The Front Lines of the Fight Against COVID-19

A TOWN HALL CONVERSATION XIV

We will begin at 10 a.m.

Hosted by the Houston Methodist DeBakey Heart & Vascular Center Council and the Houston Methodist Women's Health Task Force

COVID-19 and Women's Heart Health

Karla Kurrelmeyer, MD, FACC, FASE

May 13, 2021

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How does an acute COVID-19 infection cause heart injury?

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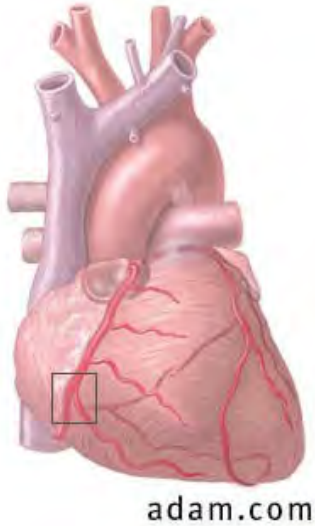
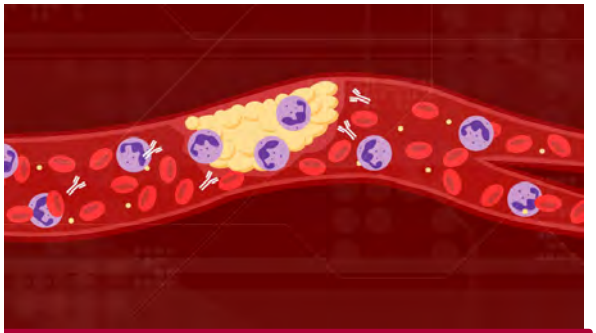
- Elevated heart blood biomarkers (troponin I and BNP) signify heart injury
  - Studies suggest injury most often is not due directly to the virus but to the body's inflammatory and blood clotting responses to the virus
  - Autoantibodies (AB)
  - Super-activated white blood cells (WBC)

Plaque in right coronary artery

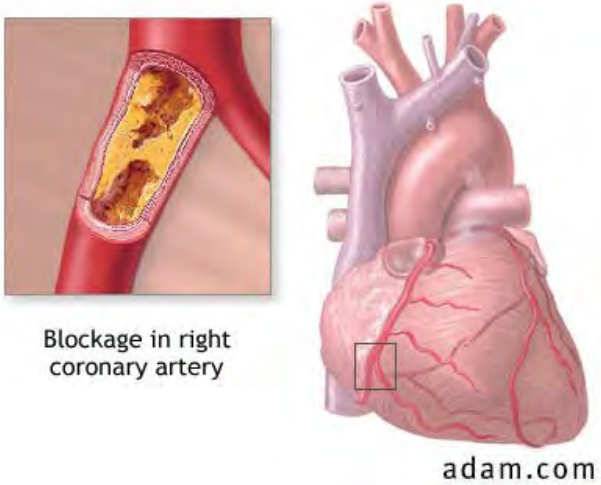




AB: Macro/micro thrombosis
WBC: Plaque Rupture/heart attack
https://labblog.uofmhealth.org

How does an acute COVID-19 infection cause heart injury?

- COVID-19 infection frequently causes hypoxia (low oxygen concentration in the blood) due to pneumonia, fast heart rates, low blood pressure which increases the amount of oxygen the heart needs to function. The heart normally receives more oxygen by increasing blood flow through expansion of the coronary arteries in the heart.
- People with underlying coronary artery disease are at high risk for heart injury during COVID-19 infection because blockages prevent the blood vessels in the heart from expanding to provide increased blood flow/more oxygen to the heart muscle.



How does an acute COVID-19 infection cause heart injury?

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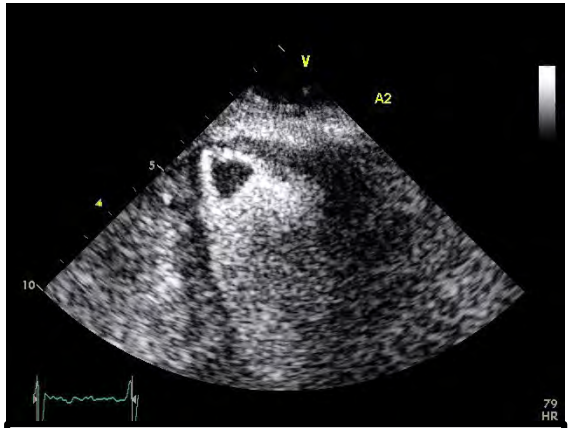
- In rare cases COVID-19 virus can directly attack the heart muscle (myocarditis) causing chest pain, heart failure, and abnormal heart rhythms (atrial fibrillation, ventricular fibrillation, ventricular tachycardia) in < 1% of patients.
- Cardiac MRI (CMR) is the best way to diagnose myocarditis after all other COVID-19 heart affects have been excluded.
- If CMR supports the diagnosis of myocarditis, AHA/ACC myocarditis guidelines for athletes advocate a 6-month holiday from the sport.

https://www.acc.org

How does an acute COVID-19 infection cause heart injury?

- Heart failure can also develop during an acute COVID-19 infection due to the severe stress placed on the heart during the infection (stress cardiomyopathy or Takotsubo's cardiomyopathy).
- Regardless of the exact mechanism of the elevated heart blood biomarkers (troponin I and BNP) the higher the level of these biomarkers the greater the risk of death from the COVID-19 infection.
- Echocardiography is the first line imaging modality used to determine how COVID-19 is affecting the heart during an acute infection.

https://www.acc.org



Blood clot in apex (tip) of heart

How does long COVID affect the heart?

- “Long COVID” is lingering symptoms that persist beyond the acute infection and may include: fatigue, brain fog, shortness of breath, chest pain, and dysautonomia or POTS (Postural Orthostatic Tachycardia Syndrome) like syndrome.
- 60-80% of discharged patients reported at least one of these symptoms 50 days following COVID-19 diagnosis, 35% non-hospitalized reported long COVID symptoms 14-21 days after initial diagnosis.

American Heart Association
https://www.heart.org

How does long COVID affect the heart?

- Those with fatigue, shortness of breath and chest pain should be screened for myocarditis with heart blood biomarkers, inflammatory markers, ECG, echocardiography and, if these suggest myocarditis, CMR.
- Dysautonomia/POTS treatment is currently supportive (home blood pressure and pulse logs, push fluids, salt, midodrine, beta blockers, ivabradine).

https://www.acc.org

COVID-19 Pandemic Affects on Patients with Heart Disease

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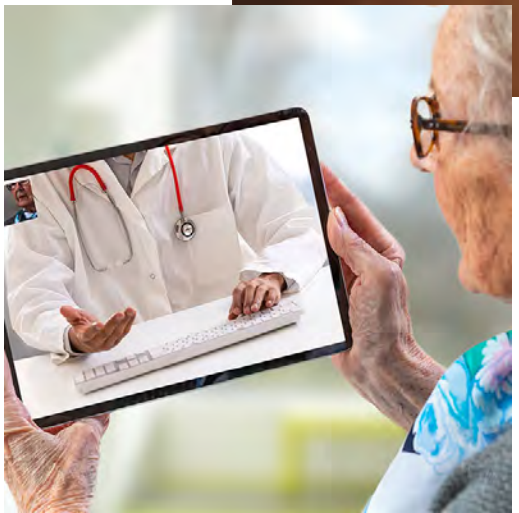
- Stress from the COVID-19 pandemic has led to high blood pressure, poor sleep habits, overeating, unhealthy food choices, weight gain, increased use of tobacco and other drugs.
- Fear and anxiety have led to missed appointments to manage these risk factors in patients with heart disease.
- Telehealth and home-based cardiac rehab can help physicians meet the pent-up demand for preventive services.



https://www.acc.org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Innovations in Imaging for Limb Threatening Ischemia

Trisha Roy MD PhD FRCSC

May 13, 2021

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Limb Threatening Ischemia

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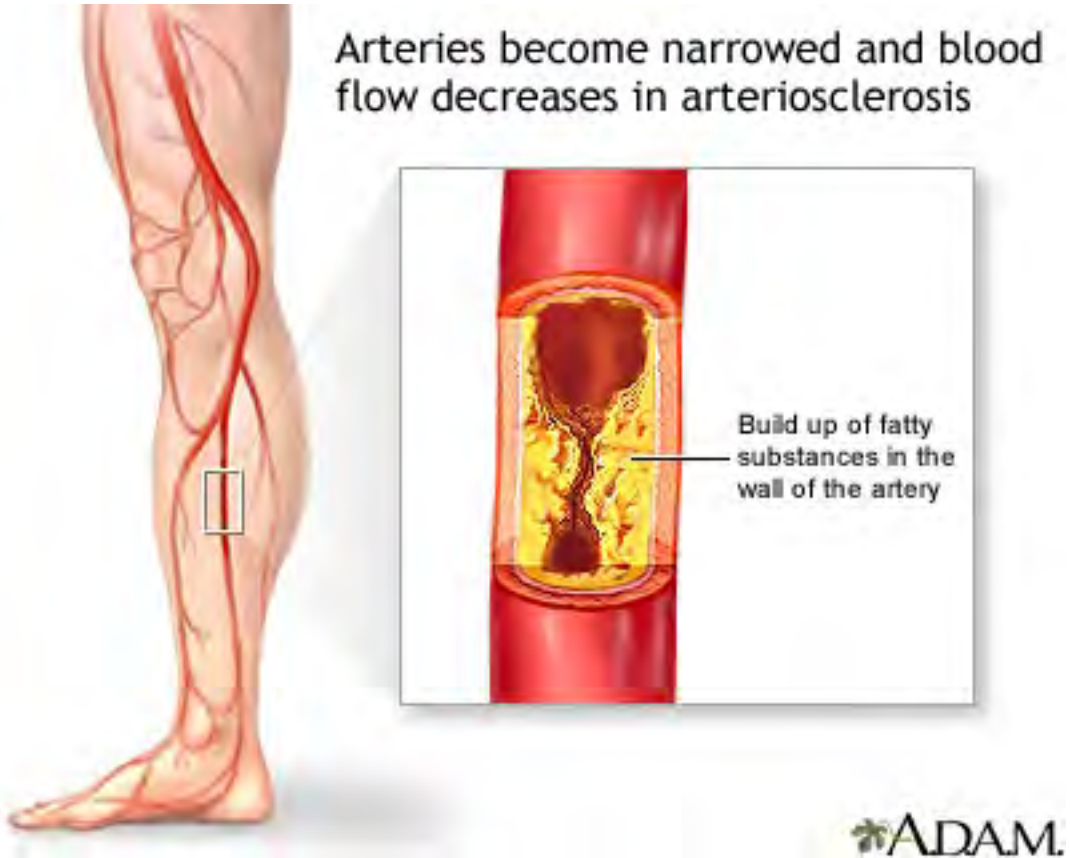

Limb Threatening Ischemia

1 Year Amputation Rate: ~20-25%

1 Year Mortality: ~20%

1. Dosluoglu H. Lower extremity arterial disease: General considerations. In: Cronenwett JL, Johnston KW, eds. Rutherford's Vascular Surgery, 8th ed. Philidelphia, PA: Saunders; 2014: 1660-1673.

COVID-19 & Limb Threatening Ischemia

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COVID-19

Impact of the COVID-19 Lockdown Strategy on Vascular Surgery Practice: More Major Amputations than Usual

Puck M.E. Schuivens,[1] Manon Buijs,[1] Leandra Boonman-de Winter,[2] Eelco J. Veen,[1] Hans G.W. de Groot,[1] Thijs G. Buimer,[1] Gwan H. Ho,[1] and Lijckle van der Laan,[1,3] Breda, the Netherlands and Leuven Belgium

Ann Vasc Surg 2020 Nov;69:74-79. doi: 10.1016/j.avsg.2020.07.025. Epub 2020 Aug 4.

How does COVID-19 cause Limb Threatening Ischemia?

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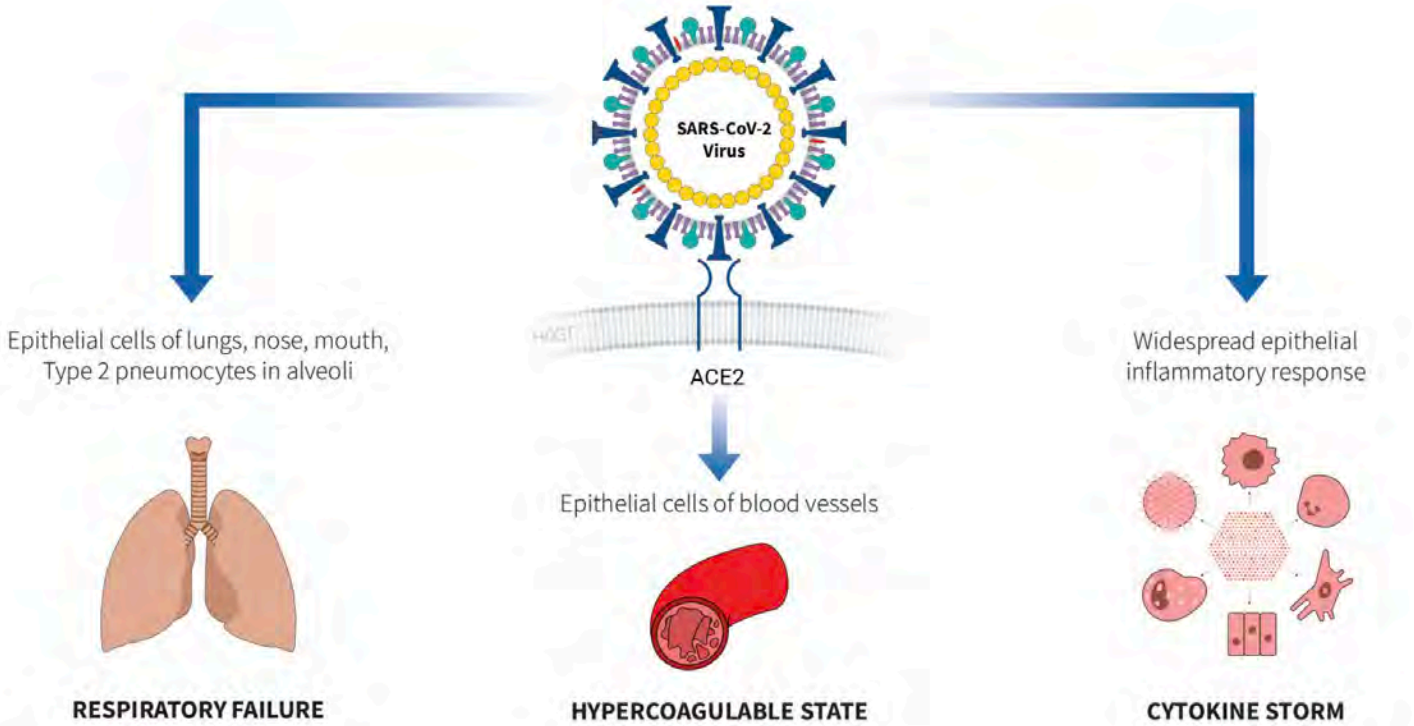
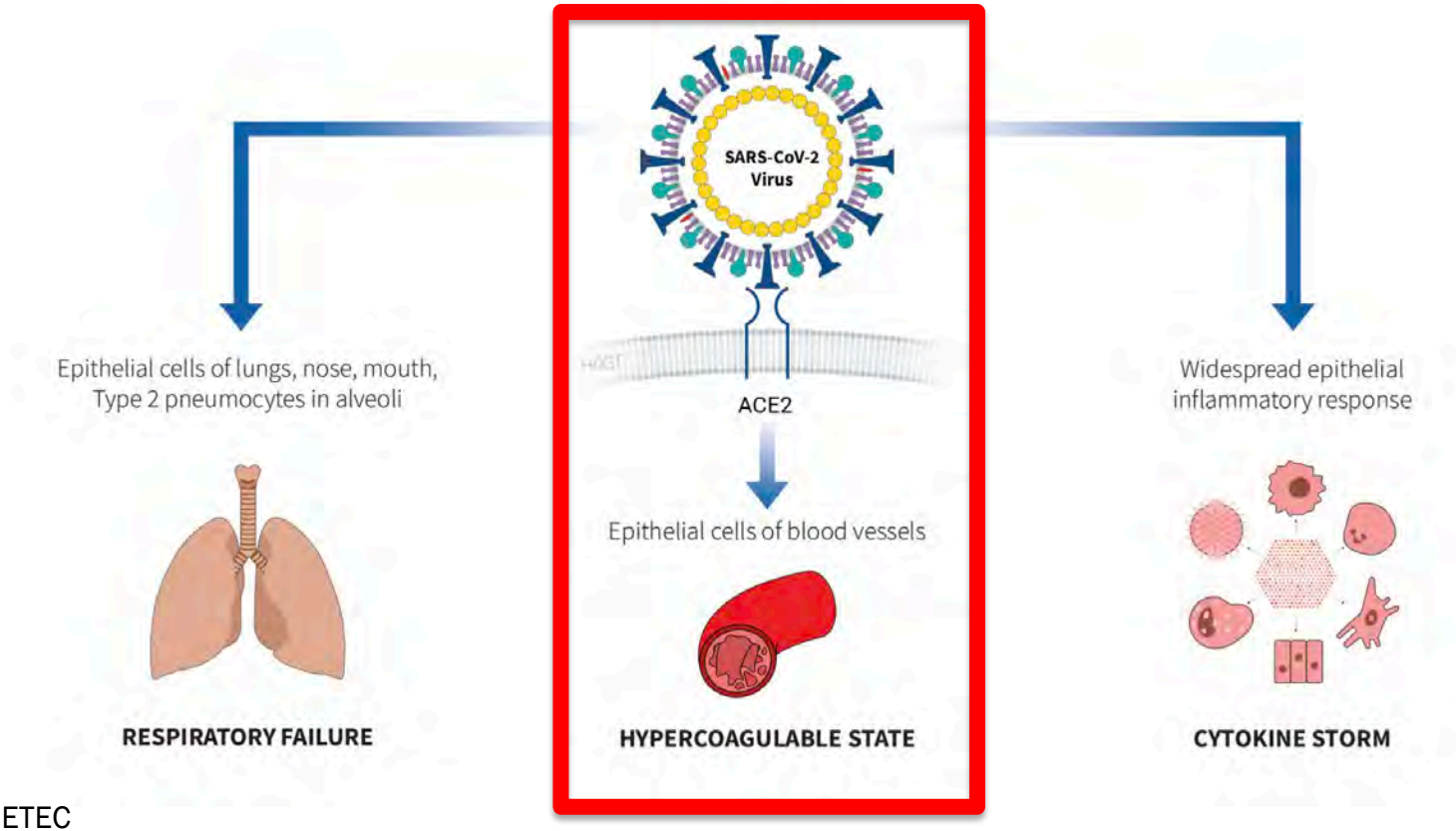


Source: NETEC

How does COVID-19 cause Limb Threatening Ischemia?



Source: NETEC

How does COVID-19 cause Limb Threatening Ischemia?

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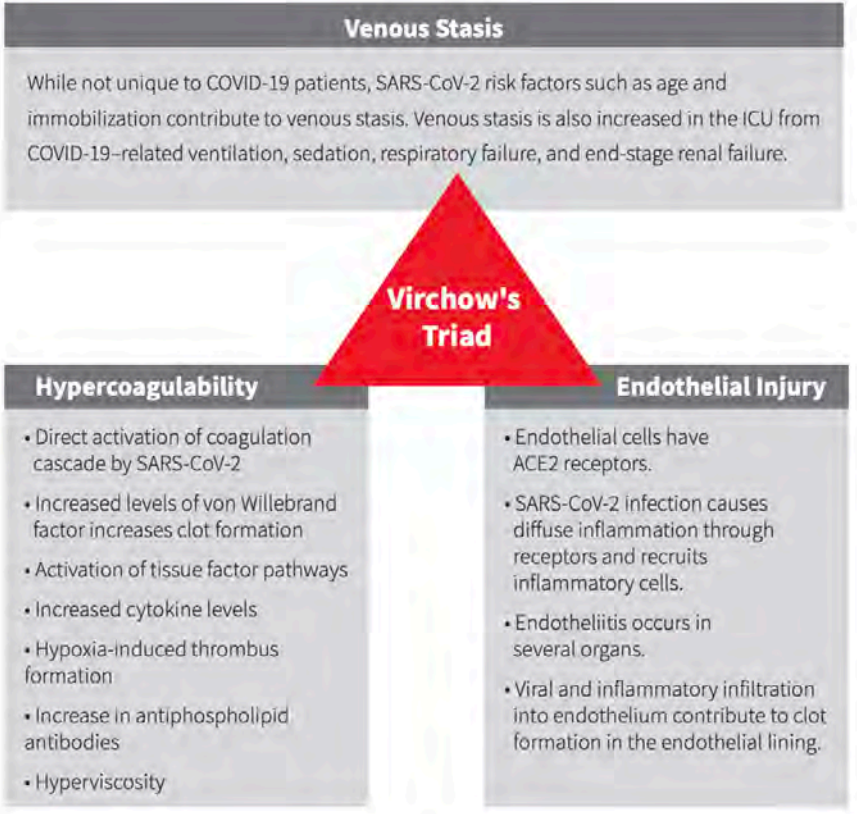
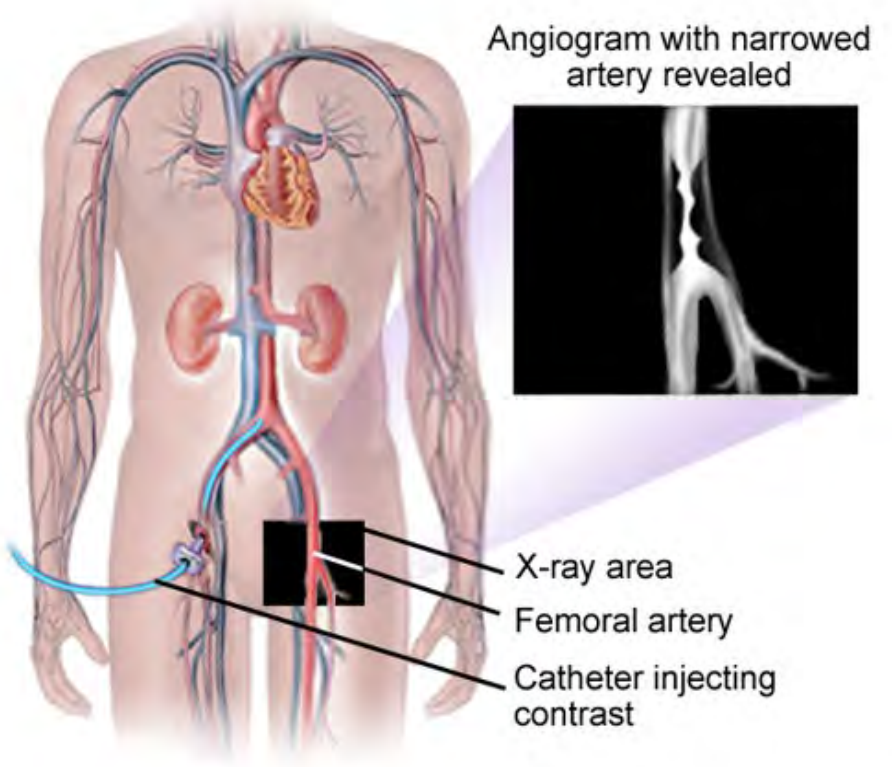
COVID-19 plays a role in activating all 3 elements of "Virchow's Triad"



Source: NETEC

Treatment Options



Treatment Options

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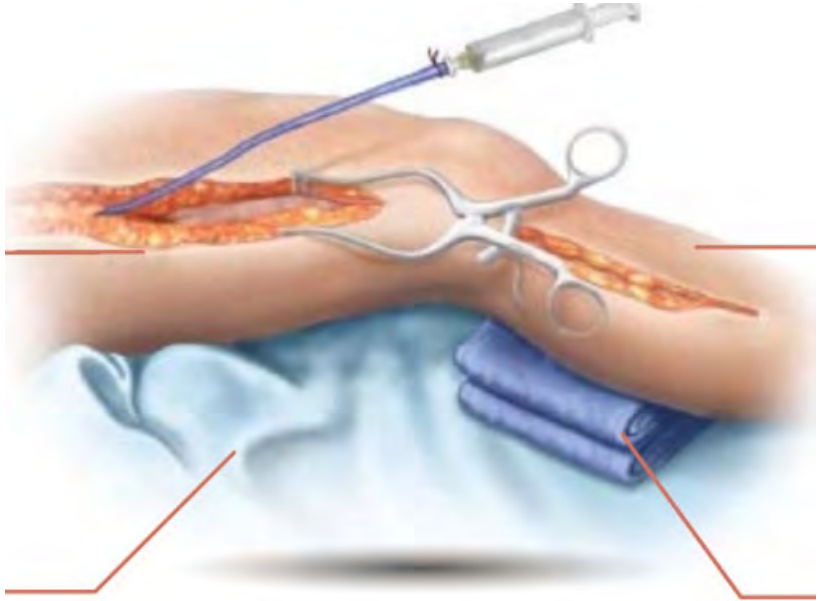
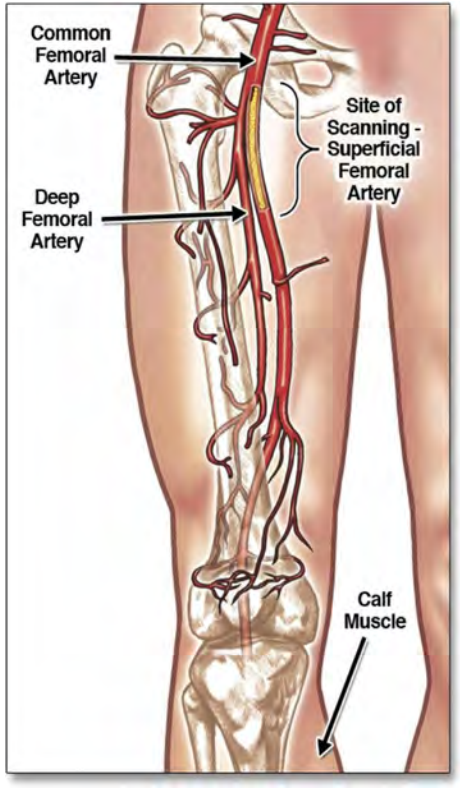


Current Imaging



Roy et. al PAD in era of precision medicine. JEVT 2016 23(5):751-761

Current Imaging

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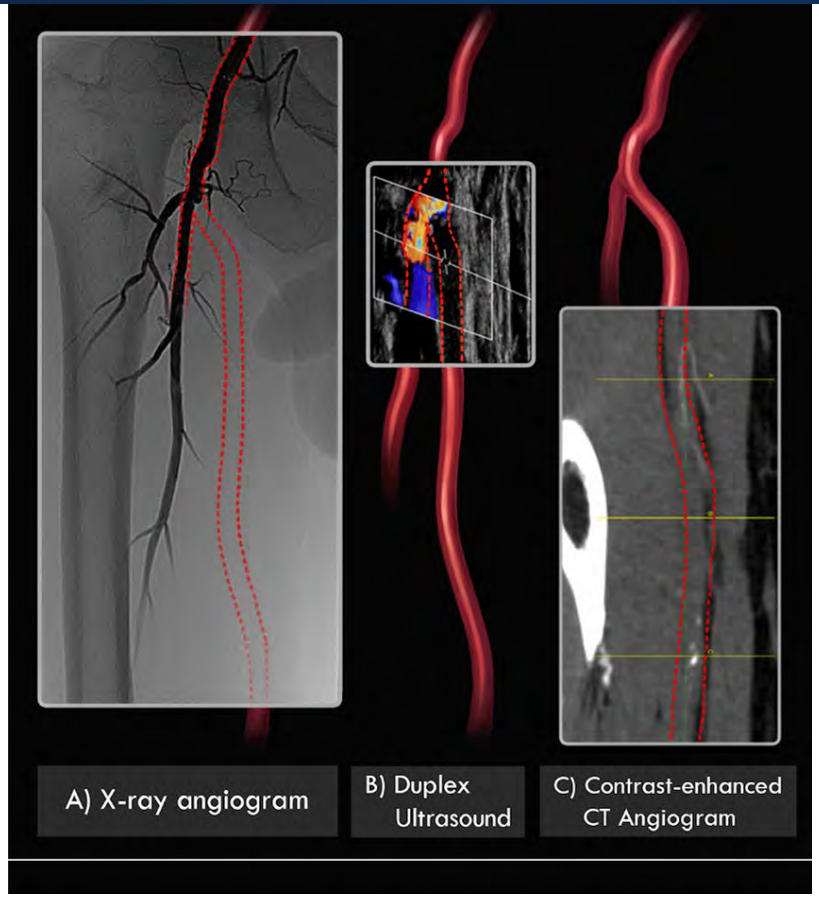

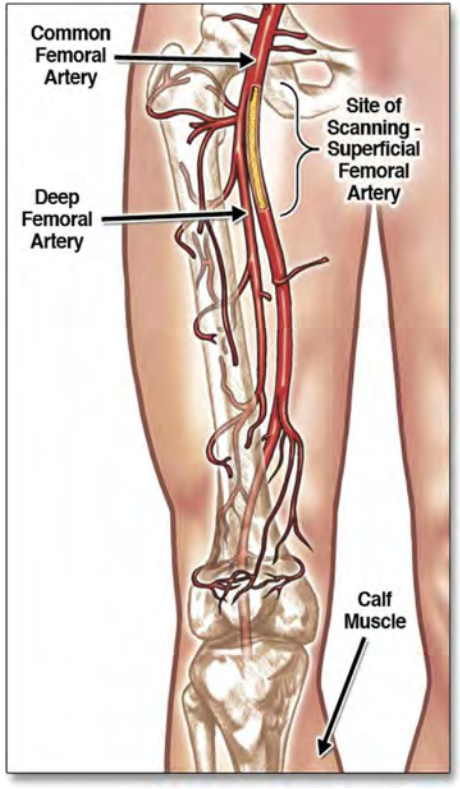

Roy et. al PAD in era of precision medicine. JEVT 2016 23(5):751-761

Many Treatment Options

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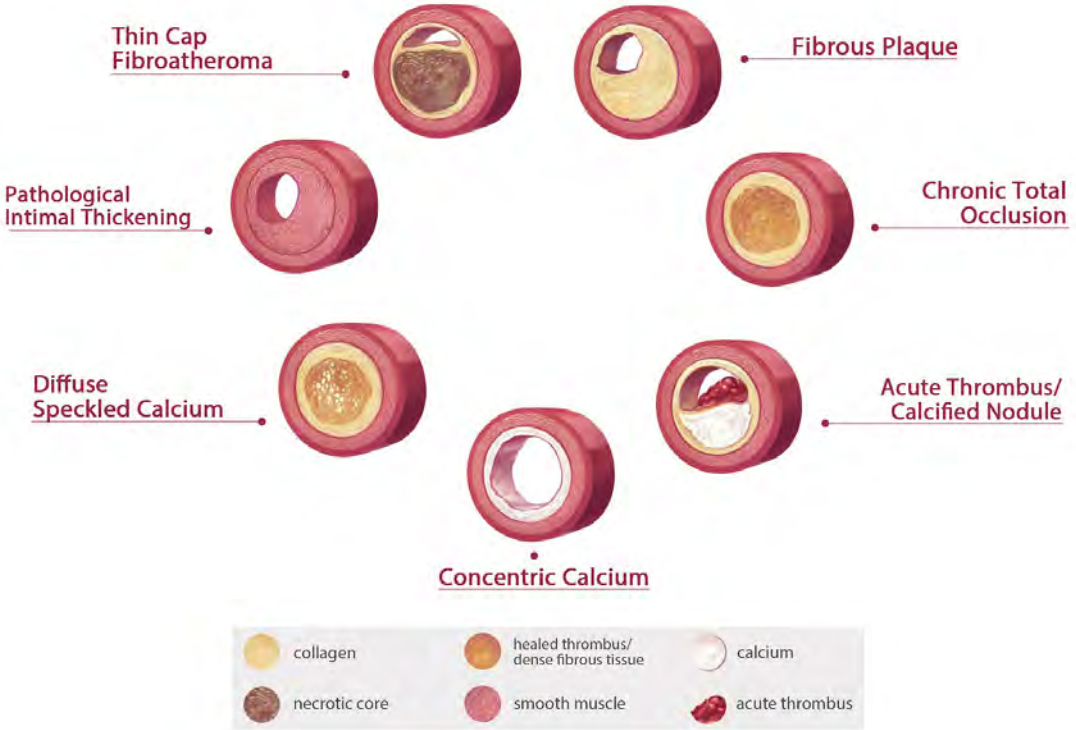

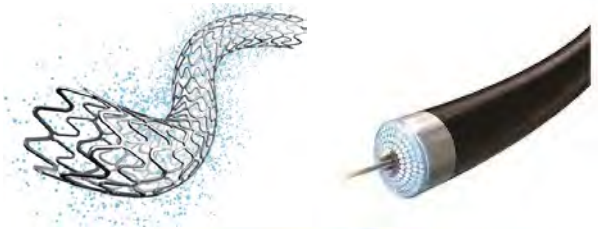

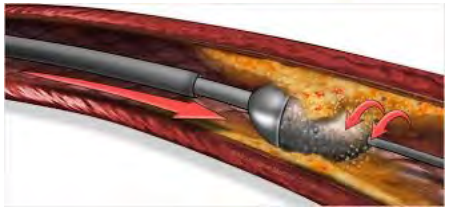

Current Approach

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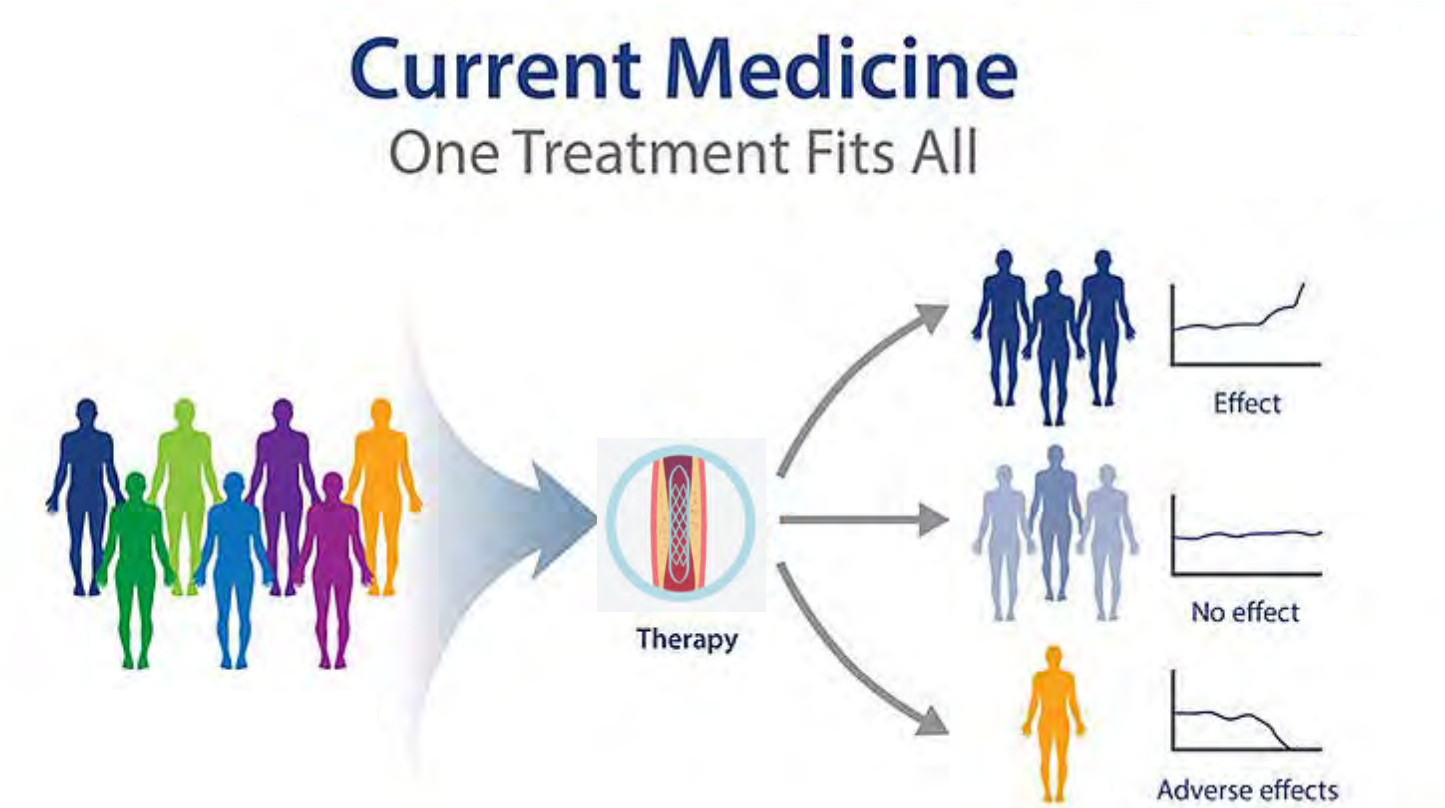
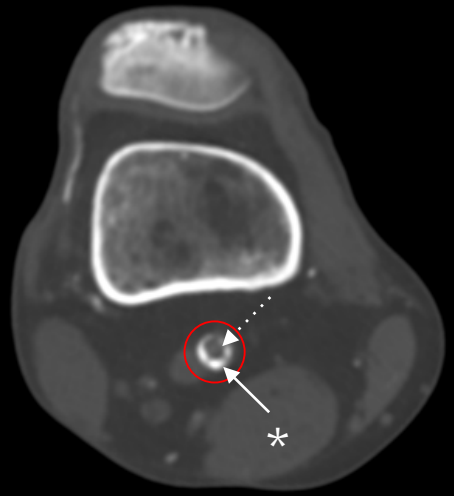


Adapted from: CrownBio

MRI-Histology



MRI-Histology

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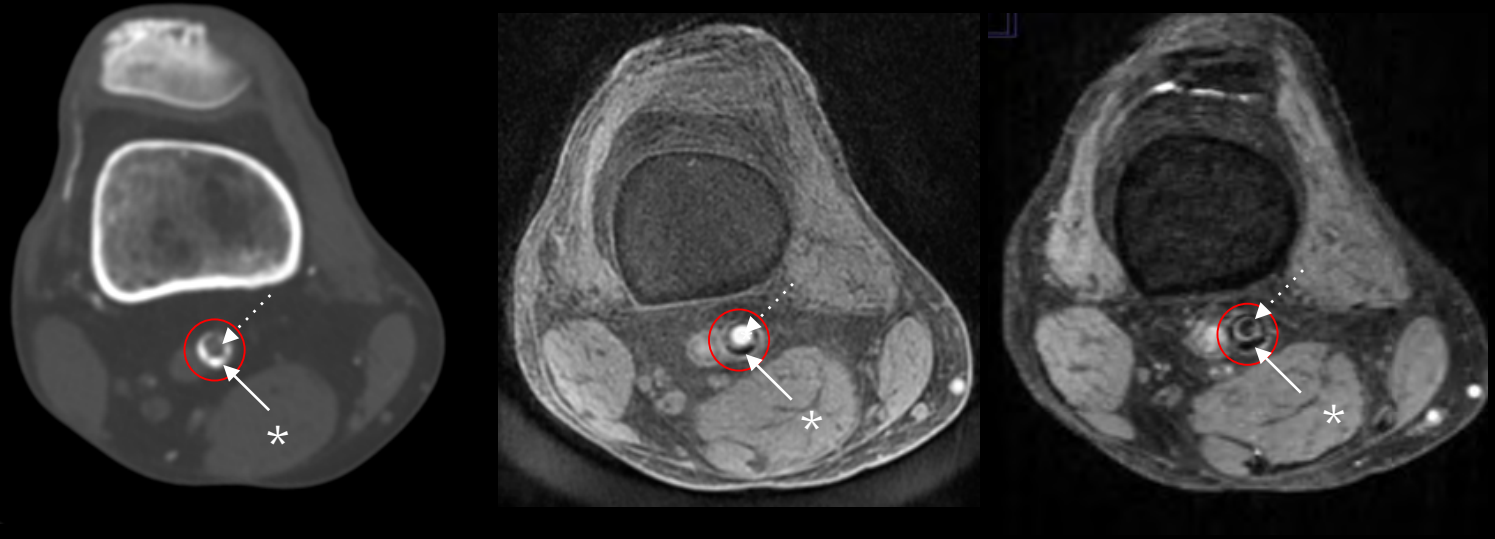
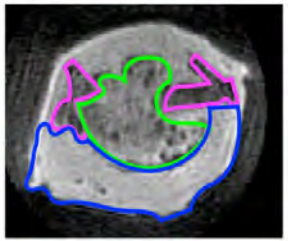
CTA **MRI (UTE)** **MRI (SSFP)**

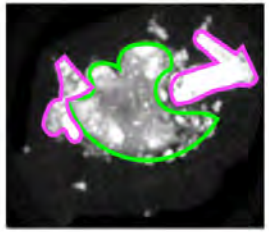


MRI: Mechanical Properties

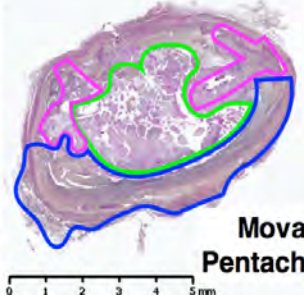
T2W



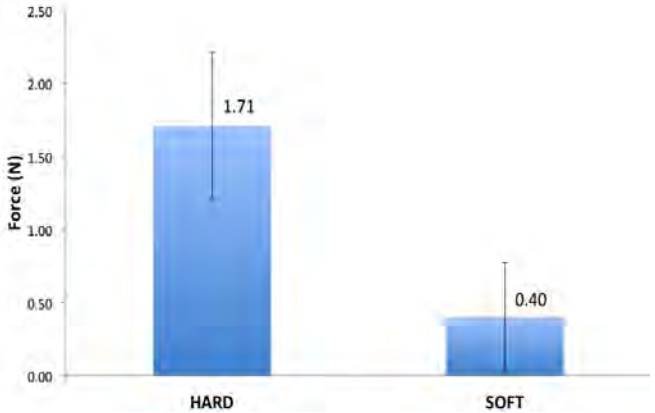
UTE



µCT



Movat's Pentachrom



N = 9

N = 25

Future Approach

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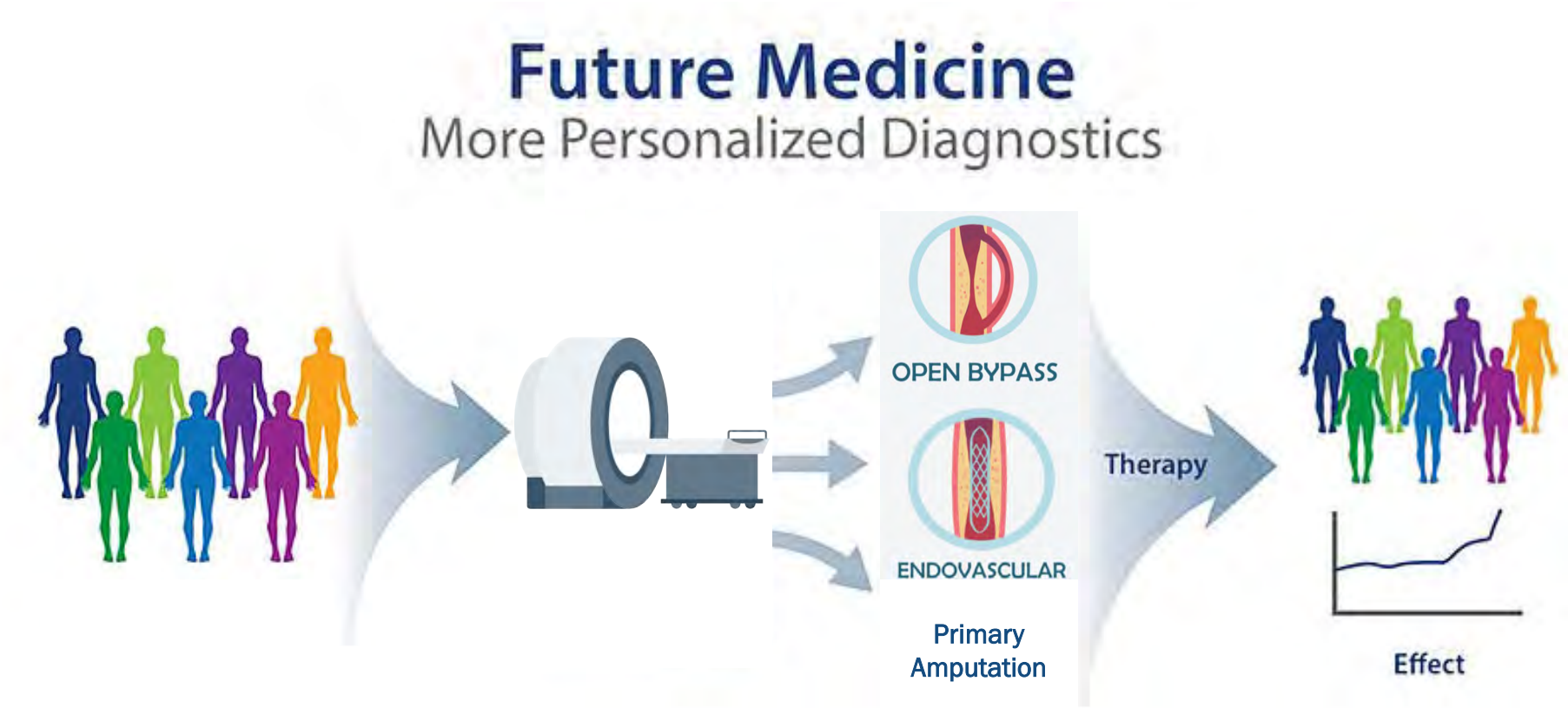

Adapted from: CrownBio

Thank You

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Mentors
Dr. Alan Lumsden
Dr. Christof Karmonik
Dr. Dipan Shah

Post-Docs
Dr. Kavya Sinha
Dr. Marton Berczelli

Translational Imaging Center
Lien Phan
Vi Phan

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Houston Methodist Research Institute Clinician-Scientist Award

Jerold B. Katz Investigator Award


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COVID-19 Vaccine Update

Town Hall, May 13, 2021

H. Dirk Sostman, MD FACR
Ernest Cockrell, Jr. Presidential Distinguished Chair
EVP & Chief Academic Officer

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Real World Data on Vaccination

- Israel
  - 96% protection from infection
  - April 23 was first day in 7 months with 0 COVID deaths
- Scotland
  - hospitalization reduced by 85% (Pfizer) and 94% (AstraZeneca)
  - 30% reduction in household contact infections after one dose
- England
  - Public Health England – vaccine efficacy 73% (AstraZeneca) to 89% (Pfizer)
  - Cambridge Health – 75% reduction in asymptomatic infection
  - Public Health England – 45% reduction in household transmission
- USA
  - Houston Methodist – reduced employees' positive test rate 95%
  - St. Jude – 94% reduction in asymptomatic, 100% in symptomatic (2 doses)
  - CDC study – vaccination reduces incidence rate of all infections by 97%

CDC Breakthrough Infection Data

	Unvaccinated 1/1/2020 – 12/31/2020	Vaccinated 1/1/2021 – 4/27/2021
Infections	92 / 1,000 Probably much higher	0.74 / 1,000 29% of the infections were asymptomatic
Hospitalizations	900 / 1,000,000 Probably much higher	5.1 / 1,000,000
Deaths	1,680 / 1,000,000	0.91 / 1,000,000

Why Get Two Doses?

Houston Methodist Patient Outcomes

- 91,134 patients
- January 1 – April 4, 2021
  - –70.2% not vaccinated
  - –4.5% had one dose of vaccine
  - –25.4% had two doses of vaccine
- 2,017 COVID hospitalization
- 225 COVID mortality

Pfizer Vaccine	One Dose	Two Doses
Prevention of Hospitalization	77%	96%
Prevention of Death	64%	99%

Recommended interval between doses:
Pfizer 3 weeks, Moderna 4 weeks – CDC allows 6 weeks

Maximum possible interval is not known

Vaccine Safety Overview

Phase 3 Clinical Trials

- How many people received the vaccine?
  - Pfizer – 46,307
  - Moderna – 15,208
  - J&J – 23,190
- Severe reactions in vaccine groups?
  - Nothing beyond what was seen in placebo group or general population
- There is now 6 months of safety follow-up on thousands of people

Real World Experience

- Rare reactions seen with wide deployment of vaccines:
  - Small number of severe allergic reactions (mostly Moderna and Pfizer)
  - Extended duration of local reaction in injected arm (mostly Moderna)
  - Systemic rashes
  - Blood clot risk (J&J)
- 152 million people have been vaccinated in USA
- Pfizer vaccine approved for EUA in 12-15 year olds (May 10, 2021)

CDC Analysis of Risk / Benefit for J&J Vaccine

[Per Million Vaccinations]

- Females 18 – 49
  - –667 hospitalizations prevented
  - –127 ICU admissions prevented
  - –12 deaths prevented
  - –13 cases of TTS
- Females > 50
  - –4,794 hospitalizations prevented
  - –1,292 ICU admissions prevented
  - –563 deaths prevented
  - –2 cases of TTS

Sara Oliver MD, ACIP Meeting April 23, 2021

I recommend women 18-49 consider getting Pfizer or Moderna vaccine

Emergency Use Authorization (EUA) vs. Approval

FDA SUMMARY: Criteria for EUA

- SARS-CoV-2 can cause a serious or life-threatening disease.
- Based on the totality of scientific evidence available, including data from adequate and well-controlled trials, it is reasonable to believe that the vaccine may be effective to prevent such serious or life-threatening disease.
- The known and potential benefits of the vaccine, when used to prevent the identified serious or life-threatening disease, outweigh the known and potential risks of the vaccine.
- There is no adequate, approved, and available alternative to the vaccine for preventing the disease or condition.

[Rule of thumb – EUA requires 2 months of safety follow-up, full approval requires >6 months. Pfizer will submit for full approval within a few weeks. Likely FDA will grant approval this year.]

Update on Vaccines and Viral Variants

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Viral Variants and Vaccines

Vaccine Efficacy	D614G	UK – B.1.1.7	S Africa – B.1.351
Pfizer	95%	85% - 95%*	75% - 100%
Moderna mRNA-1273	94%	89%	
J&J	72%	72%	57%
Novavax	95%	89%	60% (HIV negative)
AstraZeneca	70%	76%	10%

*In vitro, similar slightly reduced potency against B.1.1.7, B.1.526 and P.1 variants

All vaccines show much reduced potency against B.1.351 in vitro

B.1.1.7 is 90+% of isolates in Houston

Pfizer Vaccine vs. Variants

Highly vaccinated countries

Country of Qatar

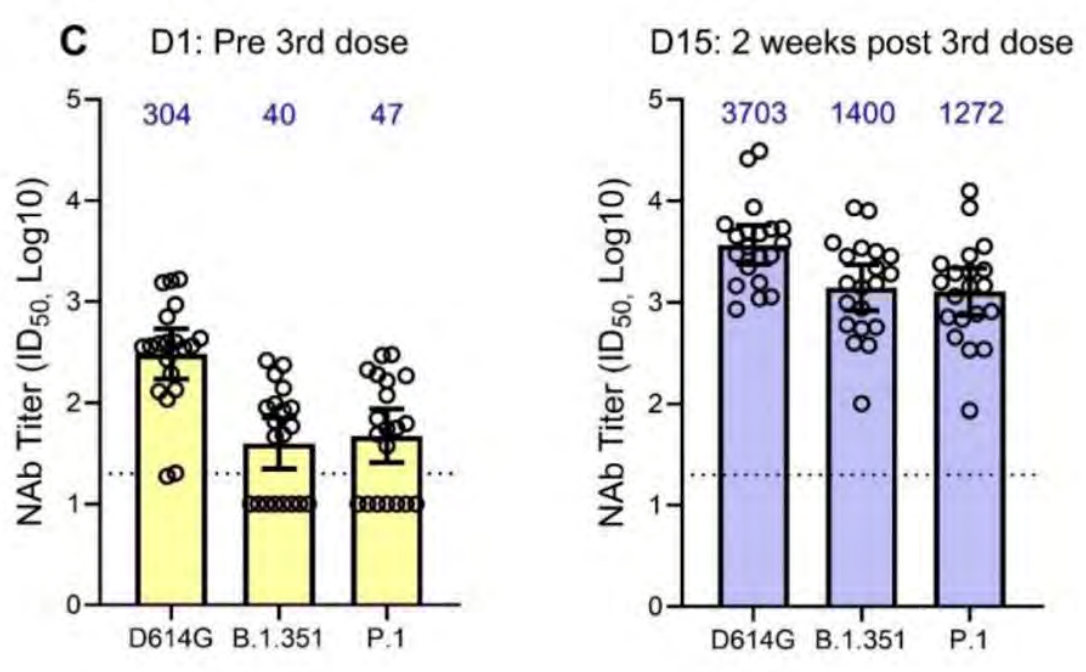
- B.1.1.7 = 44.5% of cases, B.1.351 = 50% of cases
- Prevention of infection
  - B.1.1.7 – 89.5%
  - B.1.351 – 75%
- Prevention of severe, critical or fatal disease
  - Any form of SARS-CoV-2 – 97.4%
  - B.1.1.7 or B.1.351 – 100%

Country of Israel

- B.1.1.7 = 95% of COVID cases
- Prevention of
  - Asymptomatic infection – 91.5%
  - Symptomatic infection – 97.0%
  - Hospitalization – 97.2%
  - Death – 96.7%

Moderna Booster Shot Data

- Compared three options
  - Third shot of mRNA-1273
  - Booster of mRNA-1273.351 (optimized to SA variant)
  - 50:50 mixture
- Before booster
  - 6-8 months after primary vaccination
  - 92.5% had detectable titers against D614G
  - Only 50% had detectable titers against B.1.351 or P.1
- After booster versus B.1.351
  - GMT = 1400 for mRNA-1273.351
  - GMT = 864 for mRNA-1273



What Does the Future Hold?

- Something close to herd immunity is **possible** this year – with vaccines
  - Normal life with some additional precautions
  - COVID-19 becomes a “normal disease”
- S protein mutations – over time – will likely require updated vaccines
  - Need for surveillance of COVID mutations
  - mRNA technology well suited to respond to viral mutations
    - Science – several weeks
    - Regulatory – a few months
  - Annual COVID booster likely needed for the next several years
- Once first exposure to COVID is in childhood, may become a mild endemic illness – many years from now
  - Great pandemic of 1889-1890 “Asiatic flu” killed 1 million people out of a world population of 1.5 billion
  - Probably coronavirus HCov-OC43 jumping cattle → humans
  - HCov-OC43 is now one cause of the common cold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COVID-19 and Vaccine Update

Marc L. Boom, MD
May 13, 2021

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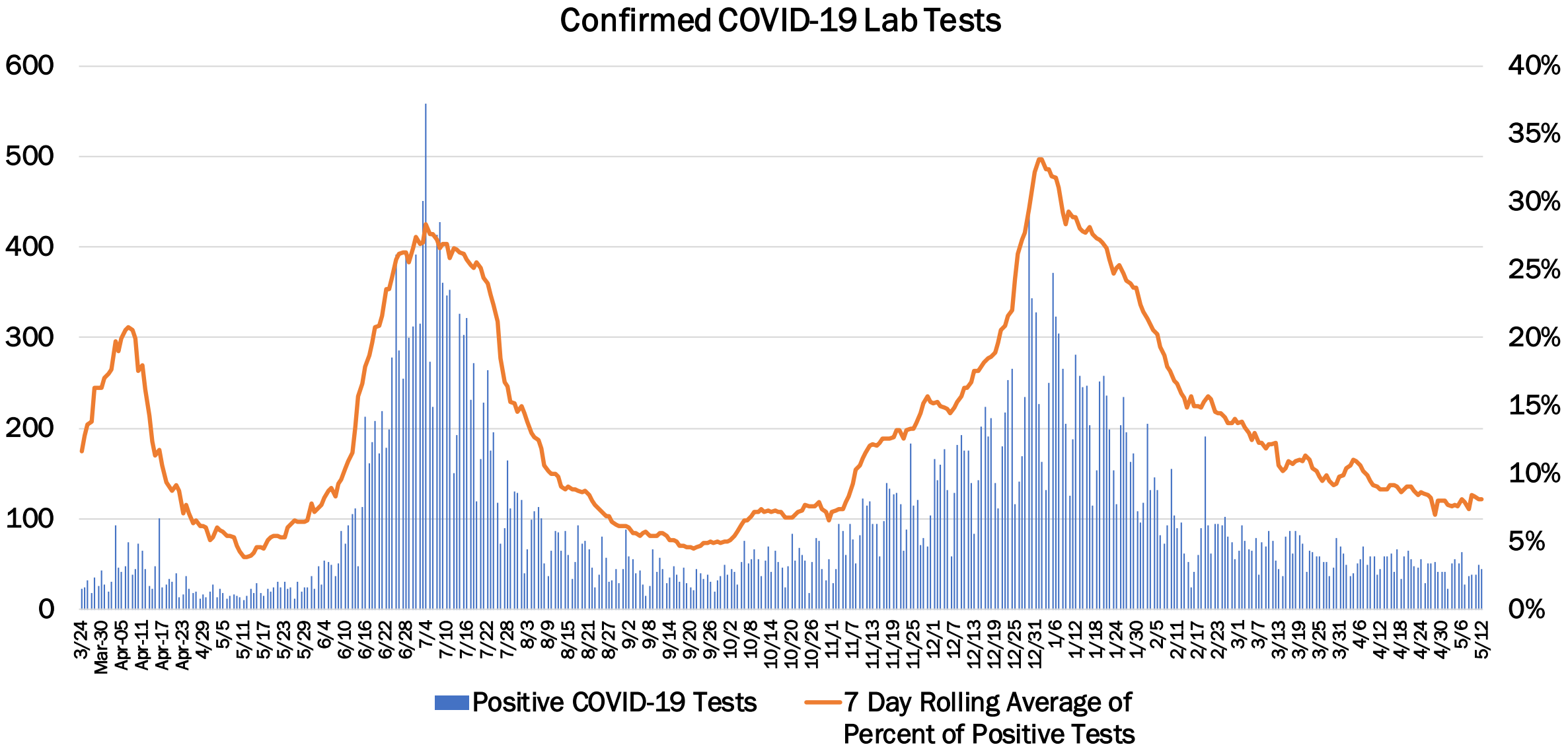
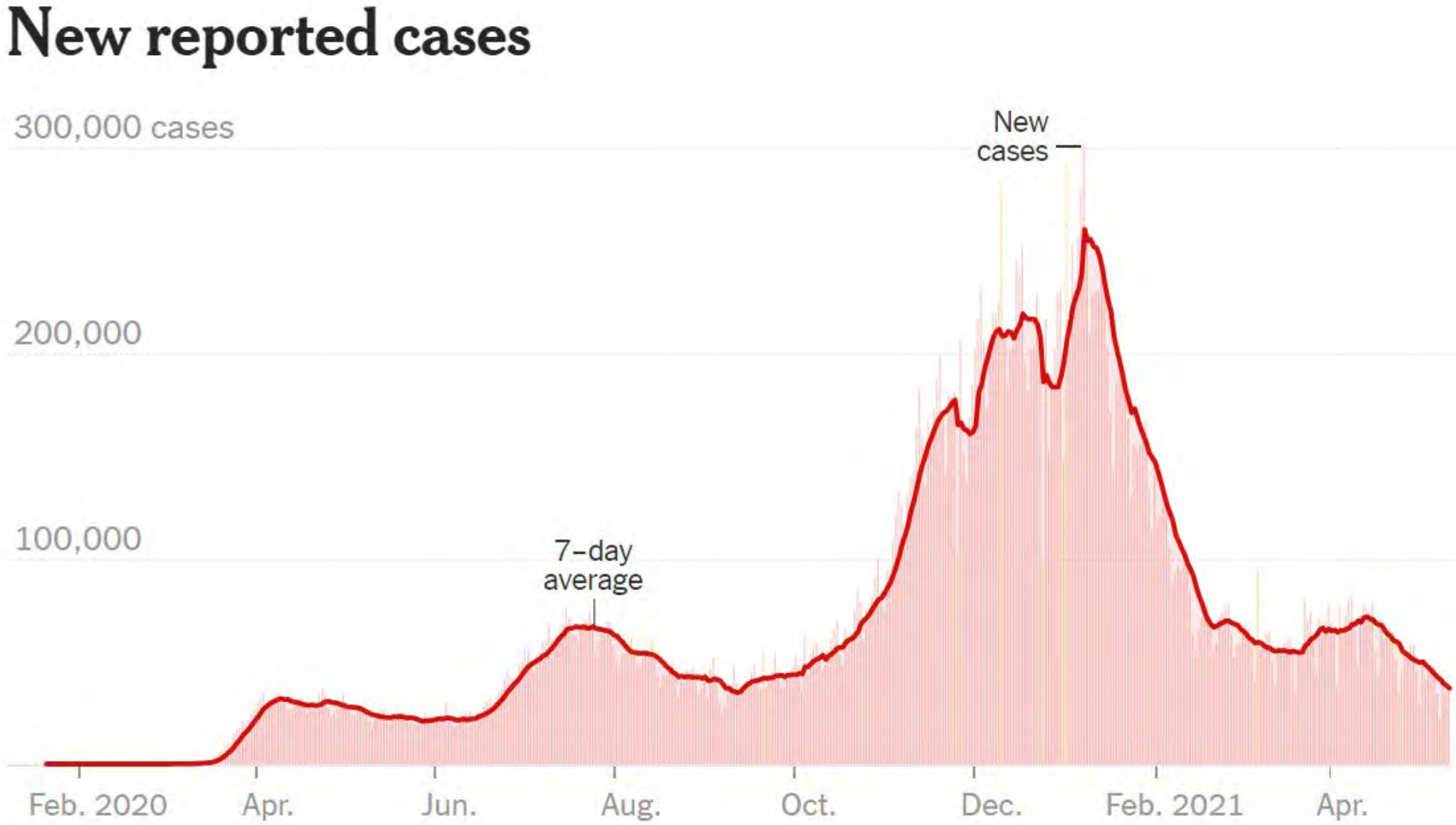
Houston Methodist Testing Trend

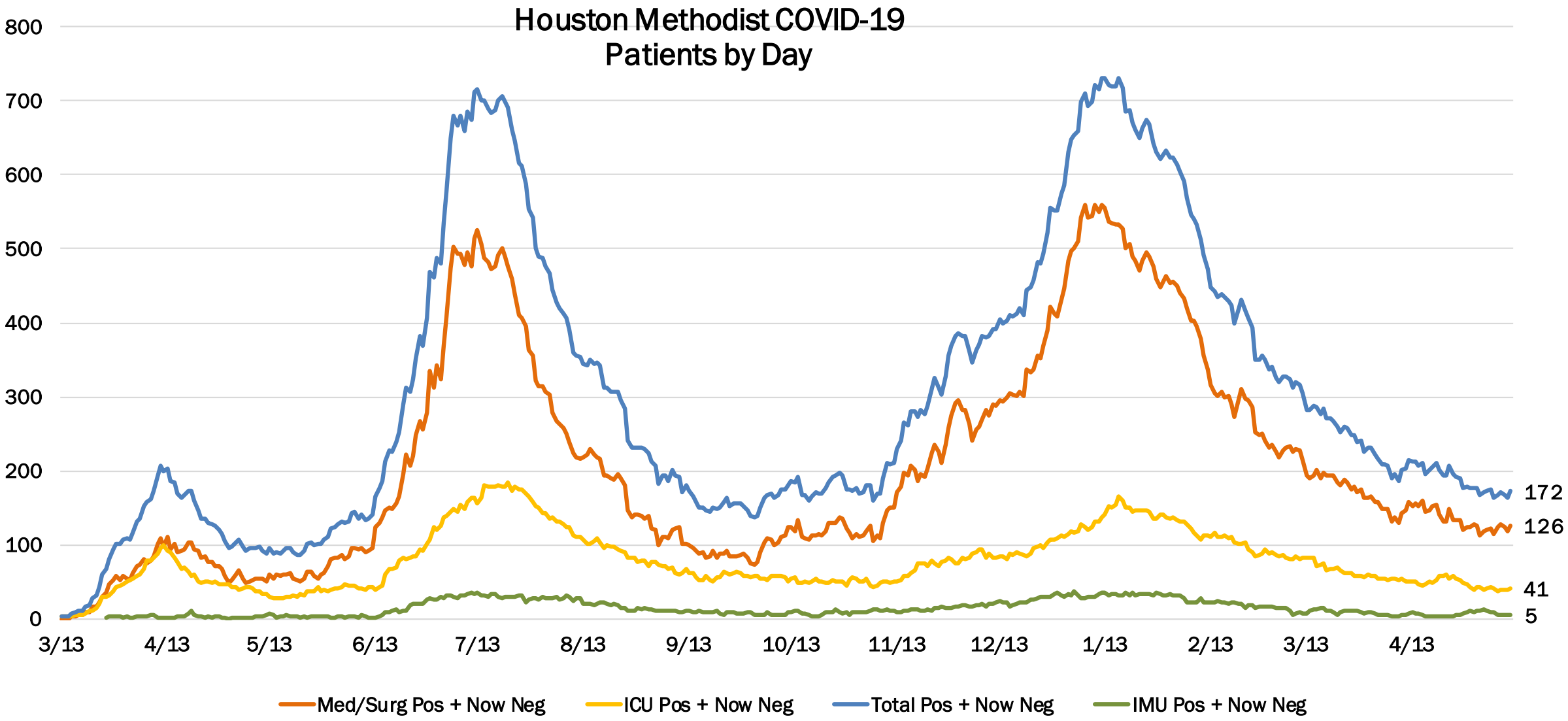


New COVID-19 Cases Reported in U.S. by Day



Source: https://www.nytimes.com/interactive/2020/us/coronavirus-us-cases.html?auth=login-google

Houston Methodist COVID-19 Cases by Day



Data as of May 12, 2021

My two key take home messages today:

TRUST THE VACCINES!

GIVE US 45 DAYS!!

CDC Model Predicts Cases Will Fall Significantly by July

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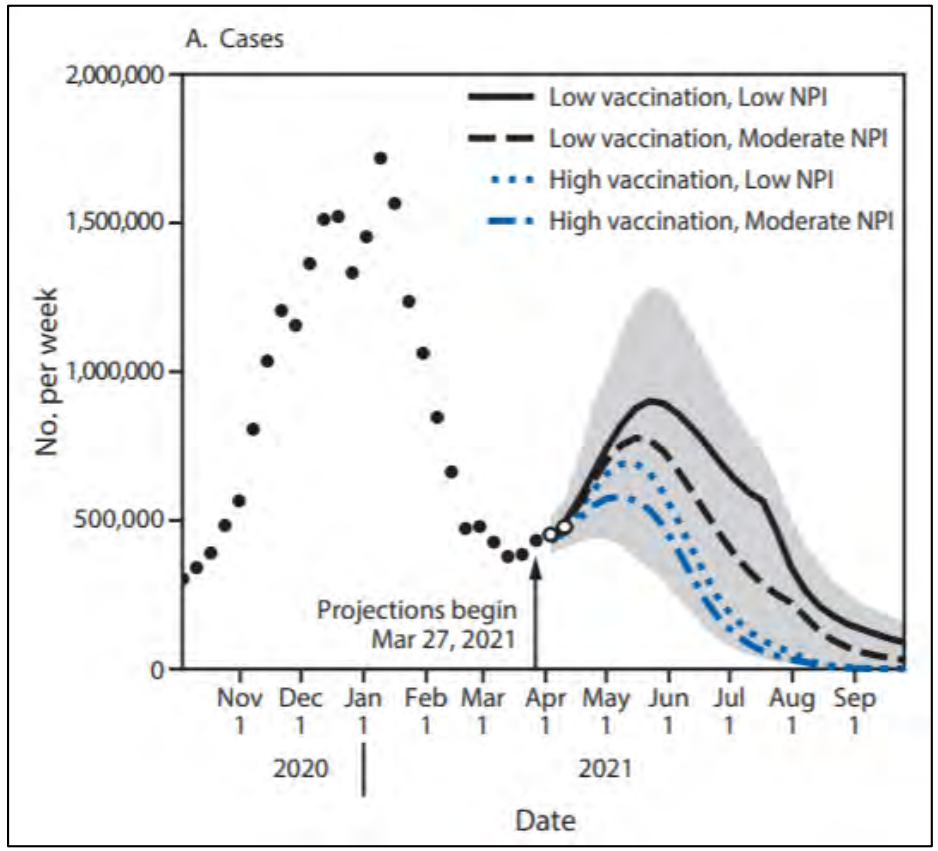
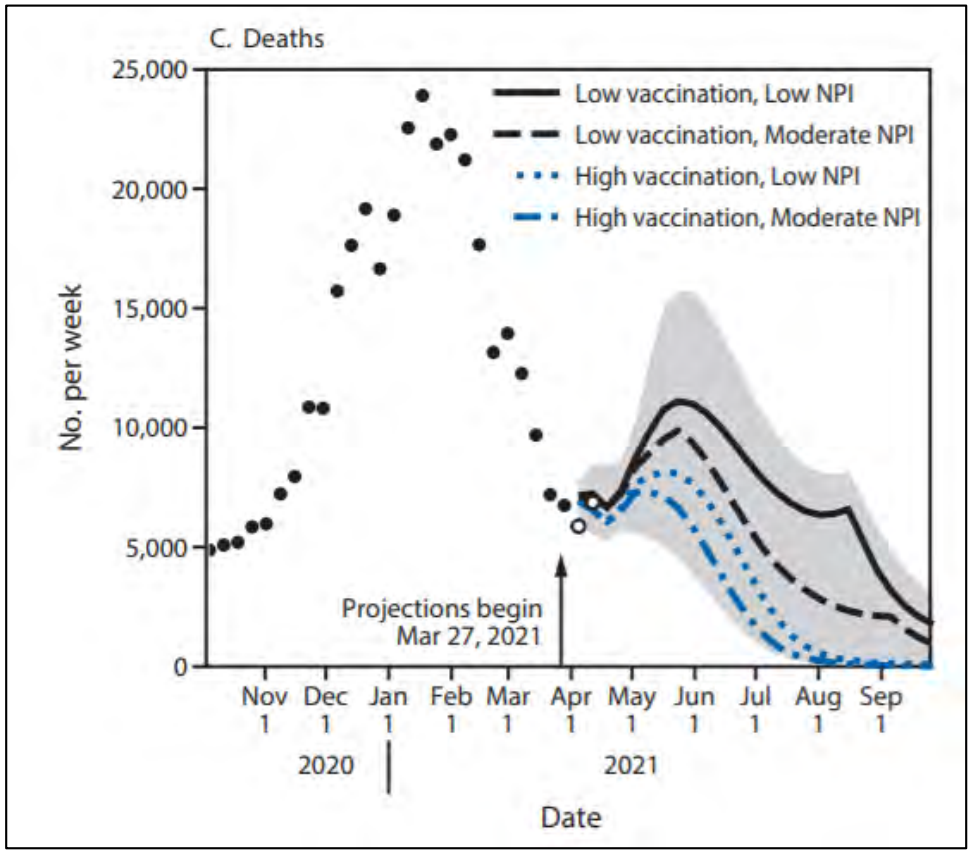
Centers for Disease Control and Prevention
MMWR

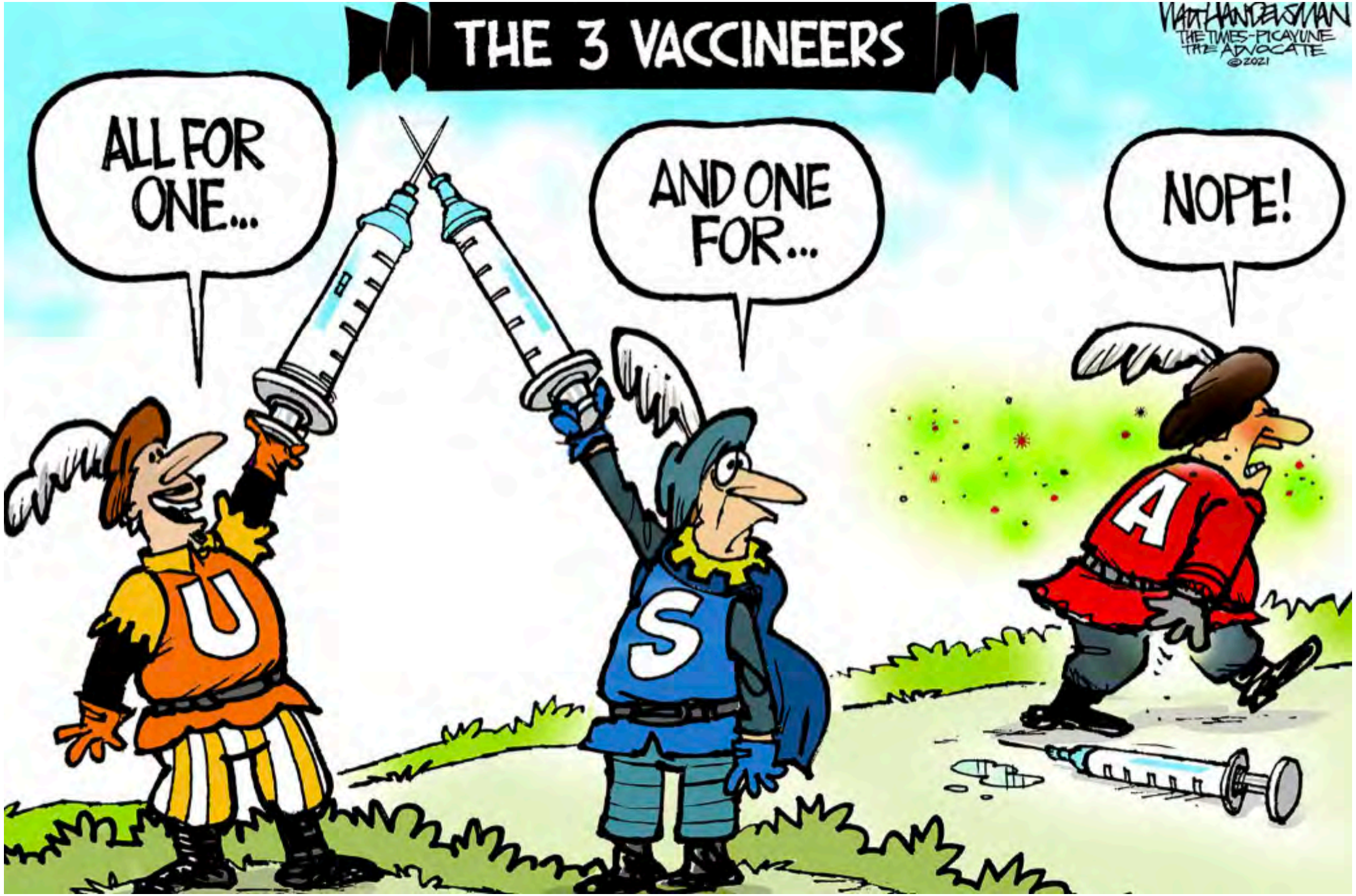
Modeling of Future COVID-19 Cases, Hospitalizations, and Deaths, by Vaccination Rates and Nonpharmaceutical Intervention Scenarios — United States, April–September 2021





"High vaccination rates and compliance with public health prevention measures are essential to control the COVID-19 pandemic and to prevent surges in hospitalizations and deaths in the coming months."

https://www.cdc.gov/mmwr/volumes/70/wr/pdfs/mm7019e3-H.pdf


THE 3 VACCINEERS
MATT HANDELSMAN
THE TIMES-PICAYUNE
THE ADVOCATE
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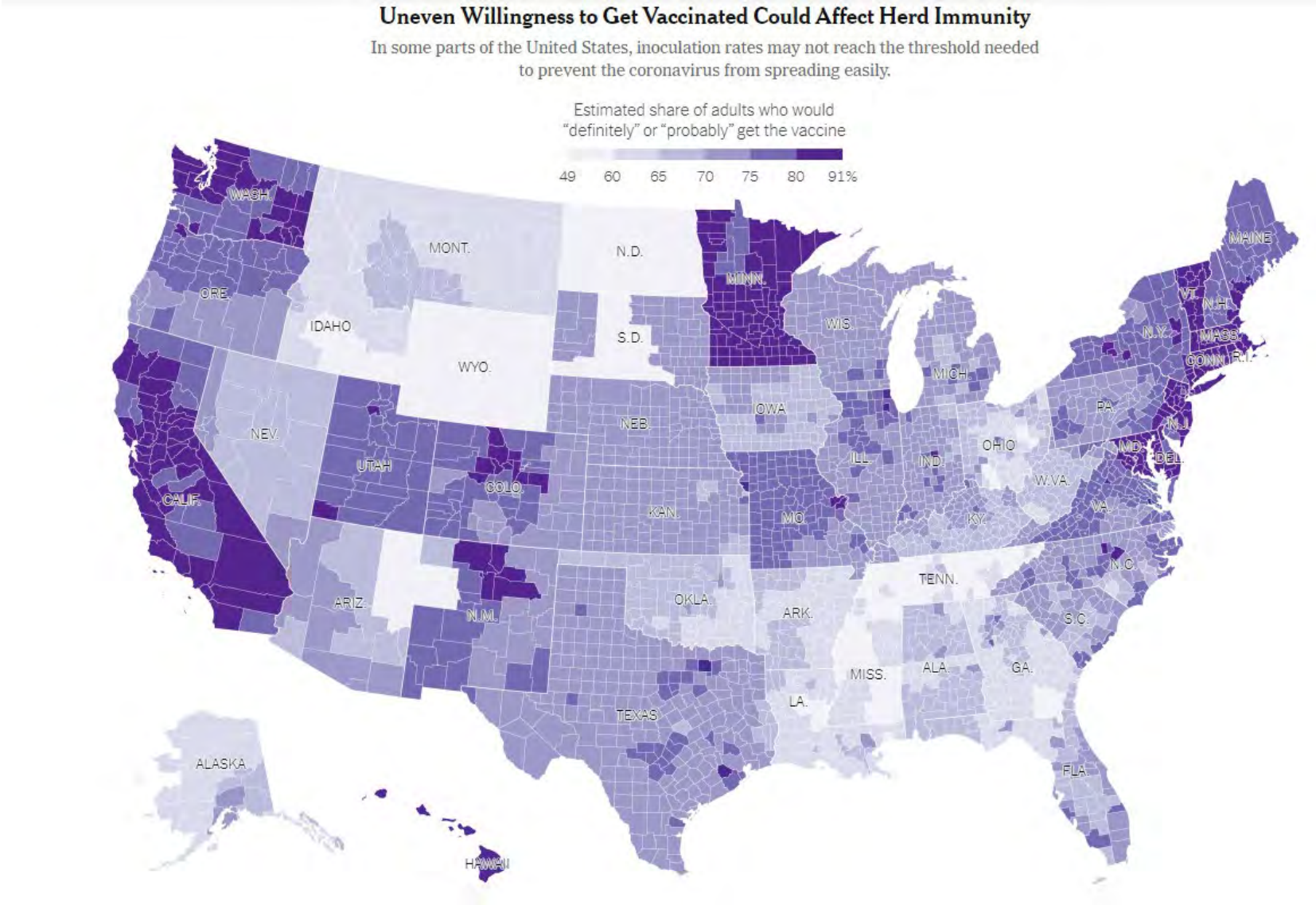
ALL FOR ONE...
AND ONE FOR...
NOPE!
U
S
A

Willingness to Get Vaccinated by County

HOUSTON Methodist LEADING MEDICINE

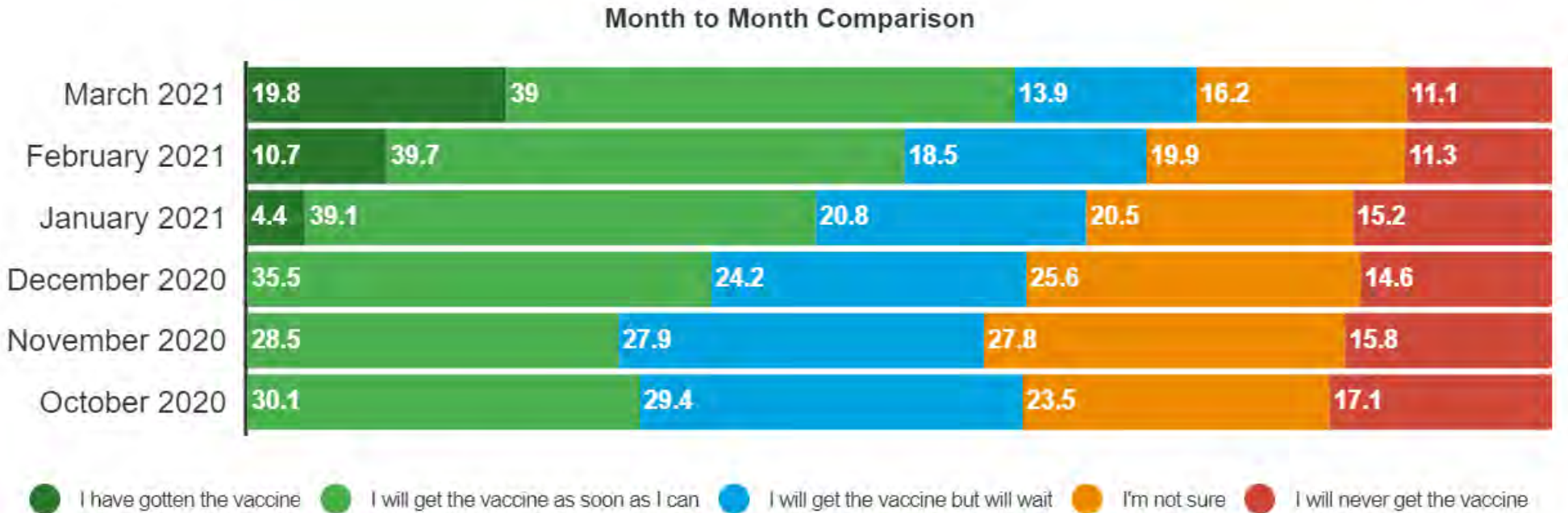


https://www.nytimes.com/2021/05/03/health/covid-herd-immunity-vaccine.html

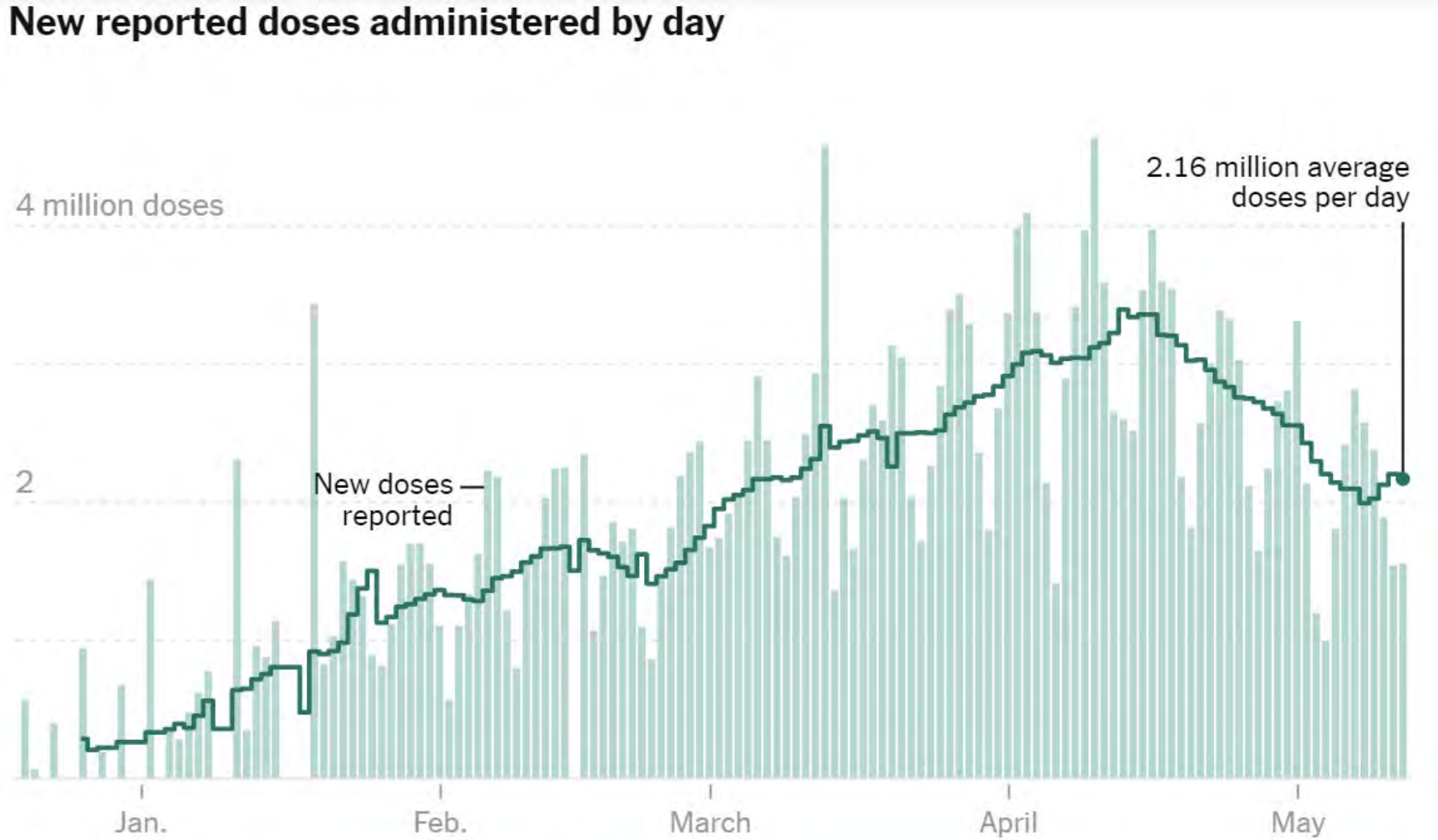
How Likely Are You To Get The COVID-19 Vaccine When It Becomes Available To You?

HOUSTON Methodist LEADING MEDICINE

Houston-Baytown-Sugar Land, TX CBSA



Number of Vaccine Doses Administered by Day in the U.S.



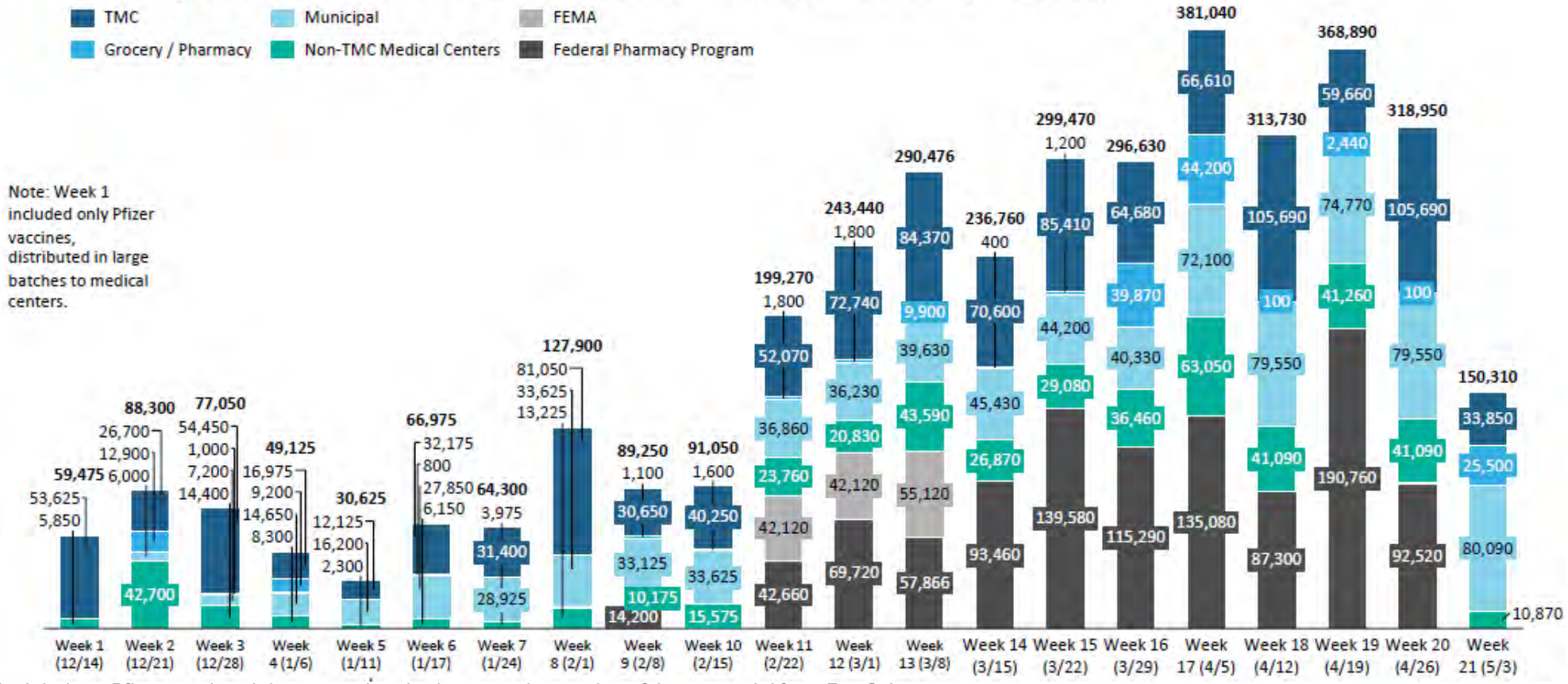
https://www.nytimes.com/2021/05/03/health/covid-herd-immunity-vaccine.html

Greater Houston First Dose Supply

HOUSTON Methodist LEADING MEDICINE

COVID-19 VACCINE ALLOCATIONS FOR GREATER HOUSTON

Weekly vaccine allocation for Greater Houston Area[1] (# doses)



*Starting in week 11, the labels on Pfizer vaccine vials were updated to increase the number of doses per vial from 5 to 6 doses.

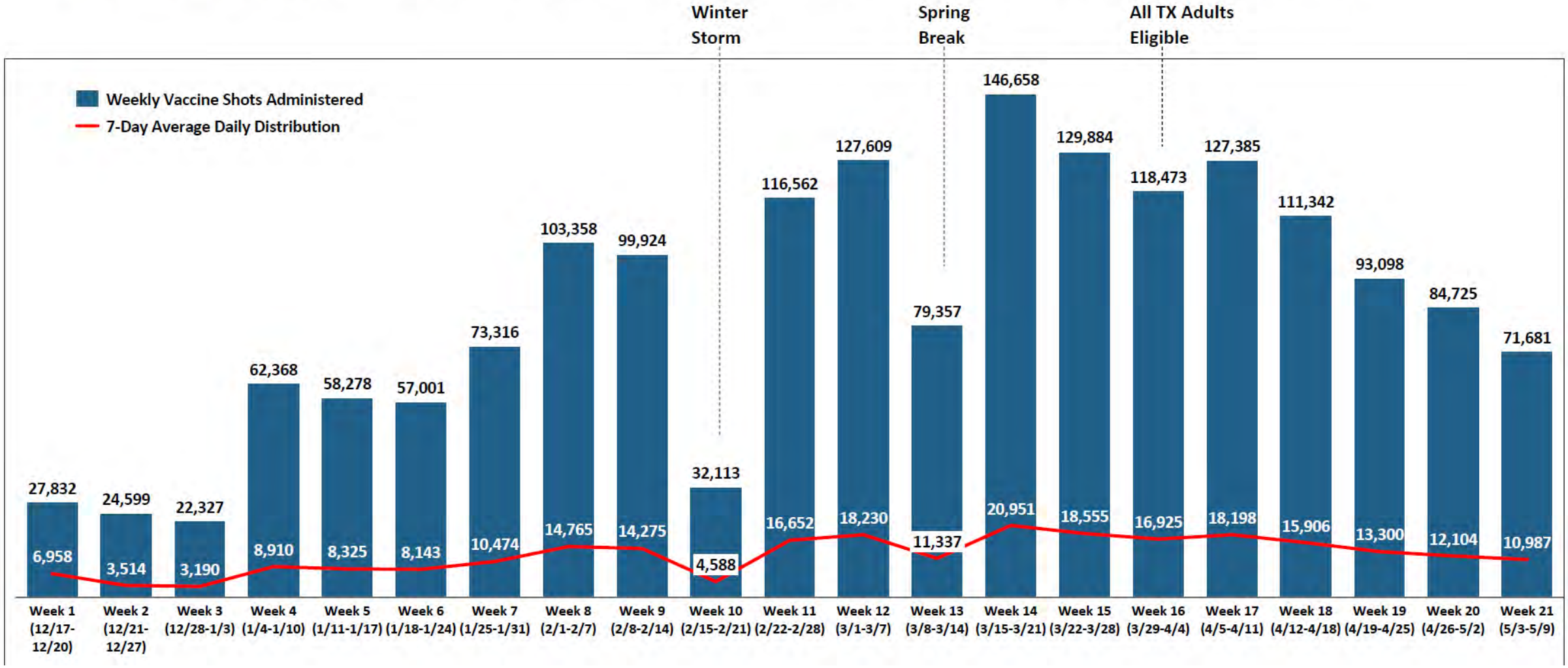
Number of Vaccine Doses Administered by Week in the TMC

HOUSTON Methodist LEADING MEDICINE

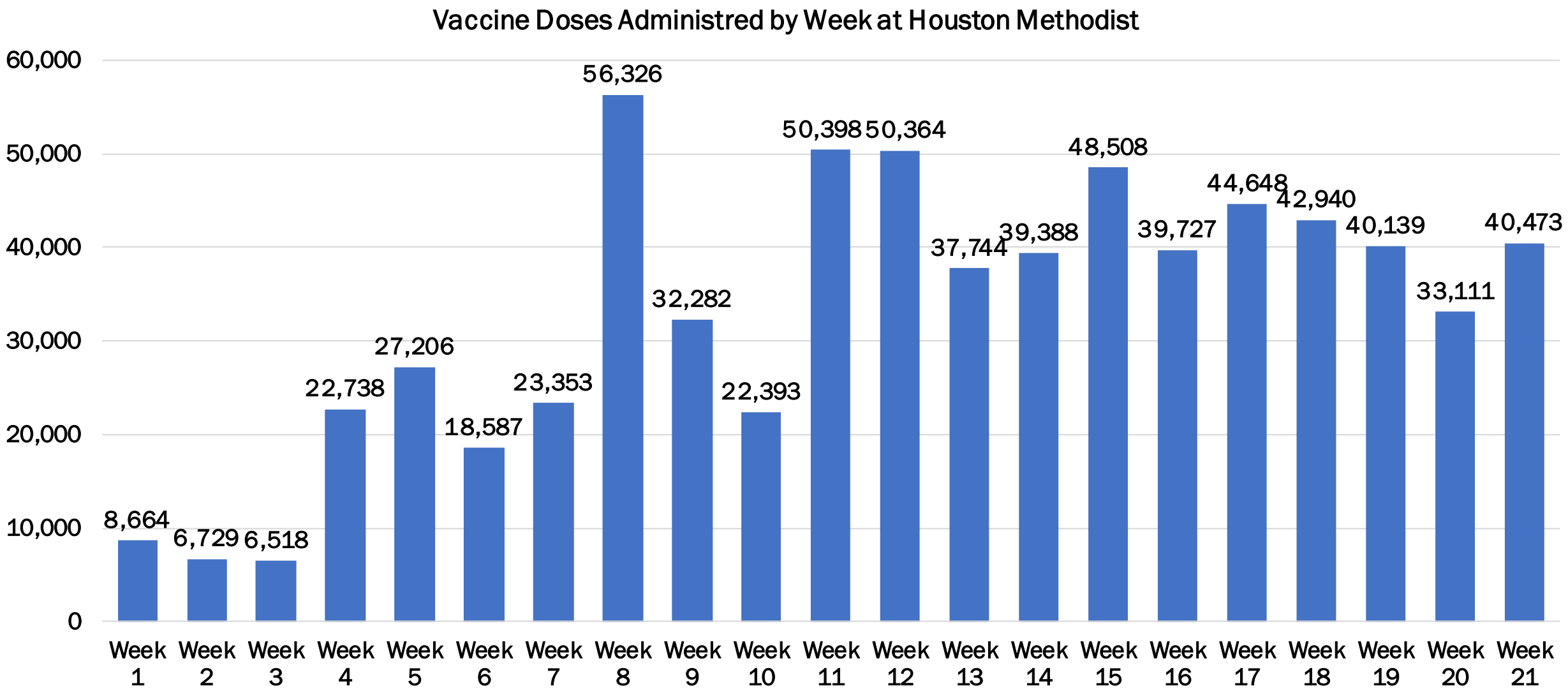
COVID-19 VACCINE DISTRIBUTION

May 9, 2021

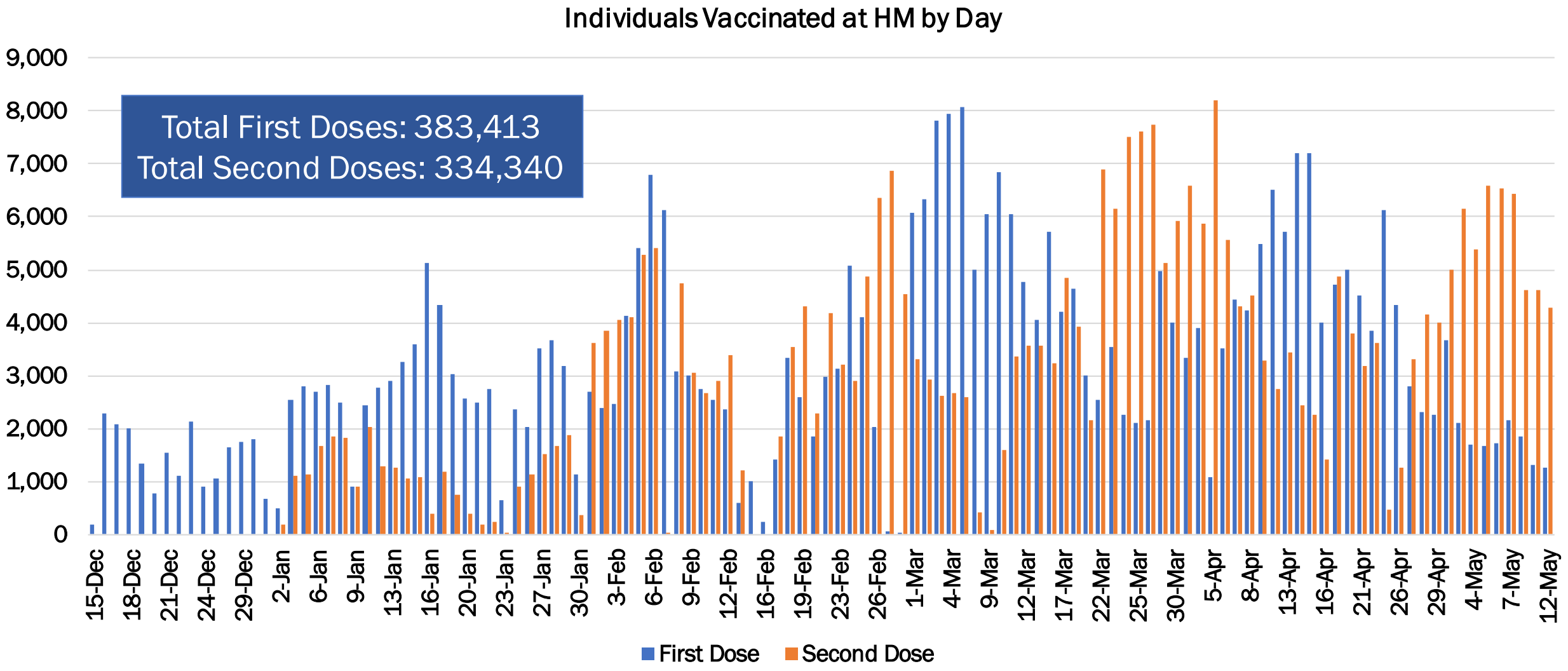
WEEKLY DOSES ADMINISTERED (ALL DOSES, 1ST AND 2ND) - TMC HOSPITAL SYSTEMS[1]



Number of Vaccine Doses Administered by Week at HM



HM COVID-19 Vaccines Administered



Pfizer COVID-19 Vaccine Approved for Children 12-15

HOUSTON Methodist LEADING MEDICINE

THE WALL STREET JOURNAL.

Children 12 to 15 Are Cleared By FDA to Get Pfizer Vaccine

U.S. health regulators have for the first time cleared a Covid-19 vaccine's use in children, paving the way for many to be immunized before summer camps and the start of the next school year.

Millions of people ages 16 years and older have taken the shot from Pfizer Inc. and partner BioNTech SE. The U.S. Food and Drug Administration's decision Monday widens the vaccine's use to children as young as 12.

The move comes after a study of 2,260 adolescents found the two-dose shot

Schools could get a boost in resuming in-class teaching. Teenagers are vaccinated in Connecticut. JESSICA HILL/ASSOCIATED PRESS

• **Novavax delays plans to seek**

The New York Times

F.D.A. Authorizes Pfizer-BioNTech Vaccine for Children 12 to 15

The shots may allow millions of youngsters to get back to school, camps, sleepovers and hangouts with friends.

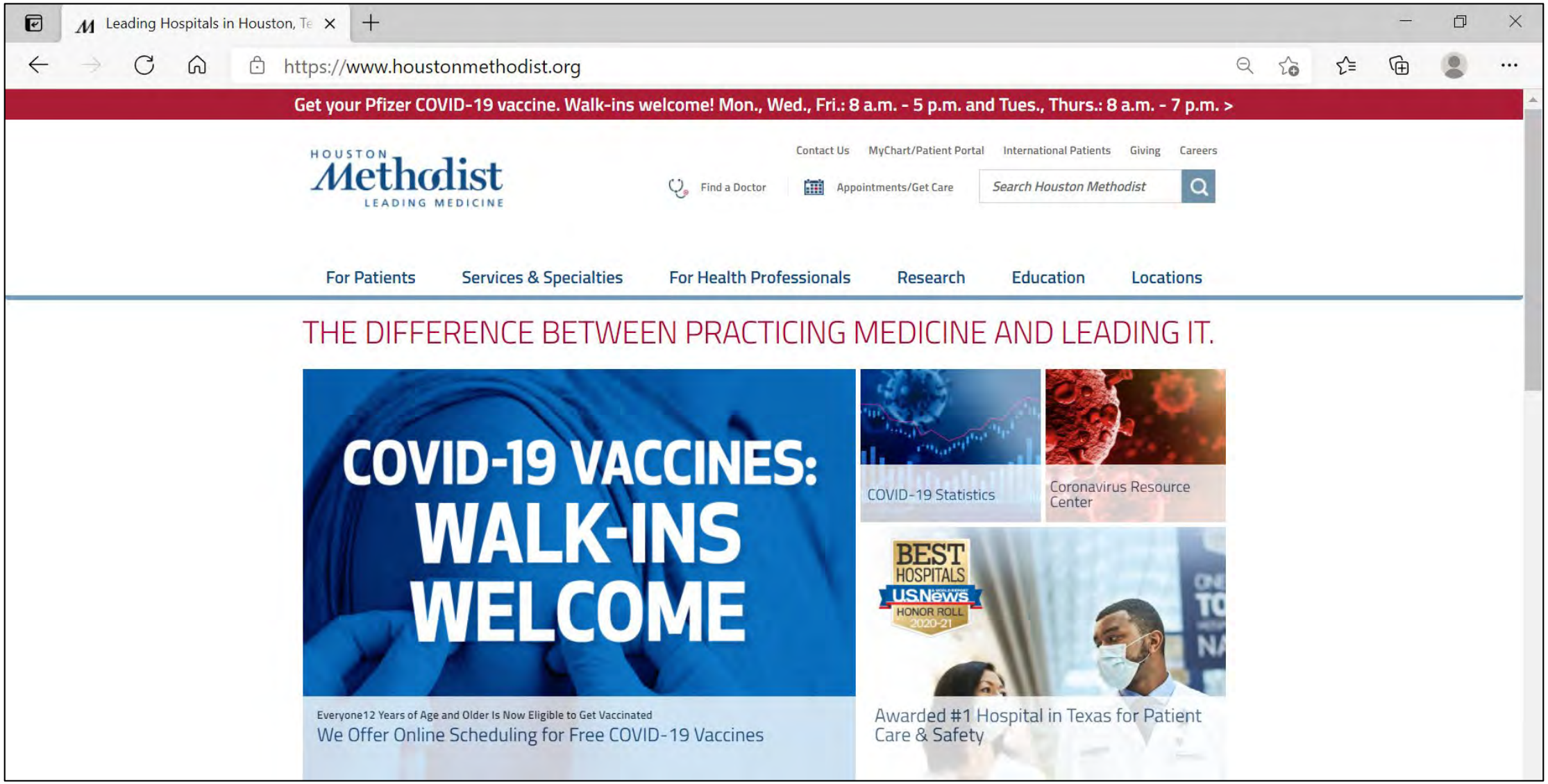
Amanda and Ajdin Dropic with their children, from left, Eli, Ty, Lila and Ben. All four children volunteered for Pfizer-BioNTech trials. Amy Powell for The New York Times

By Apoorva Mandavilli

Published May 10, 2021 Updated May 11, 2021, 4:28 p.m. ET

The Food and Drug Administration on Monday authorized use of the Pfizer-BioNTech Covid-19 vaccine for 12- to 15-year-olds in the United States, a crucial step in the nation's steady recovery from

Vaccine Clinics Accepting Walk-Ins



COVID-19 Vaccine Myths

BUSTED

MYTH #1

The vaccine can affect my DNA

Why it's false: The genetic material in COVID-19 vaccines cannot interact with or change your DNA in any way.

MYTH #2

A vaccine developed so quickly can't be safe

Why it's false: Available vaccines have undergone thorough testing and external review. These vaccines may seem new, but there's decades of research behind them.

MYTH #3

The vaccine can give me COVID-19

Why it's false: The mild sid effects associated with the vaccines are a sign that your body is building immunity to the virus. These vaccines cannot give you COVID-19.

MYTH #4

The COVID-19 vaccine can affect my fertility

Why it's false: There's no data to suggest that these vaccines pose a risk to someone who is pregnant or wants to become pregnant.

MYTH #5

I don't need the vaccine because I've already had COVID-19

Why it's false: You may experience some level of immunity after having COVID-19, but it's unclear how long this protection might last.

MYTH #6

I don't need the vaccine because I'm young and healthy

Why it's false: Even mild COVID-19 can cause uncomfortable and/or lingering symptoms. Plus, even those who are young and healthy must be vaccinated to achieve herd immunity.

MYTH #7

I don't need to wear a mask after being vaccinated

Why it's false: Until herd immunity is reached, wearing a mask and social distancing continue to be important safety measures.

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ROOT FOR THE ASTROS AND
GET YOUR COVID-19 VACCINE
FOR THE H
FOR THE H
FOR THE H
SUNDAY, MAY 9, 11:10 A.M. – 1:10 P.M.
UNION STATION, MINUTE MAID PARK
HOUSTON Methodist
LEADING MEDICINE
HOUSTON ASTROS
OFFICIAL HEALTH CARE PROVIDER
OR THE H
OR THE H

Community Vaccine Events

Houston Methodist partnered with Houston Music Foundation, the Heights Theater and local musician Bun B to provide vaccines at the Heights Theater on May 5th.

Vaccine Mandate for Houston Methodist Employees

HOUSTON Methodist LEADING MEDICINE

Houston hospital threatens to fire workers who refuse COVID-19 vaccine

BY KATE GIBSON
UPDATED ON: APRIL 27, 2021 / 10:48 AM / MONEYWATCH

CNN US Crime + Justice Energy + Environment Extreme Weather Space + Science LIVE TV Edition

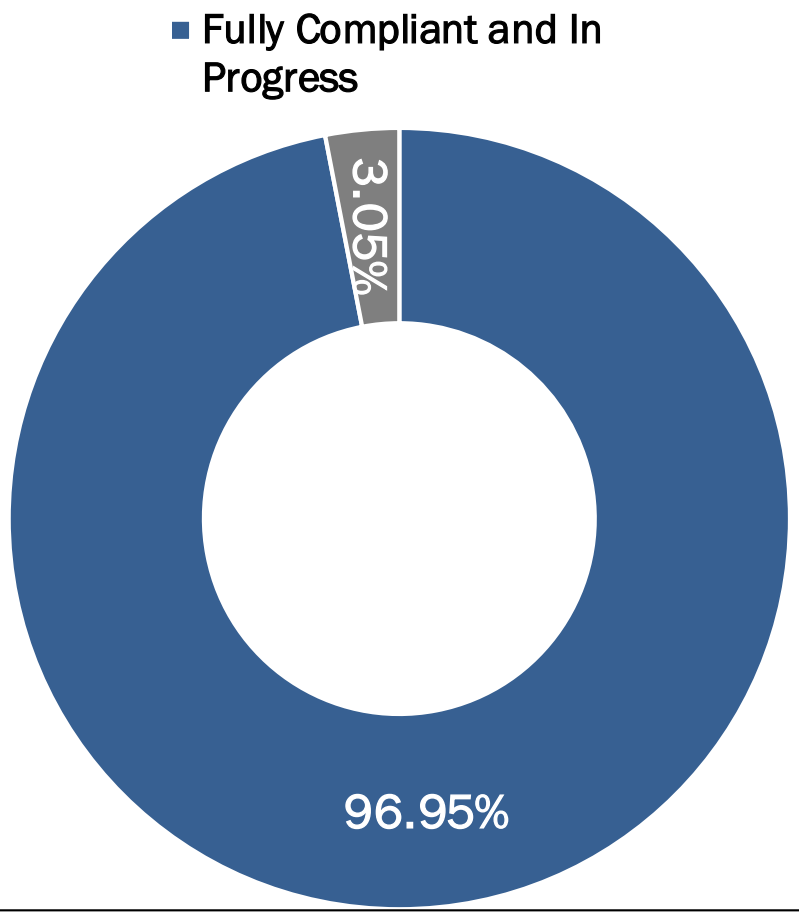
HAPPENING NOW
Family attorneys for Andrew Brown hold a news conference after conducting an independent autopsy. Watch CNN

A Texas hospital system will require employees to get the Covid-19 vaccine and could fire them if they don't comply

By Scottie Andrew, CNN
Updated 3:44 PM ET, Mon April 26, 2021

US hits 200 million vaccine doses 10:37

Houston Methodist Employee Vaccination Rates



My two key take home messages today:

TRUST THE VACCINES!

GIVE US 45 DAYS!!


HOUSTON
Methodist
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THANK YOU FOR ATTENDING OUR TOWN HALL CONVERSATION

If you'd like more information about women's health or The Society for Leading Medicine, please contact us at foundation@houstonmethodist.org.

Take care and be well

HOUSTON Methodist LEADING MEDICINE