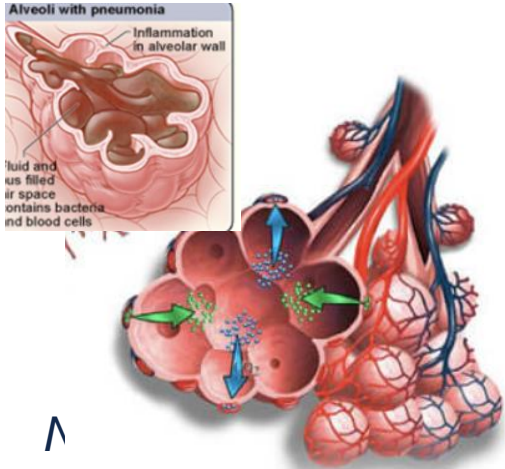
Limiting ability to take in oxygen



Shortness of breath, cough, other symptoms

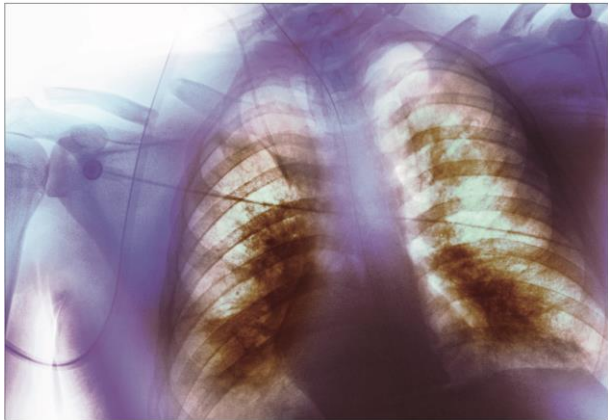
Severe and long-lasting lung injury may result in breathing difficulties for months after the disease has passed.

Severe COVID-19: lungs



Acute Respiratory Distress Syndrome

- As pneumonia progresses, more air sacs are filled with fluids leaking from tiny blood vessels in the lungs
- A form of life-threatening acute lung failure
- Ventilator support to help circulate oxygen in the body
- Those who survive may have lung scarring



thelancet.com/2013

Myotonic dystrophy type 1: breathing problems

Weakness of breathing muscles



Poor cough and ventilation



Lung infections like COVID-19

Swallowing / food pipe muscle weakness



Fluids, food enter the lungs



Aspiration pneumonia.

Sleep related breathing troubles (sleep apnea)



High CO₂, low oxygen



Heart problems

Myotonic dystrophy (DM) and COVID-19 : hospital care

➤ In the setting of pneumonia, oxygen may be needed

✓ **DM patients will require oxygen delivered through positive airway pressure device or a double lumen compatible ventilator (to remove CO₂)**

✓ good to bring home devices in case of device shortages (likely not allowed in hospital) and remember the setting

<https://www.chestnet.org/topic-collections/covid-19>

MDF_Pulmonary support for myotonic dystrophy patients during COVID-19 pandemic

Myotonic dystrophy type 1: concerns raised by COVID-19 regarding breathing devices

➤ Spread of virus to surroundings may increase and infect others

To limit the infection risk:

- ✓ well-fitted full face masks covering nose and mouth
- ✓ nonvented mask → filter → CO₂ exhalation port on tubing → device
- ✓ OR nonvented full face mask with a double lumen tube for compatible home ventilators
- ✓ clean devices as per recommendations

Myotonic dystrophy type 1: concerns raised by COVID-19 regarding breathing devices

➤ Family and caregivers

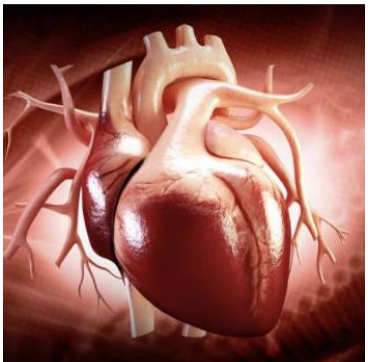
- ✓ space needed for isolation.. at least 3 feet
- ✓ hand hygiene – wash with soap water before and after
- ✓ gloves, face mask (N95 preferred), eye goggle, protective clothing
- ✓ clean surfaces with antibacterial/viral spray

MDF_Pulmonary support for myotonic dystrophy patients during COVID-19 pandemic

Severe COVID-19: heart



Heart muscle (myocardium) injury

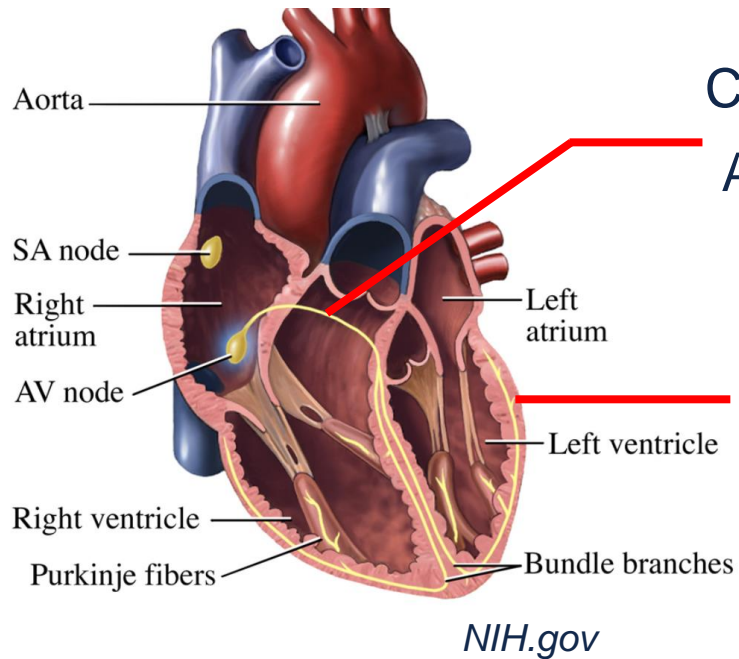


NIH.gov

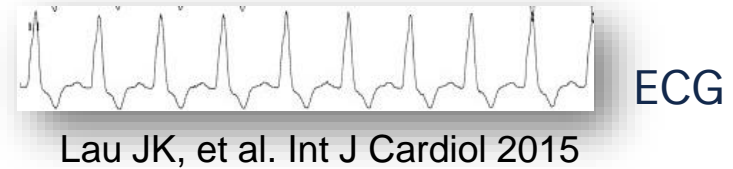
- Infection (myocarditis)
- Acute heart failure
- Heart attack (acute myocardial infarction; damaged blood vessels)

Myotonic dystrophy and heart

Regular evaluation can be lifesaving



Conduction system slowing
Abnormal heart rhythm



Prevention through proper management

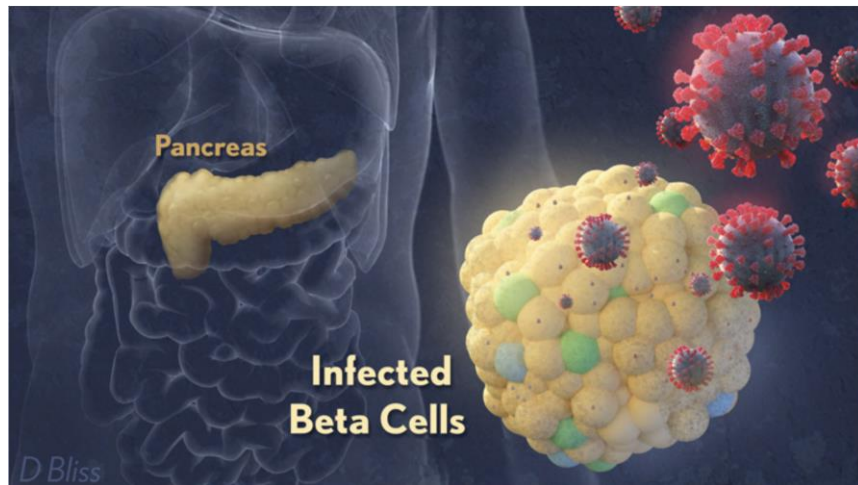
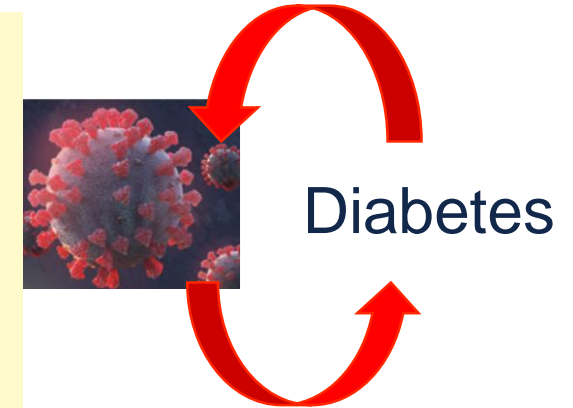
Abnormal heart function
Heart failure

Talk to your doctor:

- Palpitations (feeling of own heartbeat)
- Dizziness
- Fainting or passing out due to low BP

COVID-19 and diabetes

- Poorly controlled diabetes cause severe COVID-19
- Some people develop diabetes after acute COVID-19

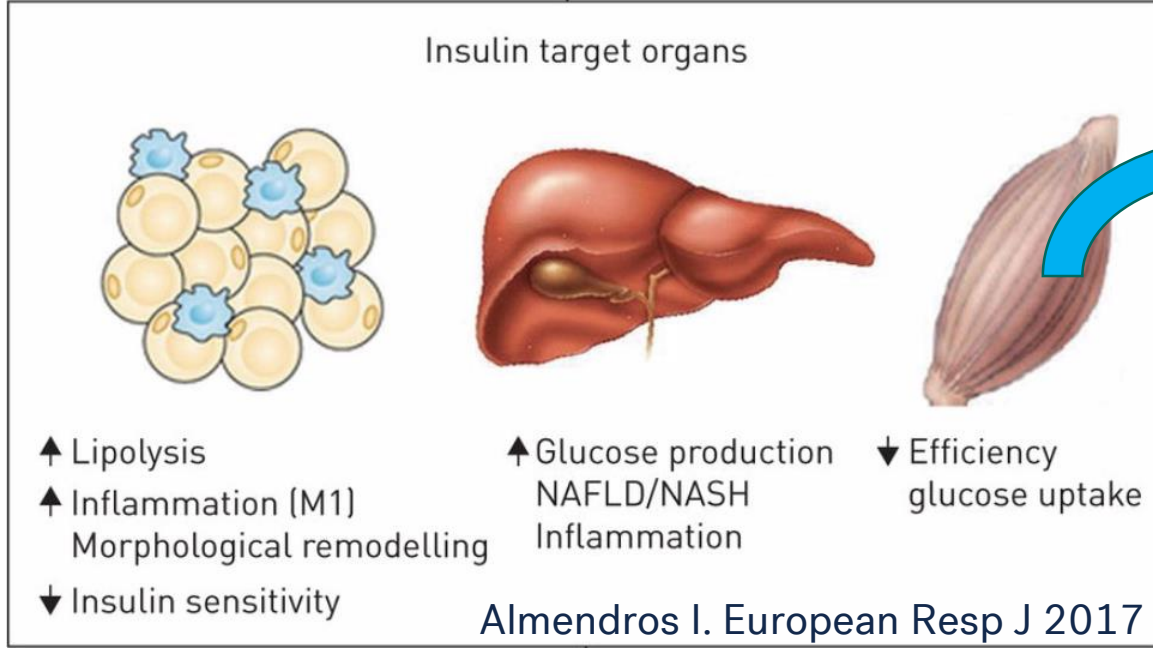


- COVID-19 can impair insulin producing cells resulting in diabetes

NIH.gov

Tang et al and Wu et al Cell Metabolism 2021

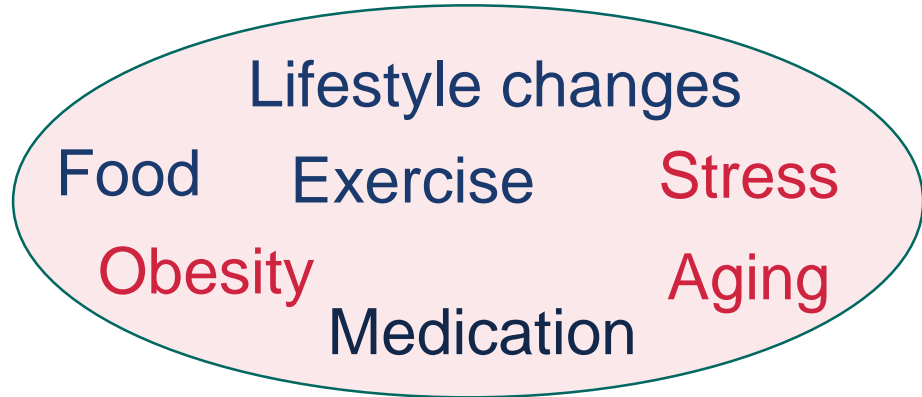
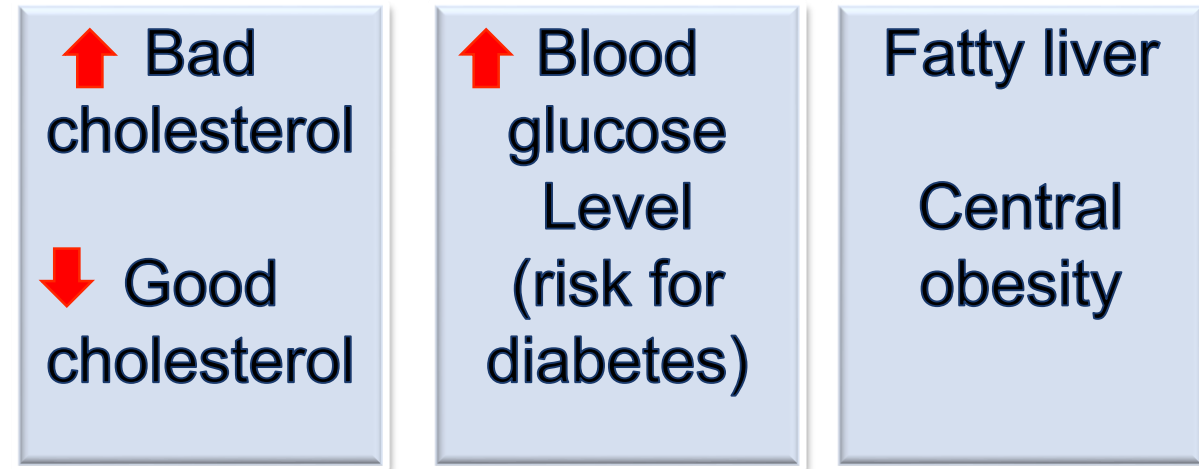
Myotonic dystrophy: metabolic syndrome



Mis-splicing of insulin receptor



Insulin resistance



Conditions with increased risk for severe COVID-19

Note: these are not specific to myotonic dystrophy

Pregnancy

Neurological
disease

Heart disease

Liver disease

Diabetes

Overweight
and obesity

Lung disease

Kidney
disease

Weakened immune system
(cancer, HIV)

Sickle cell
disease

Summary

- ❖ There is not much information about how people with myotonic dystrophy types 1 and 2 respond to COVID-19.
- ❖ Individuals with weak cough, breathing troubles, heart disease, or diabetes may be at increased risk for severe COVID-19 illness.
- ❖ **Optimize health care with your doctor's help**
- ❖ **Lifestyle changes and proper medical care can improve overall health therefore, future viral pandemic confer less threat**
- ❖ **Get your vaccine ----BEST DEFENSE**

Questions

For Dr. Mankodi about DM and COVID-19.

