

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered on the slide.

WHAT WE THINK WE KNOW ABOUT COVID-19

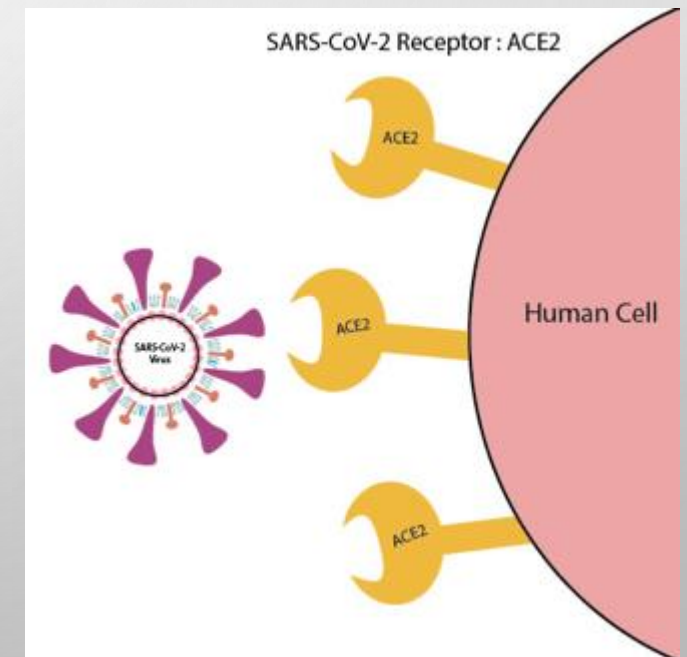
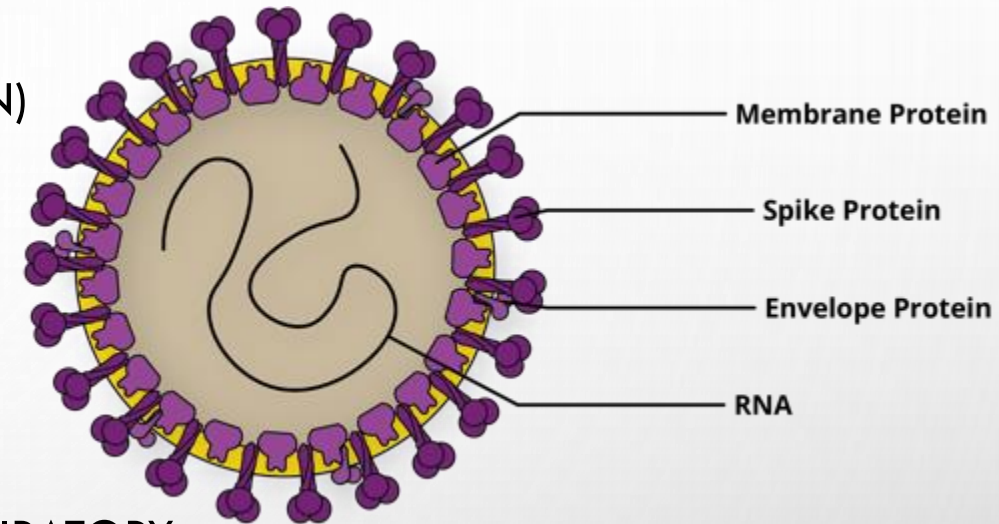
JIM SHAMES MD

HEALTH OFFICER, JACKSON COUNTY PUBLIC HEALTH

PUBLIC HEALTH ADVISORY BOARD MEETING 8/10/20

SARS CO-V2 VIRUS (CAUSES COVID-19)

- RNA VIRUS WITH “SPIKES” ON THE SURFACE = CORONA (CROWN)
- “NOVEL” VIRUS, THOUGH PART OF A FAMILIAR FAMILY.
- SPIKE ATTACHES TO ACE II RECEPTORS ON VARIOUS CELLS IN THE BODY
- ENTERS THE BODY THROUGH MUCOUS MEMBRANES OF THE RESPIRATORY TRACT BUT HAS MUCH WIDER POTENTIAL DISEASE EFFECTS THROUGH ITS ACTIONS ON THE VASCULAR SYSTEM.
- MOST OF THE SERIOUS DISEASE MAY NOT BE CAUSED BY DIRECT EFFECT OF THE VIRUS BUT RATHER THE IMMUNE/INFLAMMATORY RESPONSE CREATED BY THE VIRUS.
- CYTOKINE STORM: BODY ATTACKS ITSELF



DETAILS OF VIRUS SPREAD



- “MOSTLY” BY LARGER RESPIRATORY DROPLETS
(VIRUS HITCHES A RIDE)
- SOME AEROSOL SPREAD PROBABLY OCCURS. PERHAPS RELATED TO “SUPER SPREADER EVENTS.”
- OUTDOORS MUCH SAFER THAN INDOORS (AIRFLOW, AEROSOL, SUNLIGHT)
- VARIABLES RELATED TO TRANSMISSIBILITY: VIRAL LOAD, “SUPER SPREADER” SITUATIONS, DISTANCE, MASKING, AIR CIRCULATION, AND INDIVIDUAL SUSCEPTIBILITY ALL PLAY A ROLE IN TRANSMISSION.
- RARE TRANSMISSION BY INANIMATE OBJECTS (HARD SURFACES > SOFT SURFACES)

2 EXAMPLES OF SPREAD/NO SPREAD

After choir practice with one symptomatic person,
87% of group developed COVID-19



● index case ● 32 confirmed and 20 probable cases ● unaffected person

COVID-19 spreads easily

- Avoid groups
- Stay at least 6 feet apart
- Wear face coverings

CDC.GOV

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Two hair stylists with **COVID-19**
spent at least 15 minutes with 139 clients

EVERYONE WORE FACE COVERINGS  **NO CLIENTS ARE KNOWN TO BE INFECTED***



WEAR CLOTH FACE COVERINGS CONSISTENTLY AND CORRECTLY TO SLOW THE SPREAD OF COVID-19

*No clients reported symptoms; all 67 customers tested had negative tests

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COVID DISEASE

- INVASION OF THE RESPIRATORY MUCOUS MEMBRANES
- EFFECTS ON VARIOUS ORGAN SYSTEMS
- SYMPTOMS OF COVID: 96% OF PATIENTS HAD A FEVER, COUGH, OR SHORTNESS OF BREATH. AROUND 45% HAD ALL THREE OF THOSE SYMPTOMS
- ASYMPTOMATIC RATE PROBABLY 40+%. AGE RELATED.
- FATALITY RATE: MAY BE AROUND 1-2% (.1% FOR INFLUENZA).
HARD TO CALCULATE. VARIABLES: ASYMPTOMATIC CASES, LACK OF TESTING CAPACITY, UNDIAGNOSED CASES, COINCIDENTAL DEATHS.

Know the symptoms of COVID-19, which can include the following:



WHO GETS SICK? WHAT CAN WE DO ABOUT IT?

- RISK FACTORS: AGE, OBESITY, DIABETES, IMMUNOCOMPROMISED, CARDIO-VASCULAR DISEASE, OTHER CHRONIC ILLNESS
- STAGES OF DISEASE: OFTEN SICKEST AFTER THE FIRST 2 WEEKS.
- KNOWN TREATMENTS DEPENDING ON DISEASE STAGE: REMDESIVIR, OXYGEN, CORTICOSTEROIDS, PRONING, VENTILATORS
- KNOWN SEQUELLAE: CLOTTING DISORDERS, CARDIOVASCULAR EVENTS, ORGAN FAILURE, RESPIRATORY FAILURE, NEUROLOGICAL EFFECTS, FATIGUE, AND MORE.
- POSSIBLE TREATMENTS BEING EXPLORED: CONVALESCENT SERUM, IMMUNE MODULATORS
- SPECIAL POPULATIONS: YOUNG CHILDREN (MULTI SYSTEM INFLAMMATORY SYNDROME), SIMILAR TO KAWASAKI'S DISEASE, SOCIO-ECONOMIC FACTORS

SOCIO-ECONOMIC AND RACIAL DISPARITIES EXIST FOR COVID-19

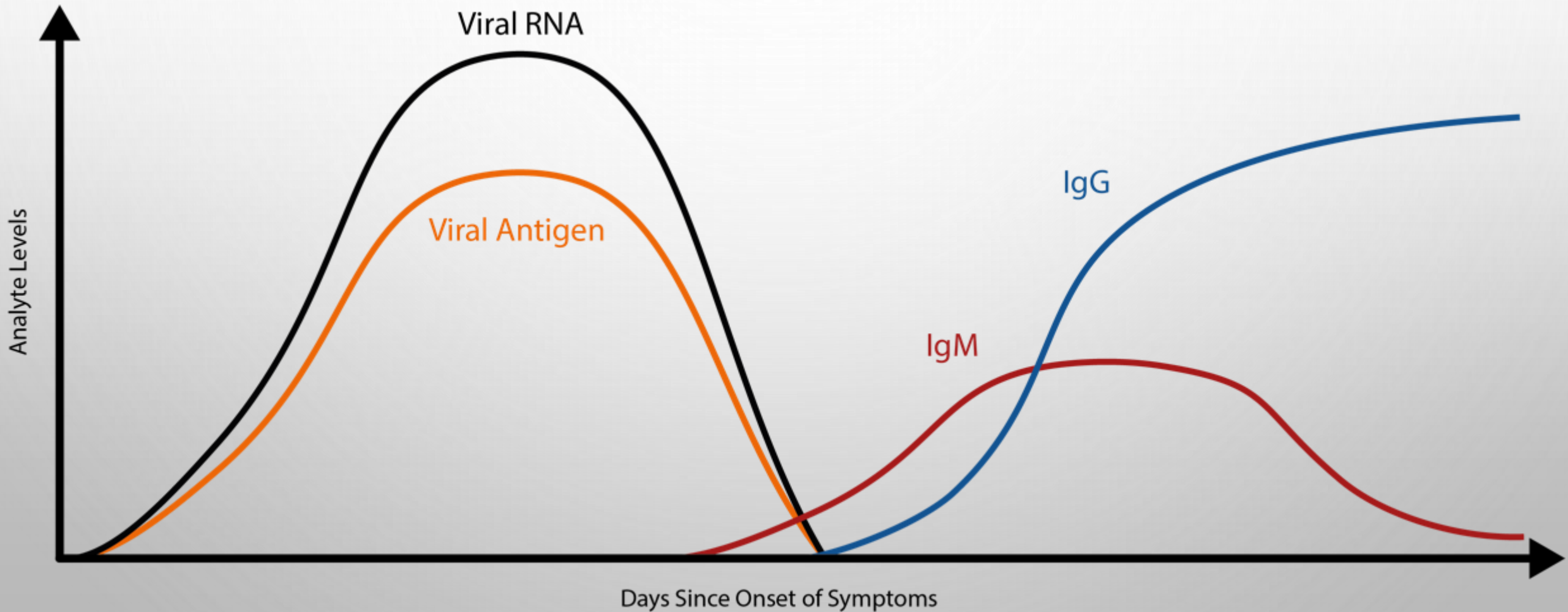
- ACCESS TO CARE
- MORE LIKELY ENGAGED IN HIGH RISK JOBS (MEAT PACKING, SALES...)
- CLOSER LIVING QUARTERS (MULTI-FAMILY HOUSING)
- LANGUAGE BARRIERS IN RECEIVING INFORMATION (CULTURALLY ISOLATED)
- PRISON (VERY HIGH RATES OF INFECTION)
- DISCRIMINATORY CARE
- DISTRUST OF THE HEALTHCARE SYSTEM
- NUTRITION (FOOD DESERTS, UNHEALTHY BUT INEXPENSIVE FOODS)
- POVERTY RELATED DISEASES (DIABETES, HYPERTENSION, OBESITY)
- UNKNOWN IF GENETIC PREDISPOSITIONS EXIST (BLOOD TYPE)



HOW THE BODY RESPONDS TO A VIRAL INFECTION

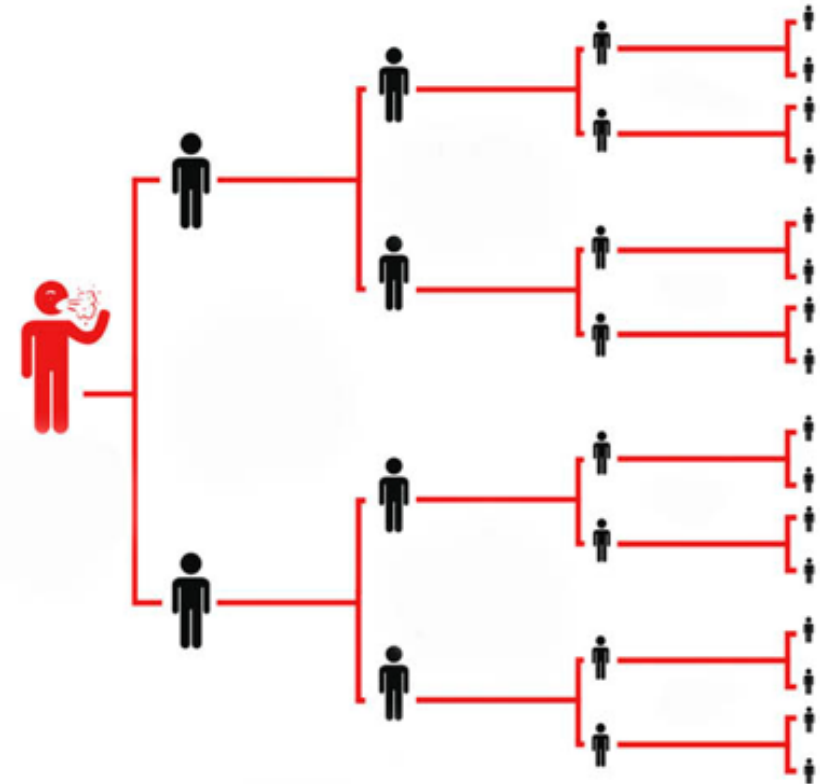
- CELLULAR IMMUNITY: T-CELLS
- HUMORAL IMMUNITY: B-CELLS > ANTIBODIES
 - IGM: FIRST ATTACK, SHORT LASTING
 - IGG: LONG TERM ANTIBODIES. DIFFERENT TYPES.
 - NEUTRALIZING ANTIBODIES KILL THE VIRUS
 - THE MAJORITY OF INDIVIDUALS WITH COVID MADE ANTIBODIES AFTER INFECTION (BUT NOT ALL) AND OF THOSE VERY FEW HAD SIGNIFICANT AMOUNTS OF NEUTRALIZING ANTIBODY.
 - HOSPITALIZED PATIENTS TENDED TO HAVE HIGHER AMOUNTS OF NEUTRALIZING ANTIBODY
 - LACK OF NEUTRALIZING ANTIBODIES DOESN'T RULE OUT A SUCCESSFUL VACCINE
- ANTIBODY DETECTION WANES QUICKLY AFTER RECOVERY FOR MOST PEOPLE

VIRAL LOAD AND ANTIBODY PRODUCTION



R-0 “R NAUGHT” OR REPRODUCTION NUMBER OF A DISEASE.

- THE AVERAGE NUMBER OF PEOPLE INFECTED BY A SICK INDIVIDUAL. NOT A FIXED NUMBER AND CAN BE ALTERED BY BEHAVIORS.
- R-0 FOR COVID-19 SAID TO BE AROUND 2.5
- INFLUENZA IS AROUND 1.5
- IF WE CAN PREVENT THE SPREAD OF THE COVID-19 THROUGH PH MEASURES TO LESS THAN 1.0, THE DISEASE WILL DIE OUT.
- AS OF 8/10/20 THE R0 IN OREGON IS ESTIMATED TO BE 1.0

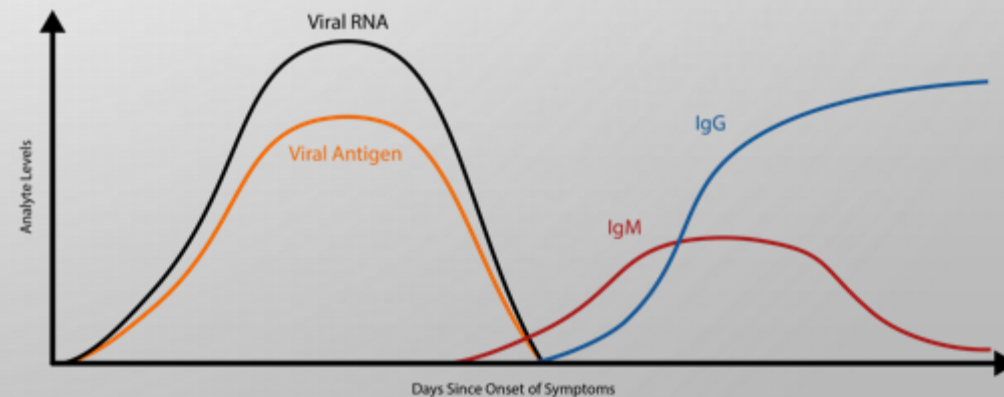


TESTING: PCR (POLYMERASE CHAIN REACTION)

- AMPLIFIES TRACE AMOUNTS OF DNA. VERY SPECIFIC TO A GIVEN ORGANISM
- PCR ONLY WORKS ON DNA, BUT SARS-COV-2 IS AN RNA VIRUS
- ENZYMES CHANGE THE RNA INTO DNA, HENCE THIS IS A REVERSE TRANSCRIPTASE TEST, RT-PCR
- THE DNA FRAGMENTS ARE THEN AMPLIFIED AND DETECTED BY FLUORESCENCE AND THIS PROCESS IS REPEATED WITH A DOUBLING OF MATERIAL WITH EACH CYCLE. CYCLE THRESHOLD REPRESENTED AT CT CYCLES. THE LOWER THE CT NUMBER THE MORE DNA PRESENT, AND THE STRONGER THE POSITIVE TEST.
- A TEST CAN DETECT DNA FRAGMENTS THAT DO NOT REPRESENT INFECTIOUS POTENTIAL
- CAN BE PERFORMED BY NASO-PHARYNGEAL, NASAL, OR SALIVA METHODS.
- REAL WORLD ACCURACY: 70-80% SENSITIVE, 95-99% SPECIFIC (MORE LATER)

TESTING: ANTIGEN AND ANTIBODY TESTS

- ANTIGEN TESTING (SOFIA II BY QUIDEL):
 - DETECTS SURFACE PROTEINS RATHER THAN RNA) AND USES A DIFFERENT DETECTION TECHNIQUE.
 - RESULTS IN 15 MINUTES. POINT OF CARE TEST.
 - USES NASAL SWAB
 - CLAIMS 96.7% SENSITIVITY AND 100% SPECIFICITY
 - REAL WORLD 80% AS SENSITIVE AS A PCR TEST (88% NEGATIVE AND POSITIVE PREDICTIVE VALUE)
- ANTIBODY TESTING (NOT A DIAGNOSTIC TEST):
 - DETECTS PREVIOUS INFECTION BUT DOES NOT ASSURE PROTECTION FROM FURTHER INFECTION.
 - BLOOD TEST



SENSITIVITY

- THE “TRUE POSITIVE RATE.”
- PROPORTION OF PEOPLE WITH THE DISEASE WHO WILL HAVE A POSITIVE TEST.
- POSITIVE PREDICTIVE VALUE: IT IS THE PROBABILITY OF PATIENTS WHO HAVE A POSITIVE TEST RESULT ACTUALLY HAVING THE DISEASE.
- RT-PCR WILL DETECT APPROXIMATELY 70% OF THOSE WHO ACTUALLY ARE INFECTED = 70% SENSITIVE

SPECIFICITY

- “TRUE NEGATIVE RATE”
- PROPORTION OF PEOPLE WITHOUT THE DISEASE WHO HAVE A NEGATIVE TEST RESULT.
- THE NEGATIVE PREDICTIVE VALUE IS THE PROBABILITY THAT PEOPLE WHO GET A NEGATIVE TEST RESULT TRULY DO NOT HAVE THE DISEASE. IN OTHER WORDS, IT’S THE PROBABILITY THAT A NEGATIVE TEST RESULT IS ACCURATE.
- WHEN A RT-PCR TESTS SAYS YOU ARE POSITIVE THERE IS A 5% CHANCE THAT YOU ACTUALLY DON’T HAVE THE INFECTION. THE TEST HAS A 95% SPECIFICITY.

DIAGNOSTIC DILEMMA

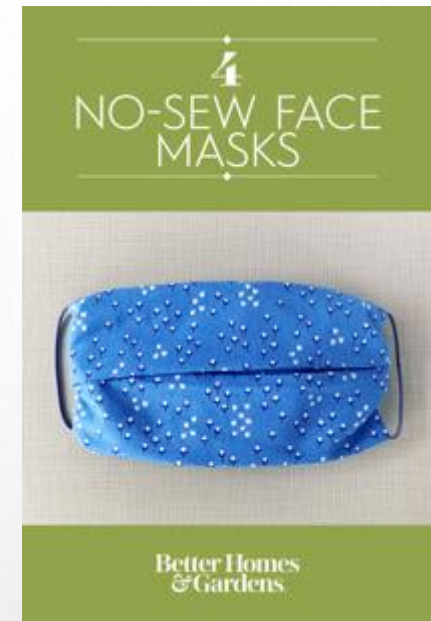
- IS IT BETTER TO HAVE A MORE SENSITIVE TEST (RT-PCR) WHICH TAKES 2-10 DAYS FOR RESULTS OR A LESS SENSITIVE TEST (ANTIGEN TEST) WHICH PROVIDES RESULTS IN 15 MINUTES?
- TESTING FREQUENCY OVERCOMES TESTING SENSITIVITY
- MICHAEL MINA MD.....BLOTTER PAPER \$1 DAILY TESTING STRATEGY

TESTING, OTHER ISSUES:

- SHORTAGES OF SWABS, TRANSPORT MEDIA, TESTING REAGENTS, PPE, STANDARDIZATION, MACHINES AND TECHNICIANS ALL AFFECT OUR ABILITY TO TEST.
- SURVEILLANCE VS DIAGNOSTIC TESTING
- TESTING RELIABILITY RELATED TO PREVALENCE OF DISEASE (FALSE POSITIVES)
- REASON NOT TO DO TEST OF CURE TESTING
- 95+% ARE NOT INFECTIOUS AFTER 9 DAYS ONSET OF SYMPTOMS
- POOLED TESTING
- BACK TO WORK TESTING NOT RECOMMENDED

MITIGATION STRATEGIES

- HANDWASHING: DOING IT RIGHT. SOAP/ALCOHOL (>60%)
- AVOID TOUCHING OUR FACES
- DISTANCING: GREATER THAN 6 FEET
- FACIAL COVERINGS: CLOTH, PAPER, N-95, FACE SHIELDS, PAPRS AND CAPRS.
- OUTDOORS VERSUS INDOORS
- CONTACT TRACING, ISOLATION, QUARANTINE
- TESTING
- TREATMENTS
- VACCINES: STAGES OF TESTING, DIFFERENT METHODOLOGIES



VACCINE DEVELOPMENT

- HOW VACCINES WORK
- OPERATION WARP SPEED
- PHASE 1, 2, 3 TESTING
 - EXPLORATORY PHASE: 2-4 YEARS
 - PRE-CLINICAL (SAFETY, EFFECTIVENESS): 1-2 YEARS
 - IND APPLICATION (INVESTIGATION OF A NEW DRUG)
 - PHASE 1 HUMAN TRIAL: SAFETY, SMALL NUMBERS
 - PHASE 2: LARGER NUMBERS OF PEOPLE TESTING FURTHER SAFETY, EFFECTS
 - PHASE 3: TENS OF THOUSANDS INCLUDING PLACEBO. DOES IT WORK?
 - APPROVAL OF LICENSURE. FOLLOWED BY POST VACCINE RELEASE TRIALS (PHASE 4)
- DIFFERENT TYPES OF VACCINES
 - MODERNA (M-RNA)
 - U OF OXFORD/ASTRA-ZENICA
 - PFIZER/BIONTEC

GUIDANCE: WHERE TO TURN FOR INFORMATION?

- CDC, OHA, JACKSON COUNTY
- FDA (EAU)
- JOHNS HOPKINS, WHO
- JOURNALS: NEJM, JAMA, MEDSCAPE, MMWR,
- PODCASTS: TWIV
 - MICHAEL MINA
 - ANTHONY FAUCI

