EXPLORING RESTRICTIVE AIRWAY CONDITIONS OF THE LUNGS

INTERSTITIAL LUNG DISEASE AND CONDITIONS THAT RESTRICT OR REDUCE LUNG VOLUME

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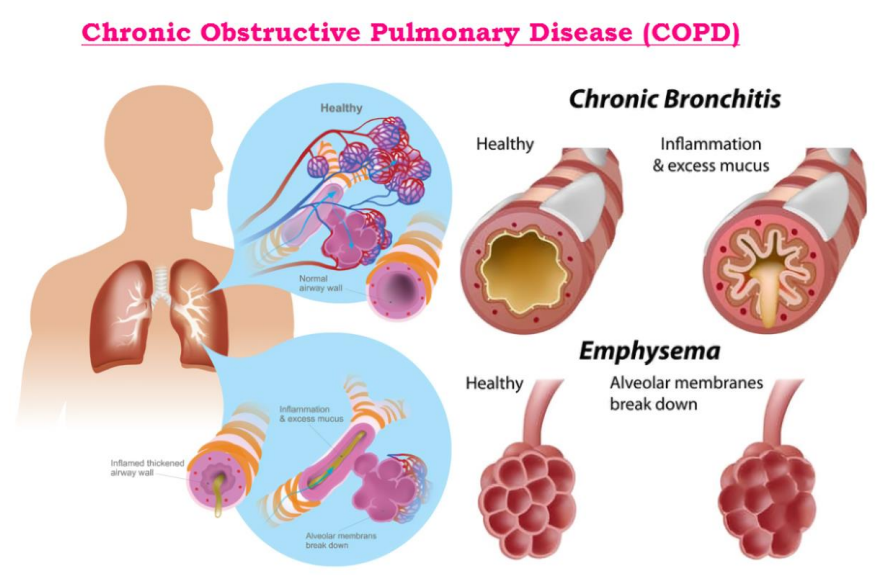
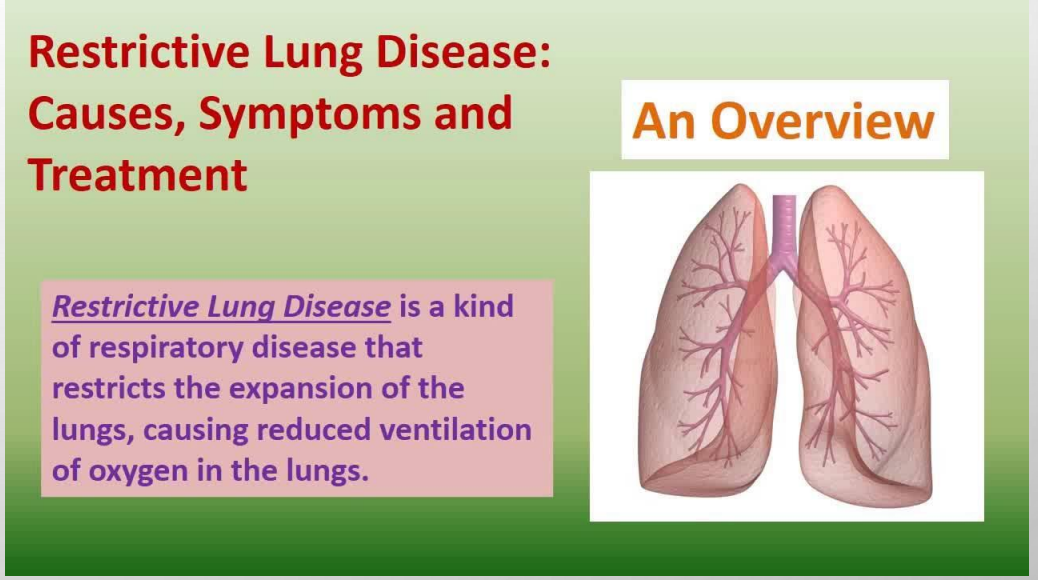
LETS BACKTRACK A LITTLE: DIFFERENCE IN OBSTRUCTIVE AND RESTRICTIVE AIRWAY DISEASE

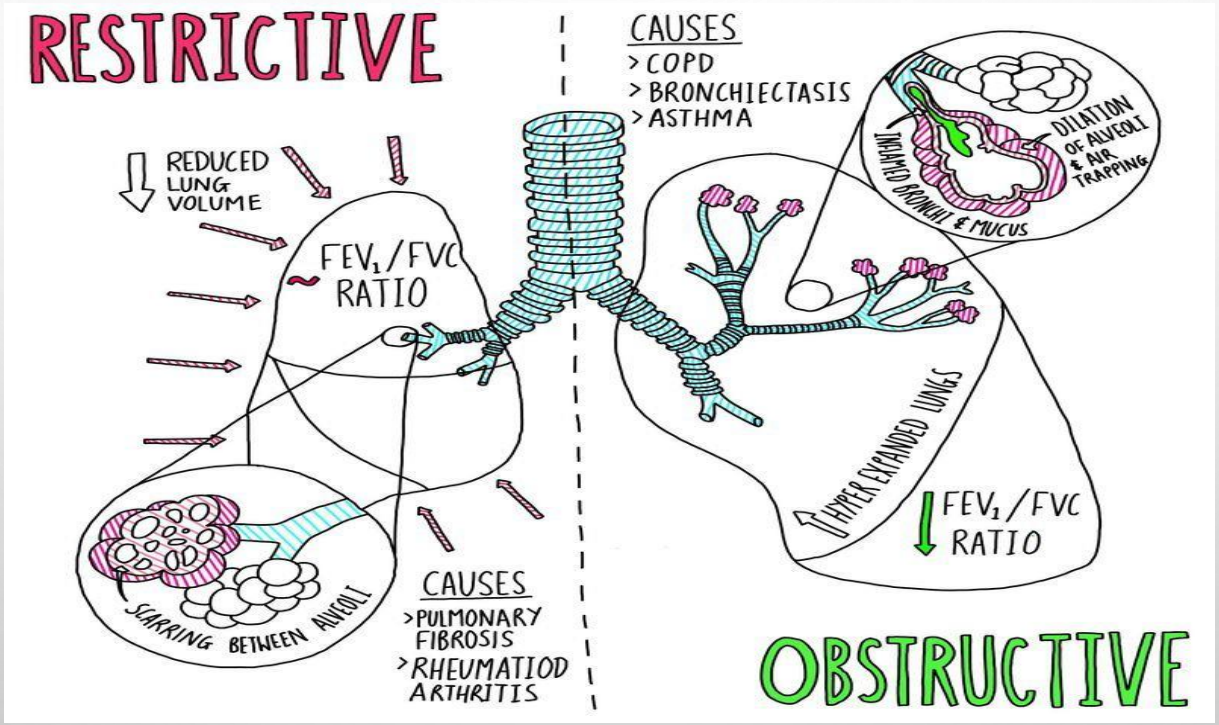
OBSTRUCTIVE AIRWAY DISEASE



RESTRICTIVE AIRWAY DISEASE



RESTRICTIVE VS. OBSTRUCTIVE



HOW ARE RESTRICTIVE AND OBSTRUCTIVE AIRWAY DIFFERENT FROM ONE ANOTHER IN MECHANISM?

- OBSTRUCTIVE AIRWAY DISEASE MAKES IT DIFFICULT TO EXHALE AIR FROM THE LUNGS.
- THESE INDIVIDUALS HAVE SOB DUE TO DIFFICULTY EXHALING AND INCREASED RR
- THIS CAN BE DUE TO A REACTIVE AIRWAY FROM SMOKING OR OTHER IRRITANTS IN THE ENVIRONMENT, ALLERGIC RESPONSE, ASTHMATIC NARROWING OF BRONCHIOLE TUBES, OR AN OBSTRUCTION AT THE LEVEL OF THE AVELOI.

- RESTRICTIVE AIRWAY DISEASE PREVENTS THE LUNGS FROM EXPANDING NORMALLY TO ACCOMMODATE MORE AIR.
- THE SOB OCCURS BECAUSE THE CHEST IS UNABLE TO EXPAND TO FULL CAPACITY WHEN YOU BREATHE; LUNGS LESS COMPLIANT AND RR INCREASES
- THIS CAN BE DUE TO DISEASES OF THE MUSCULATURE IN THE CHEST WALL, OR CHANGES IN THE LUNG PARENCHYMA

WHAT LUNG DISEASES MAKE UP OBSTRUCTIVE AND RESTRICTIVE?

- OBSTRUCTIVE AIRWAY DISEASE:
- COPD…SUBDIVIDED
- EMPHYSEMA, CHR. BRONCHITIS
- ASTHMA, OR ANAPHYLAXIS
- CHOKING, AIRWAY BLOCKAGE, MUCUS PLUGS
- ANY HYPER-REACTIVE AIRWAY CONDITION(RADS)---ALLERGIES/EXPOSURE
- PNEUMONIA AND SARS-I AND II

- RESTRICTIVE AIRWAY DISEASE:
- INTERSTITIAL LUNG DISEASE: LUPUS, OR SARCOIDOSIS, RA(SCARRING/FIBROSING)
- SCOLIOSIS(RISK), OR MARKED OBESITY
- ANY NEUROMUSCULAR DISEASE/CAUSE: MS, ALS FOR EXAMPLE
- ASBESTOSIS, CYSTIC FIBROSIS(GENETIC), IDIOPATHIC PULMONARY FIBROSIS

WHAT IS GOING ON WITH RESTRICTIVE AIRWAY DISEASE?

- RESTRICTIVE AIRWAY DISEASE LIMITS THE VOLUME OF AIR AND THE AMOUNT OF OXYGEN TAKEN IN, AS WELL AS THE AMOUNT OF EXCHANGE AND RELEASE OF CO2 FROM THE LUNGS.
- BECAUSE OF THIS A PERSON BECOMES SHORT OF BREATH(SOB), AND NATURALLY THE RATE OF BREATHING INCREASES.
- 1/5 OF ALL LUNG DISEASE SYNDROMES ARE RESTRICTIVE SYNDROMES.
- BY CONTRAST, COPD, BLOCKS AND NARROWS THE AIRWAY PASSAGES. THIS PREVENTS THE LUNGS FROM EXPELLING ON EXHALE THE NORMAL AMOUNT OF AIR AT THE OPTIMAL LEVELS

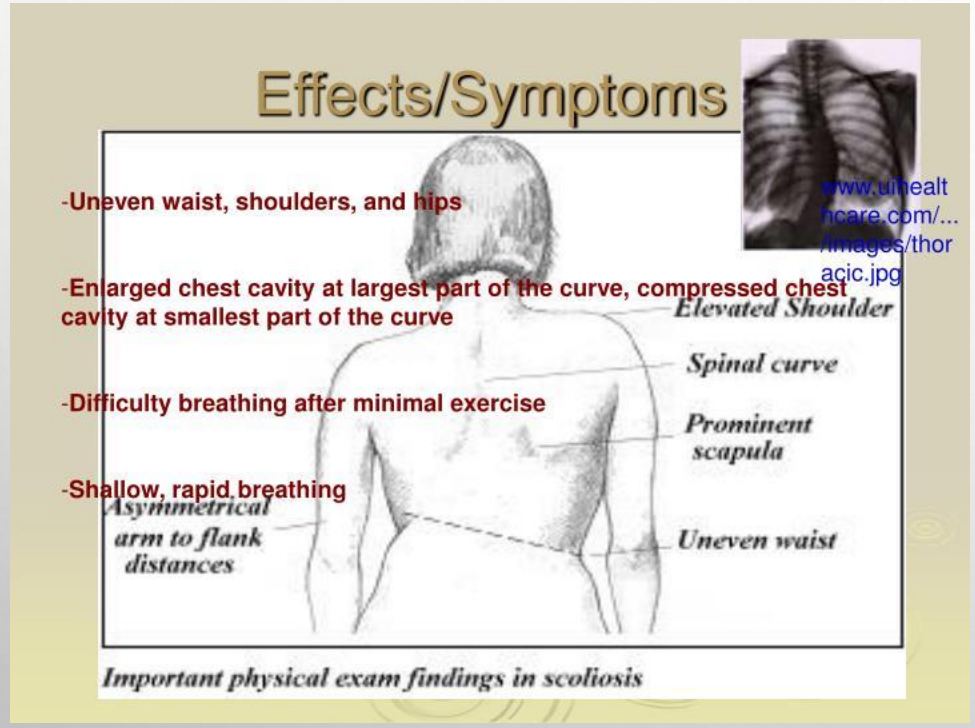
WHAT IS GOING ON WITH RESTRICTIVE AIRWAY DISEASE?

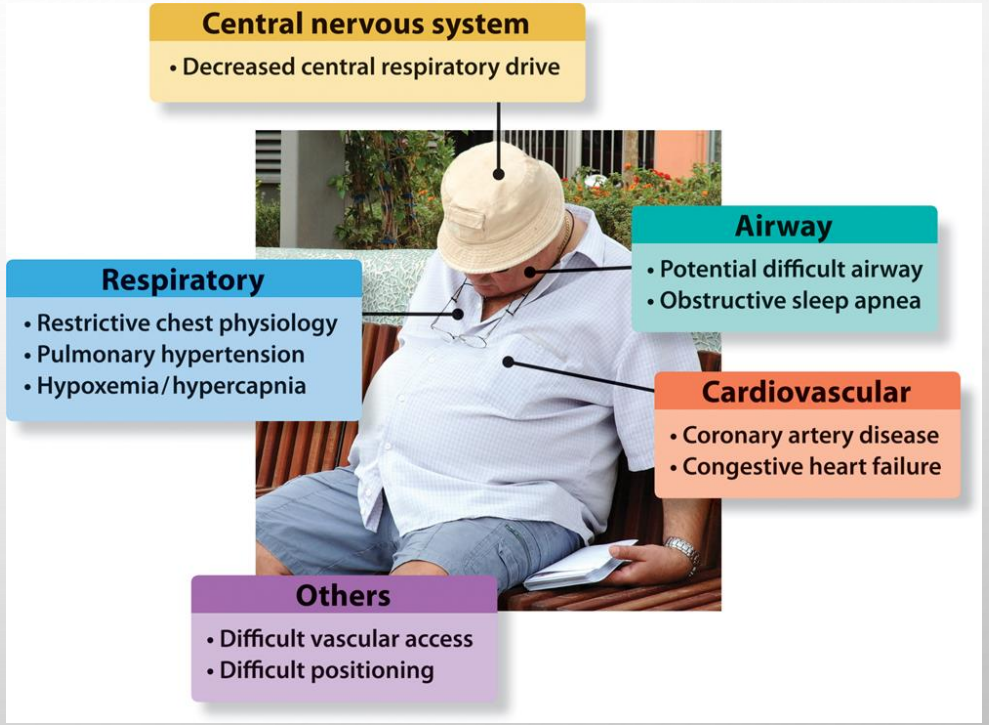
- RESTRICTIVE DISEASE BLOCKS THE LUNGS FROM FULLING EXPANDING TO TAKE IN THE NORMAL, OPTIMAL, AMOUNTS OF AIR FROM THE ENVIRONMENT.
- BY DEFINITION THIS LIMITS THE AMOUNT OF AIR AND OXYGEN YOU CAN BREATHE IN WITH EACH BREATH OF AIR.
- TO MEET THE BODY'S OXYGEN NEEDS THE PERSON MUST INCREASE THE RESPIRATORY RATE TO TAKE IN OXYGEN AND EXPEL CO2.
- OBSTRUCTIVE LUNG DISEASE ACCOUNTS FOR ROUGHLY 80% OF ALL LUNG ELATED SYNDROMES. EXAMPLES: ASTHMA, COPD, BRONCHITIS, AND EMPHYSEMA

IN WHAT WAY ARE THE LUNGS BEING RESTRICTED DURING NORMAL RESPIRATORY CYCLE?

- IN CASES OF GROSS OBESITY, THE LUNGS ARE RESTRICTED BY THE BURDEN OF WEIGHT AROUND THE THORACIC CAVITY. THAT BURDEN CAN ALSO AFFECT THE TISSUE SURROUNDING THE TRACHEA. THIS MIGHT RESTRICT THE MOVEMENT OF THE DIAPHRAGM TO ALLOW THE LUNGS TO FULLY EXPAND. THIS WILL LIKELY RESULT IN AN INCREASED RESPIRATORY RATE. WEIGHT LOSS IS AN EFFECTIVE WAY TO CORRECT MUCH OF THE RESTRICTIVE AIRWAY CONSEQUENCES.
- IN THE CASE OF CERTAIN SPINAL CONDITIONS, THE ABNORMAL CURVATURE OF THE SPINE, USUALLY IN THE THORACIC REGION, HAS ITS MAJOR EFFECT ON THE INTERCOSTALS AND DIAPHRAGMATIC MOVEMENT IN THAT AREA(S). THE NET AFFECT IS THE LUNG(S) CANNOT EXPAND AND NET EFFECT IS A RESTRICTED LUNG SIZE AND DIMINISHED PULMONARY FUNCTION. REALLY, ONLY SURGERY OFFERS AN EFFECTIVE TREATMENT IN SEVERE CASES.

PHYSICAL RESTRICTIVE PROCESSES





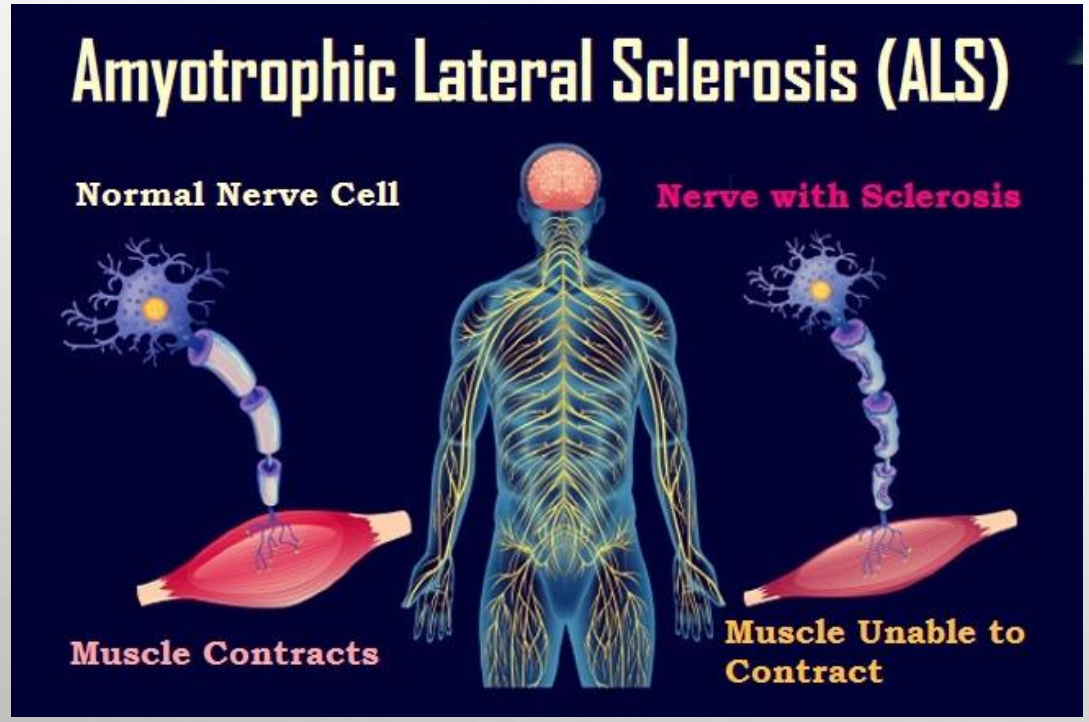
WHAT ABOUT THE RESTRICTIVE PROCESS IN THE CASES OF NEURODEGENERATIVE MUSCULAR DISEASES?

- ALS AND MS AND THE AFFECT ON NORMAL VENTILATION: RESPIRATORY ALS IS MAINLY DUE TO MUSCLE WEAKNESS. THAT WEAKNESS IS RELATED TO THE DIMINISHED INNERVATION OF THE DIAPHRAGM AND PHRENIC NERVE CONTROL. THERE IS A MORE COMPLEX PATHOPHYSIOLOGY INVOLVED WITH ALS THAT GREATLY CONTRIBUTES TO RESPIRATORY FAILURE IN ALS PATIENTS.
- WITH MS, MILD RESPIRATORY WEAKNESS AND EFFORT CAN PROGRESS TO SEVERE RESPIRATORY DIFFICULTY WITH THE ADVANCED FORM OF THE DISEASE. LESIONS IN THE BRAIN DISRUPT NERVE CONDUCTION FROM BRAIN TO SPINAL NERVES TO THE MUSCLES IN CHARGE OF BREATHING, ESPECIALLY THE DIAPHRAGM AND INTERCOSTALS AND ACCESSORY MUSCLES.

MYASTHENIA GRAVIS

- MYASTHENIA GRAVIS IS CONSIDERED A NEUROMUSCULAR DISORDER THAT AFFECTS MANY SYSTEMS OF THE BODY, BUT IS DEFINITELY CONCERNING TO OUR RESPIRATORY SYSTEM. MG, OR MYASTHENIA GRAVIS, IS AN AUTO-IMMUNE DISORDER THAT AFFECTS OUR SKELETAL MUSCLES LEADING TO WEAKNESS OF THE BREATHING AND SWALLOWING MUSCLES OF THE MOUTH, AND THORAX. AS ITS INVOLVEMENT WITH THE RESPIRATORY SYSTEM, IT AFFECTS BREATHING, SWALLOWING, AND CAN CAUSE DYSPHAGIA AND DYSARTHRIA. IF THE MUSCLES AROUND OUR LUNGS, LIKE THE INTERCOSTALS, DIAPHRAGM, OR MUSCLES AROUND THE NECK AND ACCESSORY MUSCLES OF BREATHING, GET TOO WEAK, THE CONDITION THREATENS TO PUT US INTO RESPIRATORY FAILURE, AND POSSIBLY DEATH.

NEUROMUSCULAR DISEASE AND RESPIRATORY DIFFICULTIES



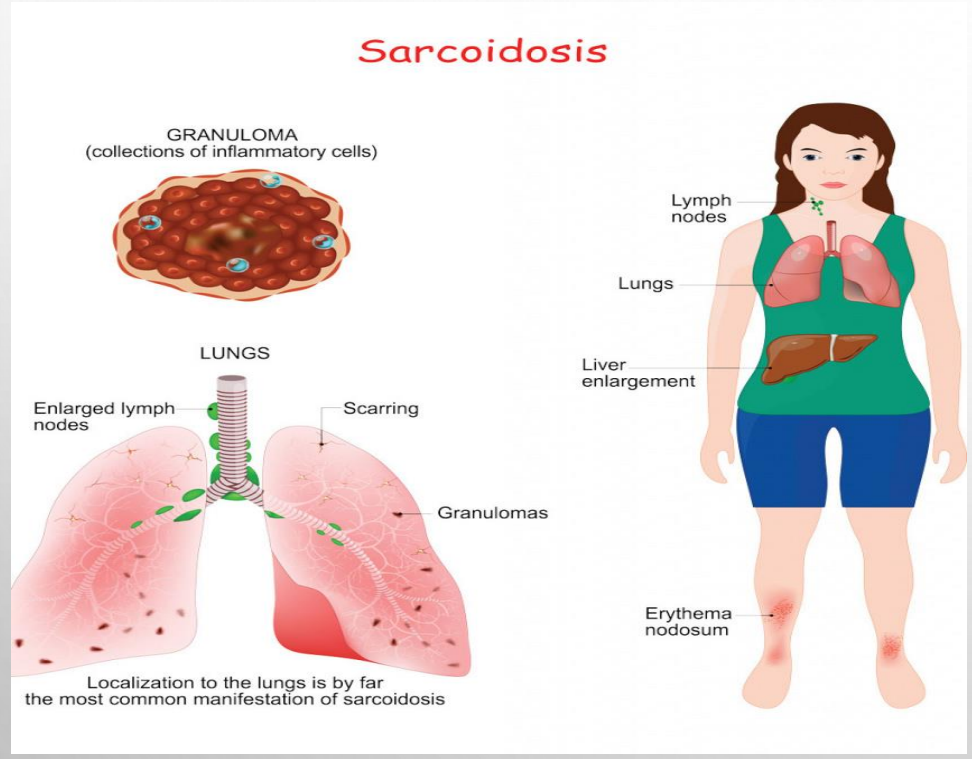
INTERSTITIAL LUNG DISEASE(S)

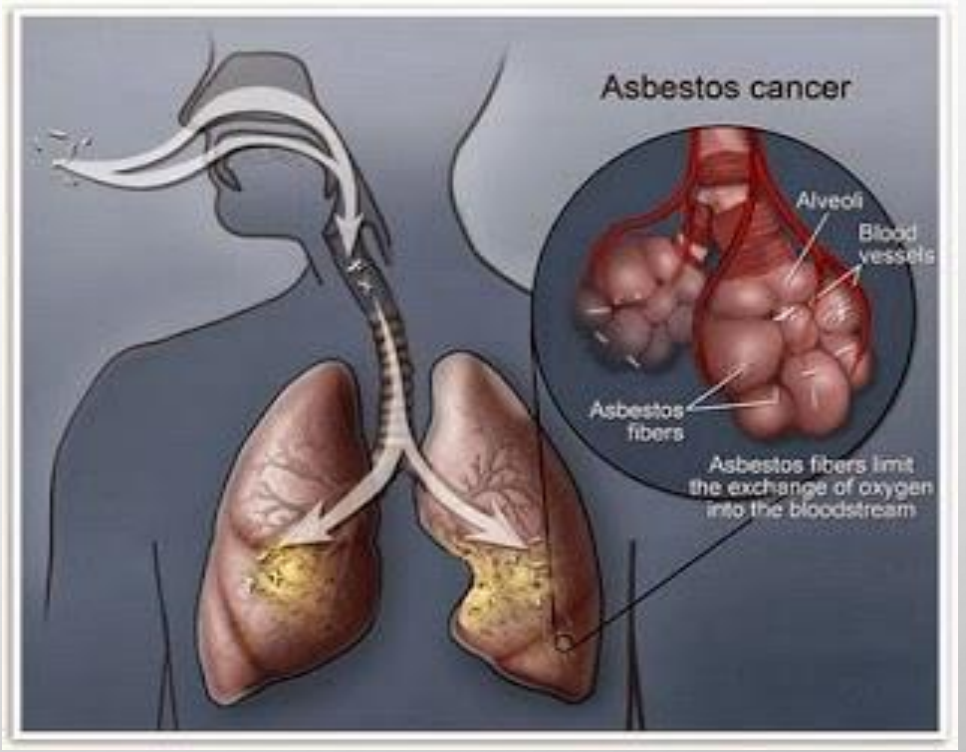
- INTERSTITIAL LUNG DISEASE DESCRIBES A VARIETY OF LUNG DISORDERS, MOST OF WHICH CAUSE PROGRESSIVE SCARRING, OR FIBROSIS OF THE OF LUNG TISSUE DO TO AN ABNORMAL IMMUNE RESPONSE.
- THE SCARRING ASSOCIATED WITH INTERSTITIAL LUNG DISEASE EVENTUALLY AFFECTS YOUR ABILITY TO BREATHE AND GET ENOUGH OXYGEN INTO YOUR BLOODSTREAM.
- THE CAUSES ARE MULTIPLE, AND INCLUDE EXPOSURE TO TOXINS(HAZARDOUS), MEDICATIONS, INFECTIONS, IMMUNE DISORDERS(RA), AND OTHER IDIOPATHIC PULMONARY LUNG DISORDERS. CYSTIC FIBROSIS IS ANOTHER DISORDER THAT AFFECTS MANY BODY SYSTEMS, BUT HAS A MAJOR IMPACT ON THE LUNGS. THIS IS A GENETIC DISORDER USUALLY FOUND EARLY IN CHILDREN, BUT CAN ALSO BE DIAGNOSED LATER IN ADULTS. ONCE SCARRING OCCURS IT IS IRREVERSIBLE!!!!

WHAT ARE SOME OF THOSE TRIGGERS?

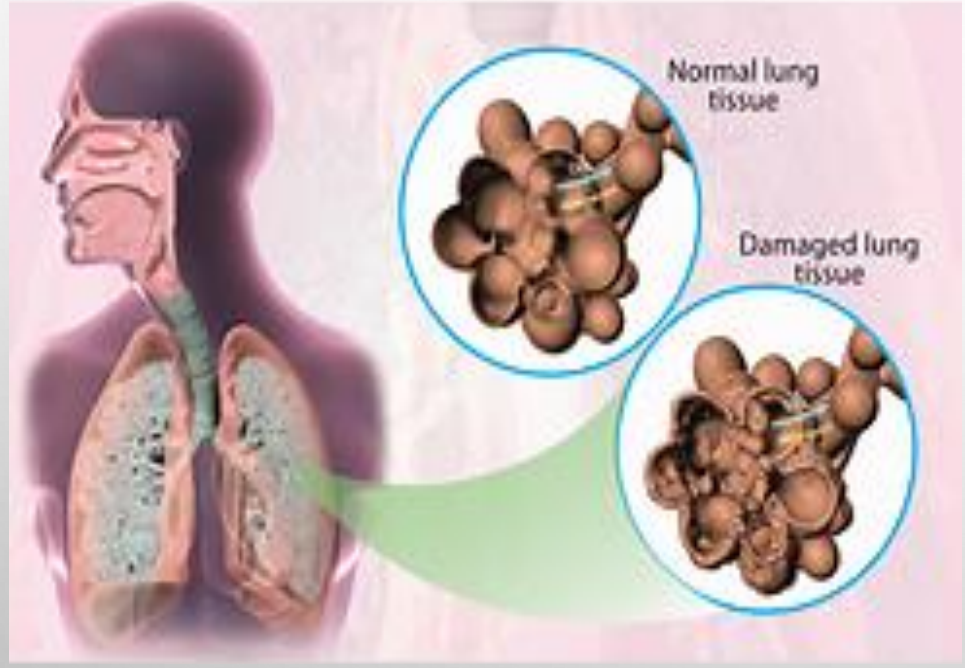
- AUTOIMMUNE DISEASE: RA, SARCOIDOSIS, SCLERODERMA(CONNECTIVE TISSUE ILLNESS)
- SILICA DUST, ASBESTOS
- RADIATION TX.
- CHEMO: METHOTREXATE
- HEART MEDS: AMIODARONE, PROPRANOLOL
- ANTI-INFLAMMATORY: RITUXIMAB, AND SULFASALAZINE

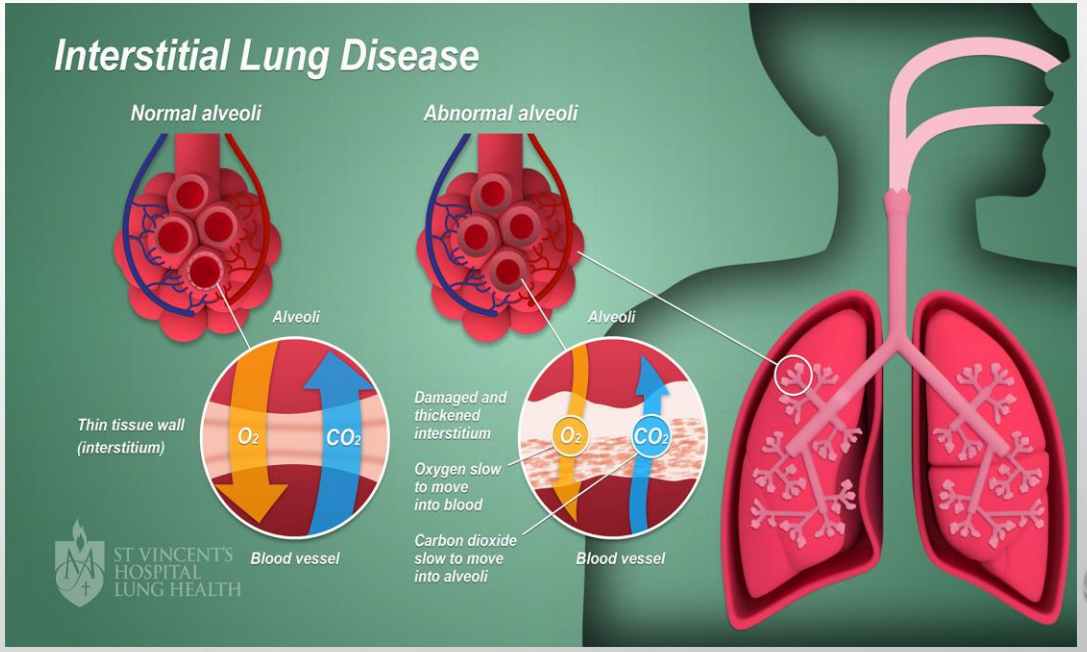
INTERSTITIAL LUNG DISEASE: SARCOIDOSIS AND ASBESTOSIS





MORE ON INTERSTITIAL LUNG DISORDERS, ILLUSTRATIVE





CONSEQUENCES

- RIGHT SIDED HEART FAILURE: (HEART WORKS HARDER TO PUMP BLOOD THROUGH RESTRICTIVE LUNG VASCULATURE)
- RESPIRATORY FAILURE: (VERY LOW BLOOD O2 LEVELS W/ RHF, AND PHTN)
- PULMONARY HYPERTENSION: EFFECTS ARE SEEN ONLY IN THE LUNGS.

PULMONARY HTN STARTS WHEN THERE IS FIBROSING OR SCARRING OF THE LUNGS AND LOW O2 BEGIN TO RESTRICT PULMONARY VESSELS LIMITING BLOOD FLOW TO THE LUNGS. THEIS IN TURN RAISES BLOOD PRESSURE IN THE PULMONARY ARTERIES.

BUT WHAT ARE THE RISK FACTORS? HOW IS THIS SYNDROME OF LUNG DISEASES DIAGNOSED?

- AGE(RISKS INCREASE WITH AGE)
- EXPOSURE TO HAZARDOUS MATERIALS
- GI REFLUX DISEASE (INCREASE RISK OF ILD)
- SMOKING (WORSENS ANY LUNG DISEASE)
- CHEMOTHERAPY AND RADIATION (SHORT TERM OR LONG TERM IMPACTS)

DIAGNOSIS? BECAUSE THE S/S ARE OF RESTRICTIVE DISEASE ALSO OVERLAPS OBSTRUCTIVE DISEASE.

- LAB TESTS: AUTOIMMUNE FACTORS/PROTEINS

  BRONCHOSCOPY AND BIOPSY
- CT SCAN: EXAMINE DETAILS OF FIBROTIC LUNGS
- ECHOCARDIOGRAM: EVALUATE PRESSURE/WORKLOAD OF R SIDE OF HEART
- SPIROMETRY AND PULMONARY FUNCTION

TREATMENT OPTIONS

- THOUGH LUNG SCARRING THAT OCCURS WITH INTERSTITIAL LUNG DISEASE CANNOT BE REVERSED, THOUGH SOME TREATMENTS CAN TEMPORARILY IMPROVE SYMPTOMS AND POSSIBLY SLOW DOWN THE PROGRESS OF DISEASE. IN SOME CASES, DEPENDING ON THE SCARING DISORDER, THERE MIGHT BE OPPORTUNITY TO BE INVOLVED IN EXPERIMENTAL STUDIES.
- THERE ARE CURRENTLY SEVERAL MEDICATIONS IN DEVELOPMENTAL PHASE TO ADDRESS ILD.
- THERE IS NEW RESEARCH TO IDENTIFY GENES THAT MAY BE RESPONSIBLE FOR ILD.
- STUDIES TO ENHANCE EARLY IDENTIFICATION OF ILD ARE CURRENTLY BEING FUNDED.

TREATMENTS FOR RESTRICTIVE ILD

MEDICATIONS

CORTICOSTEROIDS TO SUPPRESS THE IMMUNE SYSTEM: PREDNISONE

MEDICATIONS TO SLOW THE PROGRESSION OF ILD: OFEV AN ANTI-NEOPLASTIC DRUG

DRUGS USED TO TREAT GERD: H2 RECEPTOR BLOCKERS AND PROTON PUMP INHIBITORS

O2 THERAPY

OXYGEN CAN HELP MAKE BREATHING EASIER DURING EXERCISE, THOUGH IT WILL NOT STOP THE PROGRESSION OF DISEASE.

BUT OXYGEN CAN HELP LESSEN ILLNESS DUE TO LOW O2 LEVELS, AND CAN HELP REDUCE PHTN AND WORK LOAD ON R SIDE OF THE HEART.

PULMONARY REHAB

THE AIM OF REHAB IS TO IMPROVE DAILY FUNCTIONING AND TO HELP THESE PATIENTS LIVE A FULL AND SATISFYING LIFE. THE FOCUS IS ON EXERCISE, NUTRITION, BREATHING TECHNIQUES TO IMPROVE LUNG FUNCTIONING, AND EMOTIONAL SUPPORT.

QUESTIONS??????????????

REFERENCES:

- INTERSTITIAL LUNG DISEASES RESEARCH | NHLBI, NIH
- OBSTRUCTIVE AIRWAY DISEASE - AN OVERVIEW | SCIENCEDIRECT TOPICS
- IS CYSTIC FIBROSIS A RESTRICTIVE LUNG DISEASE?IS CYSTIC FIBROSIS A RESTRICTIVE LUNG DISEASE? - VIGOR TIP
- IS SARCOIDOSIS A RESTRICTIVE OR OBSTRUCTIVE LUNG DISEASE? - VIGOR TIP
- OBSTRUCTIVE LUNG DISEASE VS RESTRICTIVE LUNG DISEASE: CAUSES, DIAGNOSIS, AND TREATMENT OPTIONS (AASTWEB.ORG)

REFERENCES: CONTINUED

- RESTRICTIVE VS. OBSTRUCTIVE LUNG DISEASE (WEBMD.COM)
- DOES MS CAUSE BREATHING PROBLEMS?
- RESTRICTIVE AIRWAY DISEASE CLASSIFICATION & EXAMPLES | WHAT IS RESTRICTIVE AIRWAY DISEASE? - VIDEO & LESSON TRANSCRIPT | STUDY.COM
- OBSTRUCTIVE VS RESTRICTIVE LUNG DISEASE | ASTHMA.NET
- INTERSTITIAL LUNG DISEASE - SYMPTOMS AND CAUSES - MAYO CLINIC