Dietary Strategies for COPD and Nutritional Supplements in COPD. Weight Management in COPD

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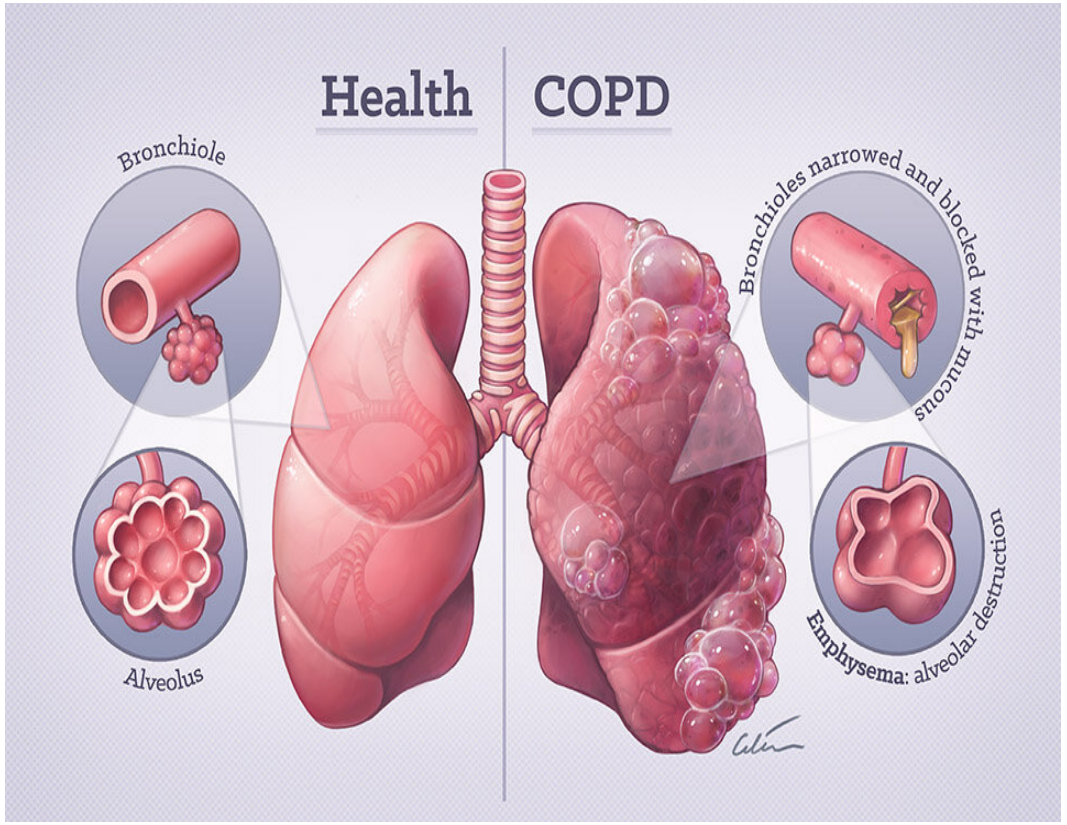
What is COPD?

What is COPD?

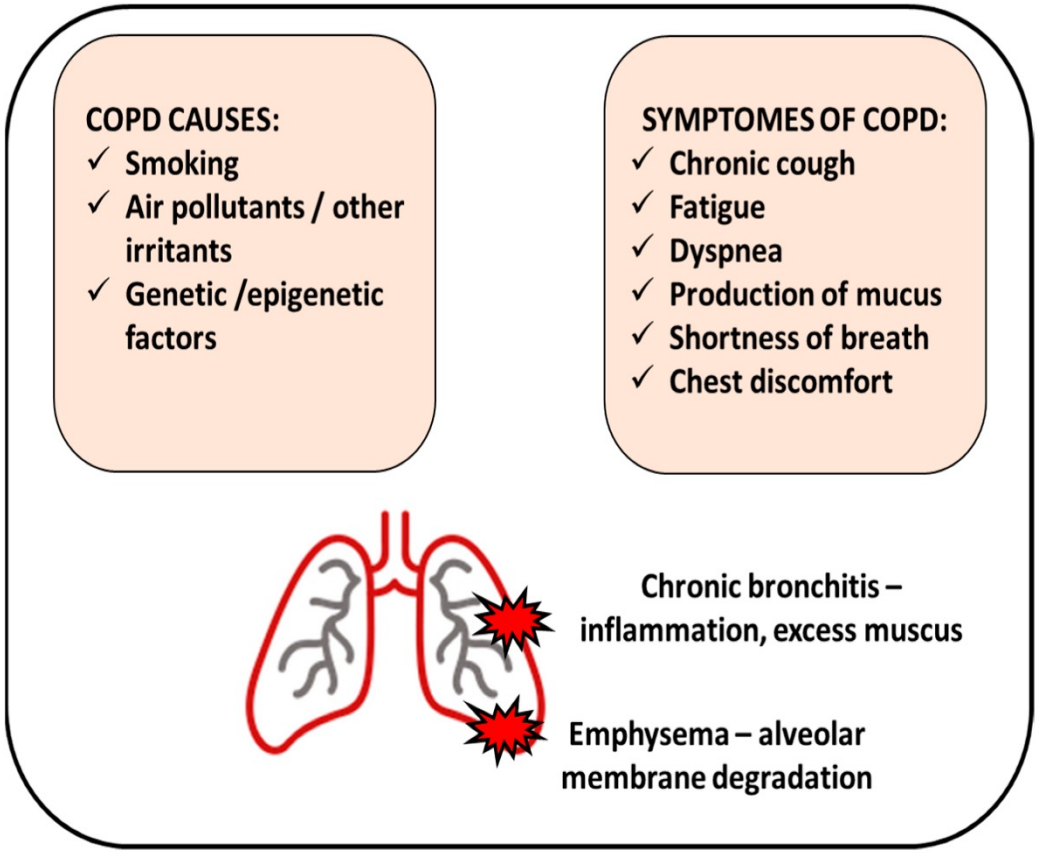
- Chronic Obstructive Pulmonary Disease (COPD) is now one of the top three causes of death worldwide and 90% of these deaths occur in low- and middle-income countries.
- More than 3 million people died of COPD in 2012 accounting for 6% of all deaths globally.
- COPD represents an important public health challenge that is both preventable and treatable.
- COPD is a major cause of chronic morbidity and mortality throughout the world; many people suffer from this disease for years and die prematurely from it or its complications.
- Globally, the COPD burden is projected to increase incoming decades because of continued exposure to COPD risk factors and aging of thepopulation.



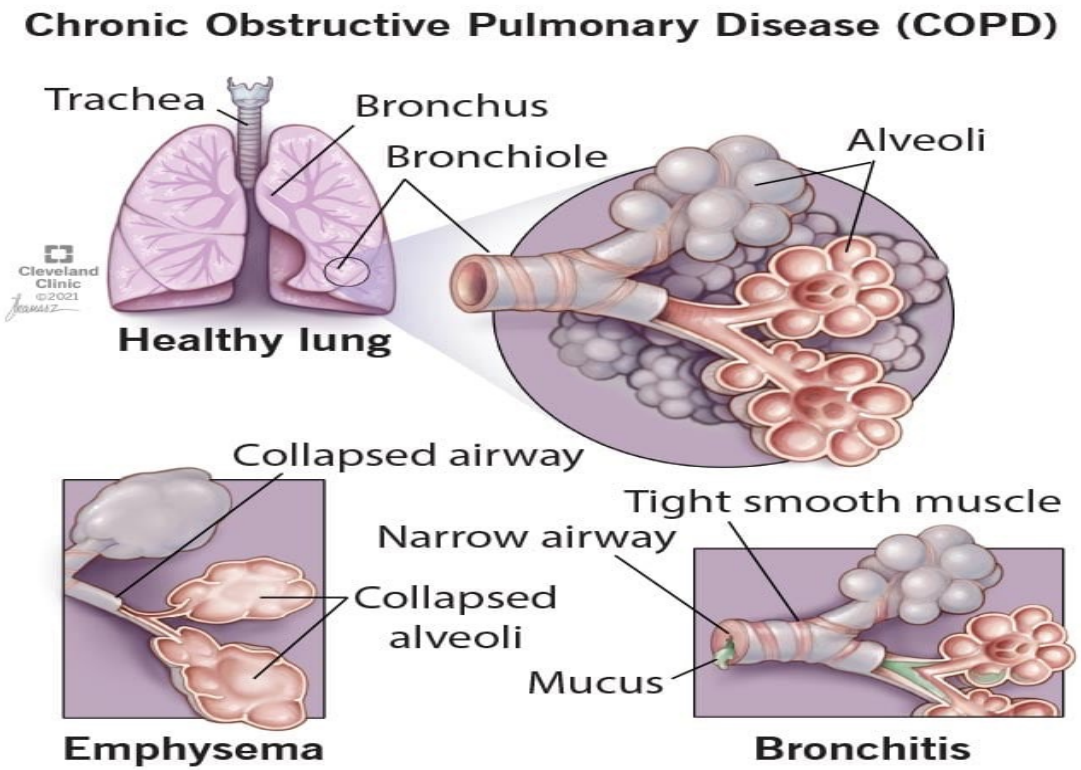
Wath is COPD?

- COPD is a heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnea, cough, sputum production and/or exacerbations) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction.

- The main environmental exposures leading to COPD are tobacco smoking and the inhalation of toxic particles and gases from household and outdoor air pollution, but other environmental and host factors(including abnormal lung development and accelerated lung aging) can also contribute.



Side Effects of COPD

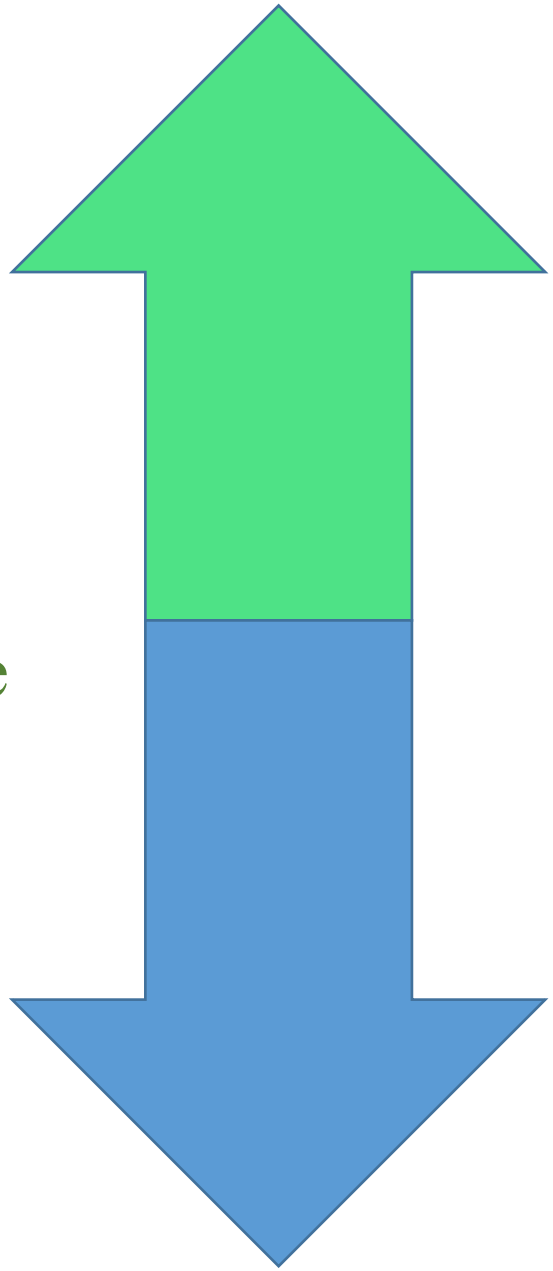


- Reduced respiratory muscle strength and endurance
- Breathing muscles fatigue easier
- Increased risk of infections
- Malnutrition

COPD and Malnutrition

Factors that increase metabolic rate:

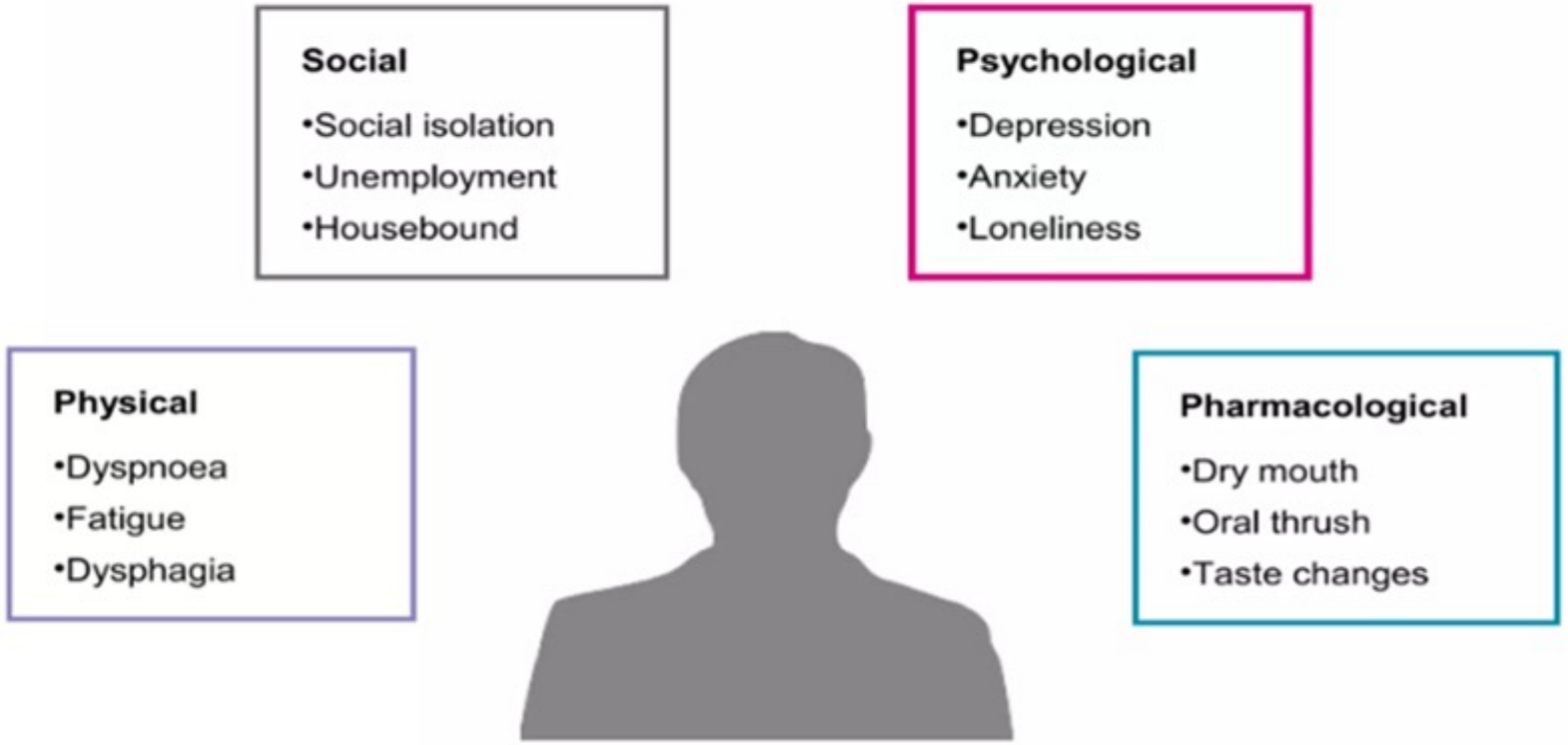
- Lean body mass
- Physical activity and exercise
- Growth and development
- Being male
- Height (overall size)
- Stress
- Digestion



Factors that decrease metabolic rate:

- Aging
- Fat mass
- Starvation and dieting
- Sedentary living
- Being female
- Sleep

Factors affecting nutritional intake in COPD



Gandy. Manual of Dietetic Practice. Wiley-Blackwell, 2014.

Within COPD patients there is a spectrum ranging from those who are very underweight to those who are overweight

Typically emphysematous patients are more commonly underweight

Patients with chronic bronchitis are more commonly overweight

COPD and Malnutrition

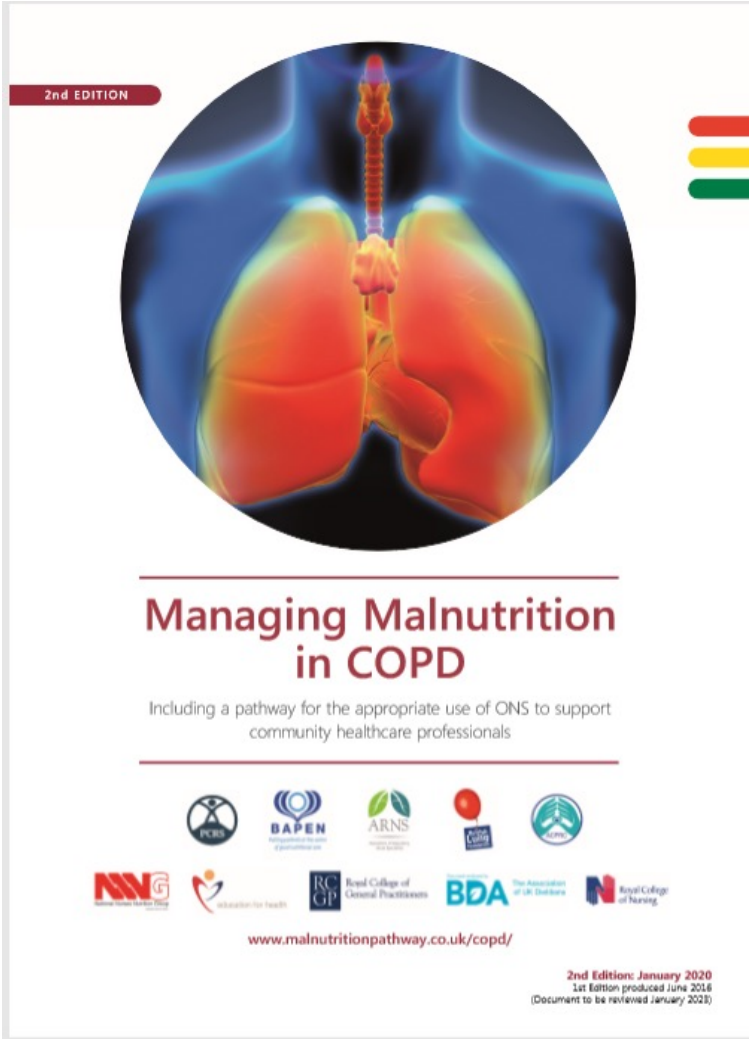
- Malnutrition has been reported in 30-60% of patients hospitalized with COPD.

- Up to 50% of people with COPD weigh less than 90% of ideal body weight.

- Weight loss occurs when energy expenditure exceeds energy supply; in people with COPD decreases in appetite and oral intake often coincide with elevated systemic levels of pro-inflammatory cytokines and the appetite suppressant hormone leptin.

COPD and Malnutrition

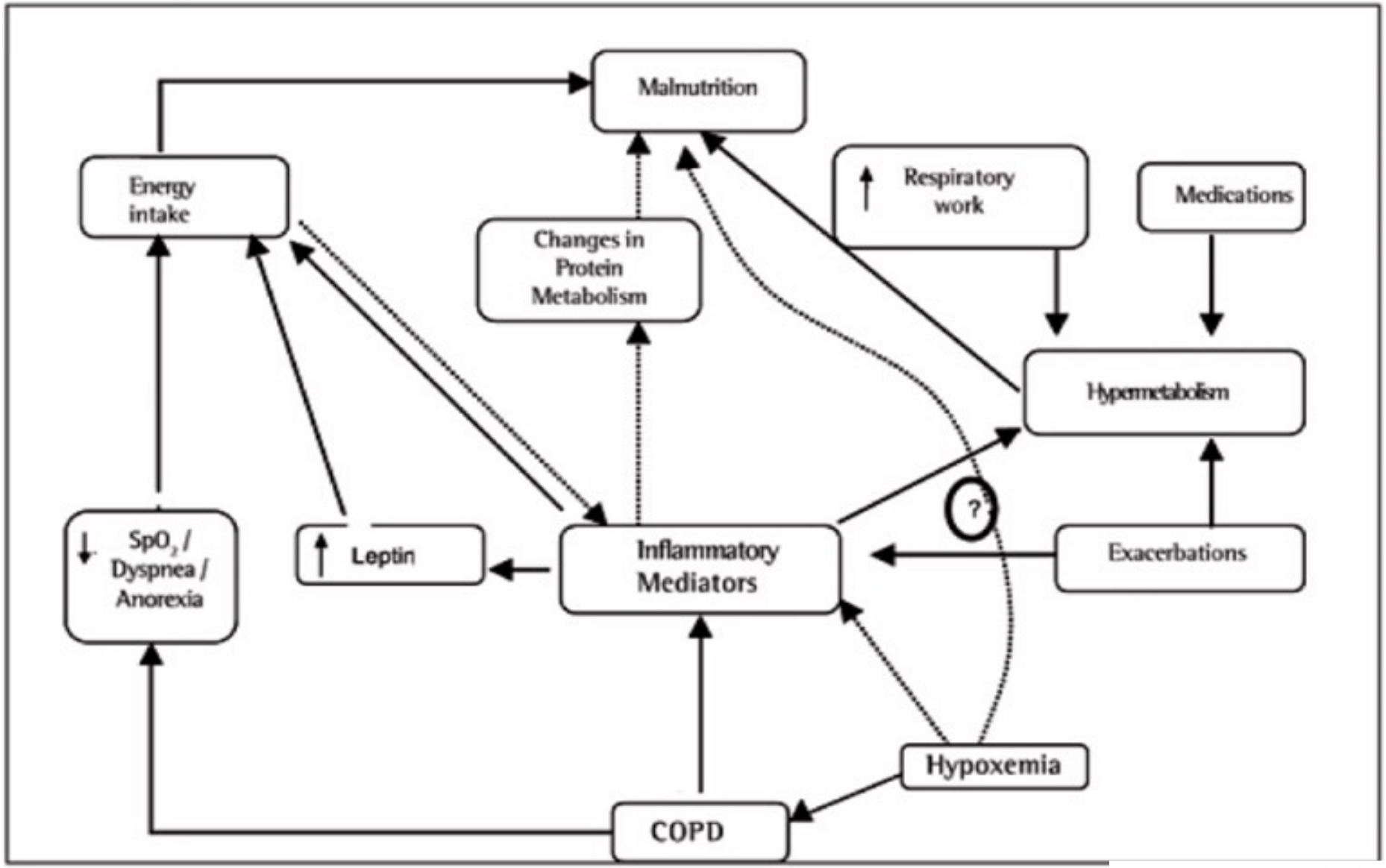
- Prevalence of Malnutrition in COPD around 1 in 3 inpatients and 1 in 5 outpatients with COPD are at risk of malnutrition.
- Malnutrition may develop gradually over several years or might develop or progress following exacerbations.
- Sarcopenia (loss of skeletal muscle mass and strength) affects 15% of patients with stable COPD and impairs function and health status.
- About 25% of patients with COPD will develop cachexia (loss of lean tissue mass due to chronic illness).



COPD and Malnutrition: Causes

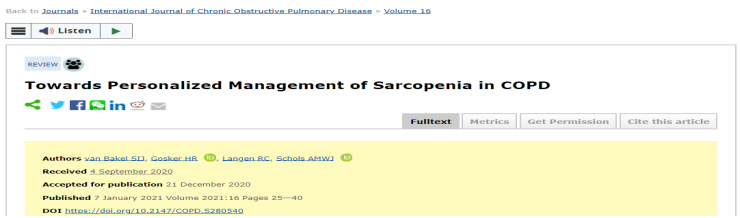
- Up to 140% of energy is needed
- Difficulty in breathing causes difficulty in eating
- Medications have gastrointestinal tract is decreased
- Too much carbon dioxide can cause early morning headaches and confusion
- Malnutrition can occur in COPD due to increased nutritional requirements and decreased oral intake

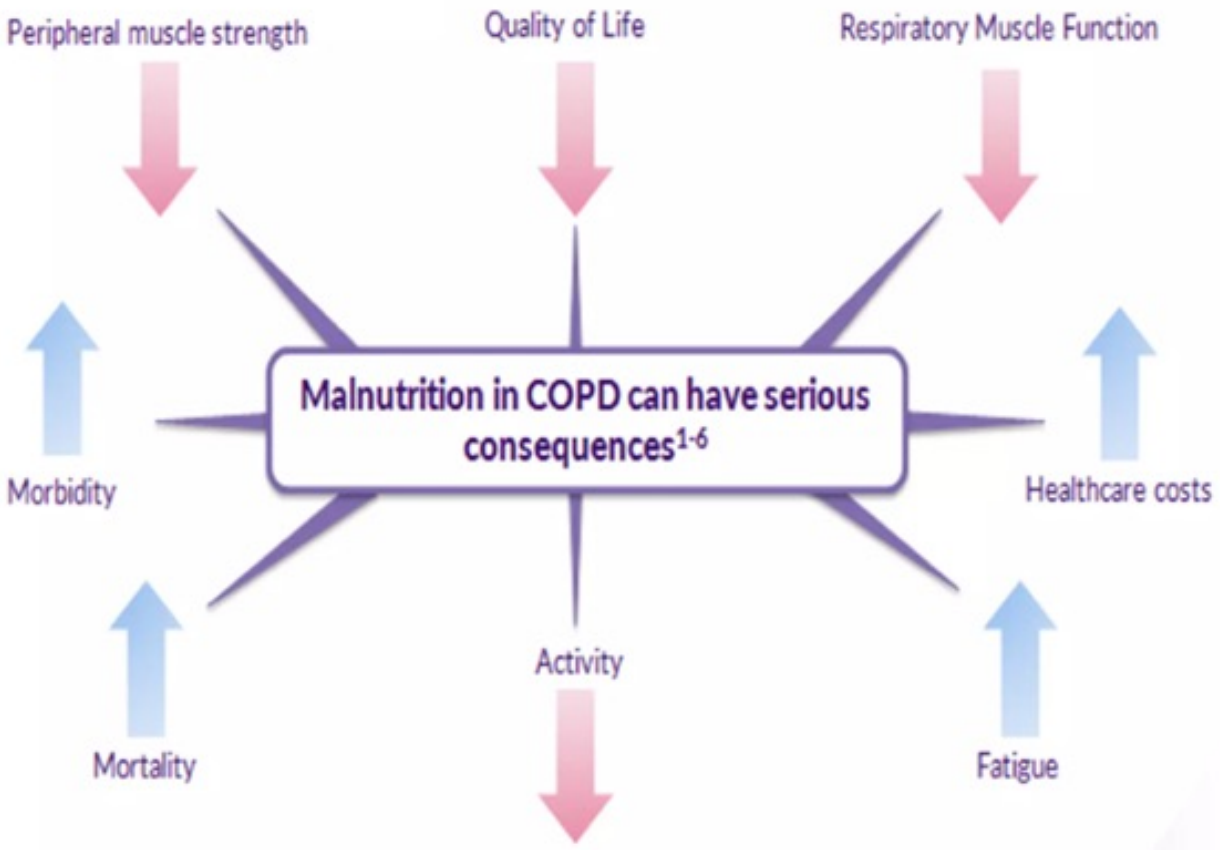
Mechanisms of Malnutrition in patients with COPD

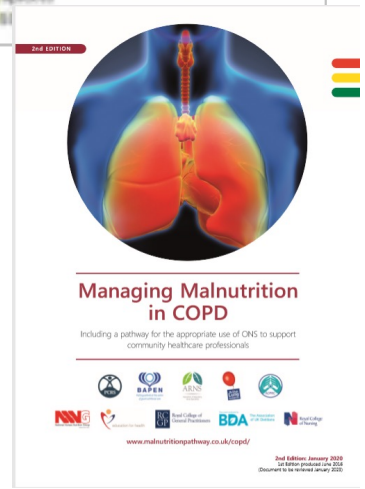


Ezzell, et al. Am J Clin Nutr. 2000;72:1415-6. 2. Ohar, et al. Prim Care Respir J. 2011;20:370-8.

Consequences of malnutrition in COPD







- Increased mortality
- Increased healthcare costs
- Longer hospital stays
- More frequent readmissions
- Reduced muscle strength
- Reduced respiratory muscle function

“Pulmonary cachexia syndrome” in COPD

- The malnourished or undernourished state in COPD referre to as “pulmonary cachexia syndrome”. Pulmonary cachexia syndrome is characterized by loss of fat-free body mass causing muscle wasting. In fact, it is estimated to occur in 25% to 40% of COPD patients and is associated with an accelerated decline in functional status, carrying an unfavorable prognosis.

- The pulmonary cachexia syndrome in COPD patients is characterized by a weight loss of 5% to 10% of initial body weight, weight less than 90% of ideal body weight (IBW), or weight loss exceeding 5% in the past 3 to 12 months.

- The exact pathogenesis of pulmonary cachexia syndrome still remains unclear, as a number of factors contribute to a progressive reduction in lean body mass. These include tissue hypoxia, disuse atrophy, changes in metabolism and caloric intake, oxidative stress, aging, inflammation, and medications (glucocorticoids) and malnutrition.

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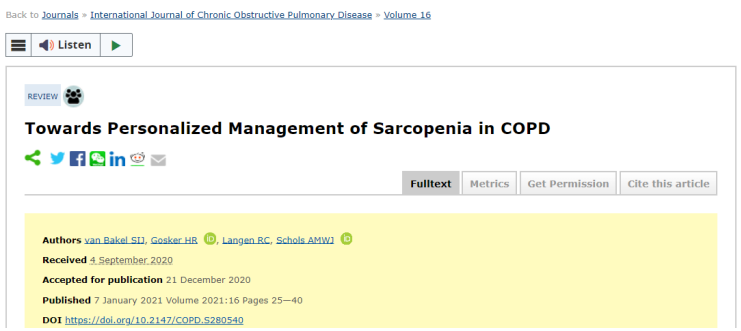
Nutrition in chronic obstructive pulmonary disease: A review

Gautam Rawal[1] and Sankalp Yadav[2]

Sarcopenia: prevalence in COPD, pathophysiology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REVIEW

Towards Personalized Management of Sarcopenia in COPD

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Authors van Bakel SIJ, Gosker HR, Langen RC, Schols AMWJ

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- The term sarcopenia, derived from the Greek words «sarx» (flesh) and «penia» (poverty) (Rosenberg, 1989) the generalized and progressive loss of muscle mass and function with age.
- The reported numbers for sarcopenia in the general population vary from 4.4% to 27.5%, not only because of the different definitions and cutoff points used, but also depending on the studied population.
- There is a higher prevalence of sarcopenia in COPD patients than in patients without COPD. The cumulative prevalence of sarcopenia in COPD is 21.6%.
- Cumulative prevalence of sarcopenia in COPD patients 27.5%, most significant in more severe stages of COPD.

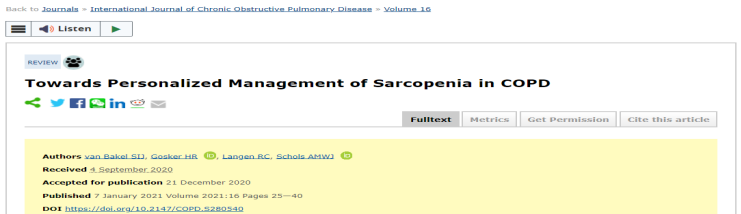
Sarcopenia: consequences

- Low fat-free mass and sarcopenia - independent predictors of both all-cause mortality and specific COPD-related mortality.

- Reduced muscle strength and impaired physical performance - predictors of poor health-related quality of life, more and longer hospital stays and higher mortality in both the general population as well as in COPD patients specifically.

- In COPD the presence of sarcopenia increase the risk for osteopenia and osteoporosis, which association of increased risk of falls and fractures.

- Acute exacerbations of COPD during which various catabolic triggers converge, may accelerate the development or progress of sarcopenia. A sarcopenia prevalence of 48% in a population with frequent acute exacerbations of COPD, which is significantly higher than the most recent reported pooled prevalence of 27.5% in COPD patients.



SARC-F screening for sarcopenia. Adapted from Malmstrom et al (2013)

Component	Question	Scoring
Strength	How much difficulty do you have in lifting and carrying 10 pounds?	None = 0 Some = 1 A lot or unable = 2
Assistance in walking	How much difficulty do you have walking across a room?	None = 0 Some = 1 A lot, use aids, or unable = 2
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None = 0 Some = 1 A lot or unable without help = 2
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None = 0 Some = 1 A lot or unable = 2
Falls	How many times have you fallen in the past year?	None = 0 1–3 falls = 1 4 or more falls = 2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Identification of Sarcopenia Risk in Oncology Outpatients using the SARC-F Method
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Abstract
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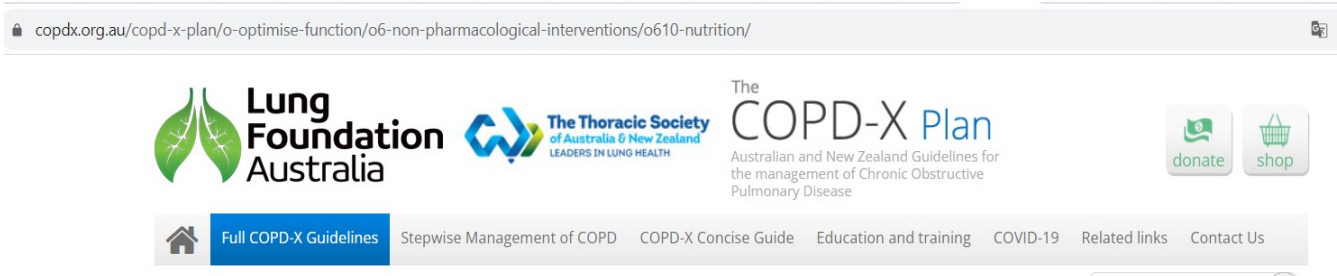
COPD and Obesity

- Nutritional management of COPD is complex, as both malnutrition and obesity are highly prevalent and both contribute to patient morbidity and mortality risk.

- Obesity complicates COPD management and in addition to the negative metabolic consequences, is associated with decreased expiratory reserve volume (ERV) and functional residual capacity (FRC), increased use of inhaled medications, increased dyspnoea and fatigue, decreased heath related quality of life and decreased weight bearing exercise capacity.

- Despite these negative effects, obesity has been associated with reduced mortality risk in severe COPD, which may be due to a reduction in static lung volumes and /or the increase in FFM that occurs in obesity due to over-nutrition and increased weight bearing.



Prevalence of Obesity in COPD

- Obesity, metabolic syndrome, and visceral adiposity are highly prevalent conditions in patients with COPD and are associated with worse outcomes, and obesity seems relevant in distinct COPD phenotypes.

- COPD and obesity are major causes of morbidity and mortality worldwide, and, according to current estimates, the global burden of these conditions will further increase. Each 5 kg/m2 increase in BMI above the normal BMI range (22.5–25 kg/m2) was associated with 30% higher all-cause mortality.

- Data on prevalence of obesity in patients with COPD are conflicting

Prevalence of Obesity in COPD

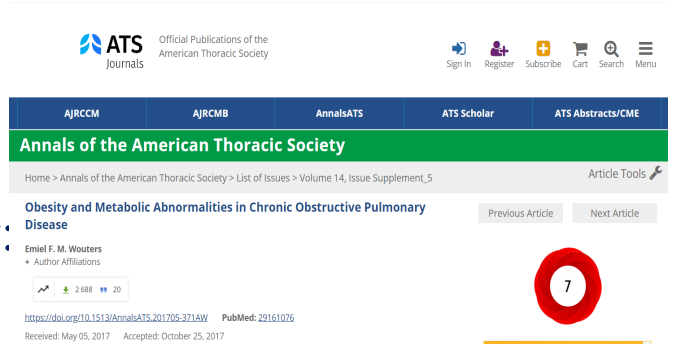
- **Netherlands:** the overall prevalence of obesity was 18%, with the highest prevalence in patients with mild to moderate COPD: 29 and 48% of these patients had mild to moderate airflow limitation according to GOLD criteria.

- **Canada:** the prevalence of obesity in COPD was significantly higher than in the population without COPD - in 2005 it was 24.6% in patients with COPD and 17.1% in control subjects without COPD (P<0.001).

- The multicenter observational **ECLIPSE** (Evaluation of COPD Longitudinally to Identify Predictive Surrogate End-Points) study: obesity was reported in 20% of patients with COPD: median FEV1 was 43.5% predicted in this COPD population.

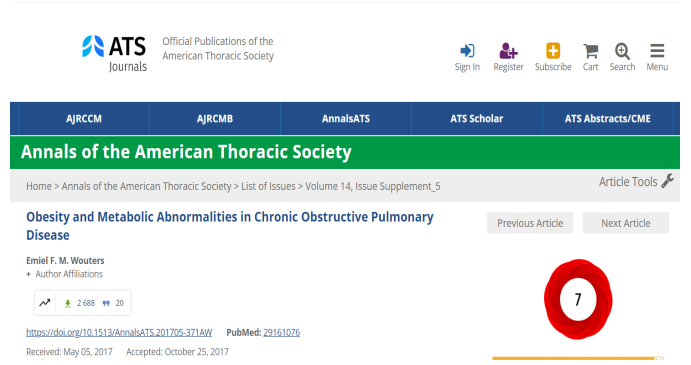
- Although data suggest that obesity is more prevalent in patients with COPD than in the general population, not all studies confirm this finding.

- BMI in relation to chronic airflow limitation was studied as part of the **BOLD** (Burden of Obstructive Lung Disease) initiative, a worldwide population-based study: prevalence of low and obese BMI was highly variable between sites and countries.



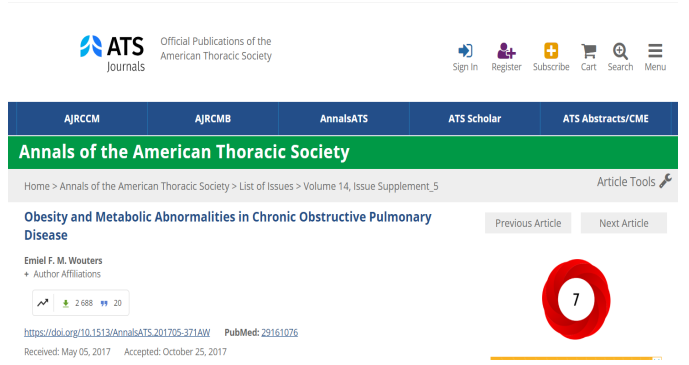
Adipose Tissue and Leptin

- Fat tissue is not only an important source of a variety of signaling molecules, adipokines, but also a source of stem cells that can participate in tissue repair.
- Leptin and adiponectin are just two of the multiple hormones produced by adipose tissue.
- Leptin is the product of the obese gene. It levels are increased with obesity and are secreted in direct proportion to the adipose tissue mass.
- Leptin primarily expressed in adipose tissue but also found in many other organs, including the lungs. Leptin and leptin receptors are present in the airways on bronchial epithelial cells.
- Leptin exerts proinflammatory effects. Other identified adipokines that promote inflammation include resistin, retinol-binding protein-4, lipocalin-2, IL-18, angiopoietin-like protein-2, CC-chemokine ligand-5, tumor necrosis factor, IL-6, and nicotinamide phosphoribosyltransferase.
- Elevated leptin levels may modulate the immune reaction in the airways by inciting a robust proinflammatory response or bias the cellular response toward a type 1 helper phenotype. Leptin may also increase bronchial hyperreactivity.
- Leptin seems also to be involved in neutrophil dysfunction in obesity.

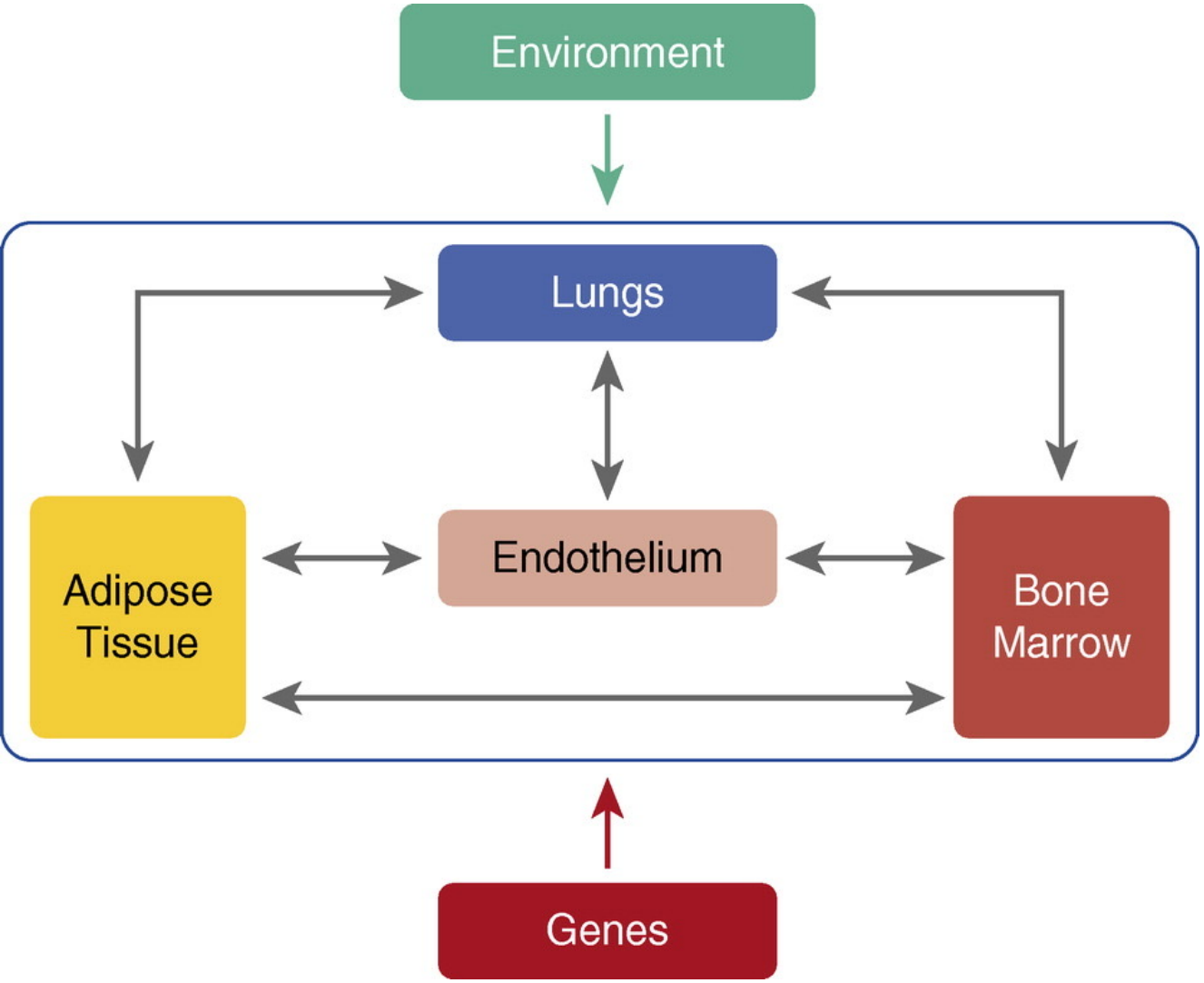


Adipose Tissue and Adipokines

- Adiponectin exerts significant antiinflammatory effects.
- It is synthesized almost exclusively by adipocytes of lean individuals, and its expression is significantly attenuated in obese subjects.
- Adiponectin exerts its function through its receptors, AdipoR1 and AdipoR2, the former being expressed ubiquitously, particularly in skeletal muscle, whereas the latter is most abundantly expressed in the liver.
- Adiponectin also to be expressed by airway epithelial cells.
- Adipose tissue hypoxia, adipose tissue inflammation, and increased macrophage infiltration in adipose tissue may further disturb adipokine secretion and may also be involved in induction of insulin resistance.



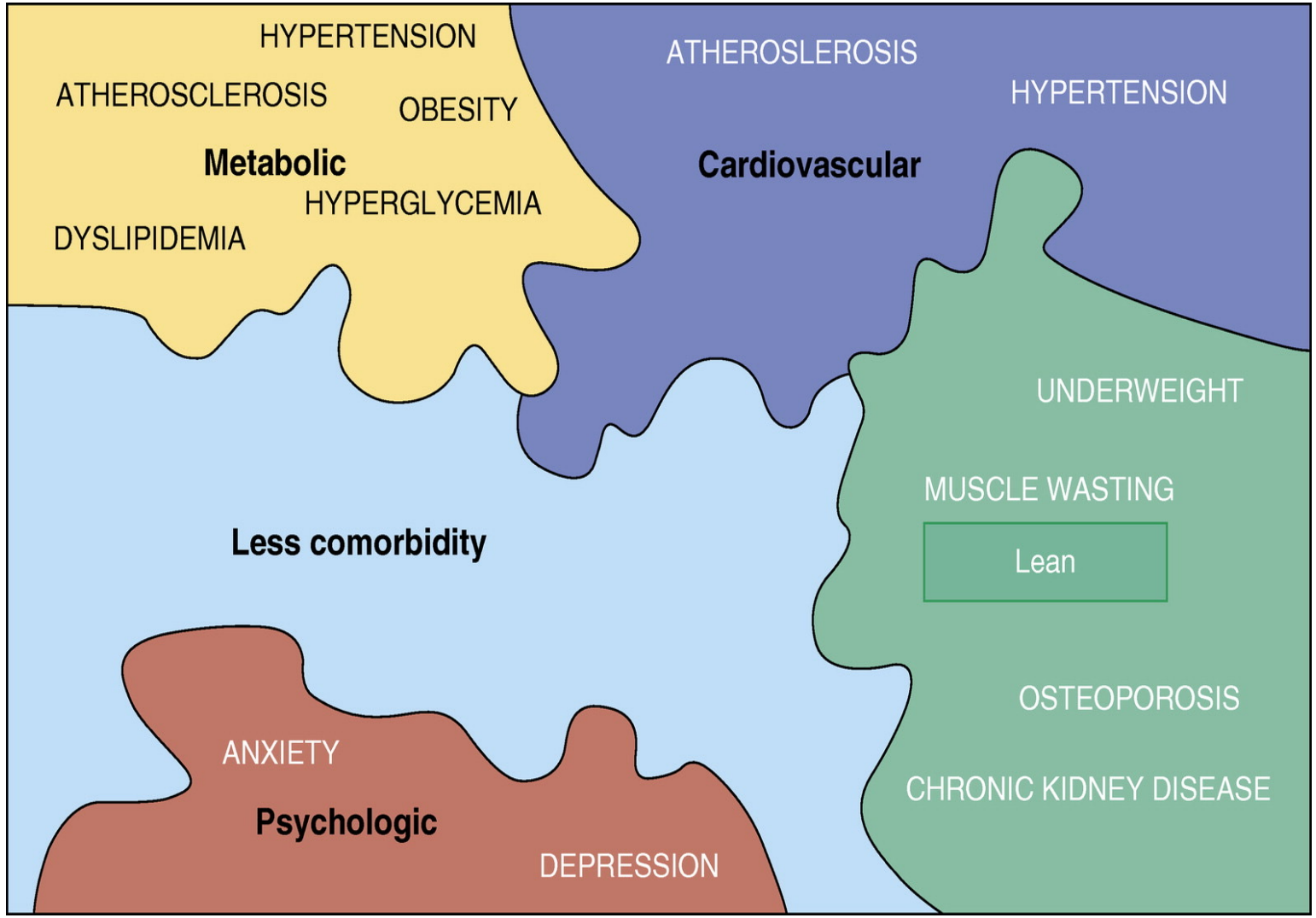
The lungs, bone marrow, and adipose tissue network. COPD is a condition characterized by gene–environment interactions, mediated by two sensors (lungs and endothelium), two responder organs (bone marrow and adipose tissue), and several linking biological signals.



This diagram shows a vascularly connected network hypothesized, with the lungs as the main external sensor, the endothelium as the internal sensor, and two key responding elements, bone marrow and adipose tissue, both producing inflammatory and repair signals. In this model, the lungs act as a selective and protective interface between the external and internal environments, and bronchial and alveolar cells, as well as other tissue-resident cells, are capable of sensing a variety of environmental factors and orchestrate an inflammatory response both locally and at a distance. The endothelial lining acts as the internal interface and as a sensor between circulating blood and the body cell/tissue milieu. It is hypothesized that these two main sensors communicate with the responder elements-bone marrow and adipose tissue-through a number of biological signals that circulate within the vasculature. According to this model, the development of COPD and associated multimorbidities depends on the manner in which the vascularly connected network responds, adapts, or fails to adapt to the inhalation of particles and gases.

Annals ATS, 2017/ https://www.atsjournals.org/doi/abs/10.1513/AnnalsATS.201705-371AW
Published in: Emiel F. M. Wouters; *Annals ATS* 14S389-S394.
DOI: 10.1513/AnnalsATS.201705-371AW

Clusters of comorbidities in chronic obstructive pulmonary disease



Theare are COPD phenotypes, of which some were overweight. COPD phenotypes with high BMI have the least emphysema, higher cardiovascular risk prediction, very high prevalence of diabetes, hypertension, dyslipidemia and atherosclerosis, and the highest levels of systemic inflammatory markers. These phenotypes have worse survival, the least progression of emphysema, and low rates of exacerbations during the 3-year follow-up period.

Annals ATS, 2017
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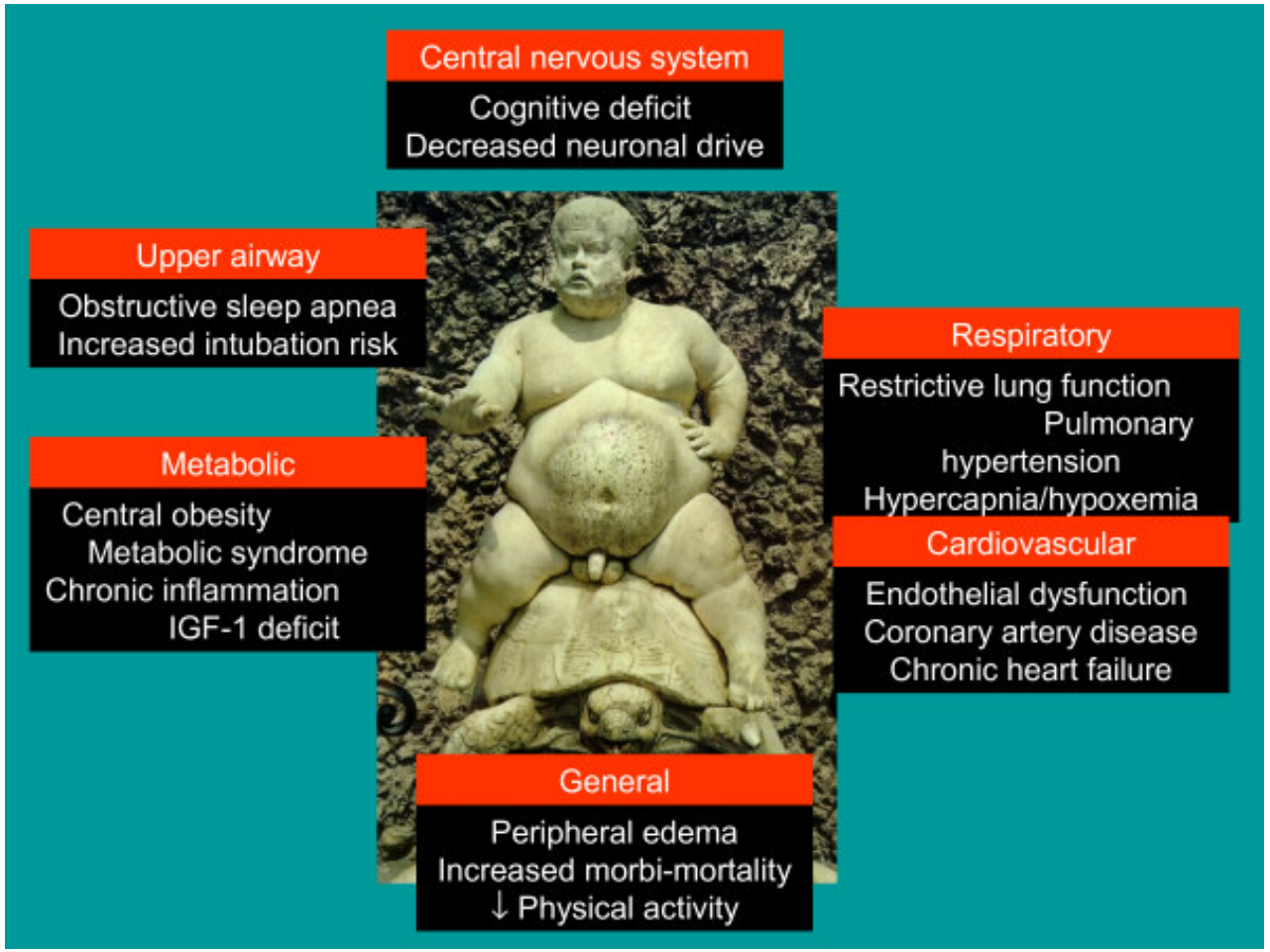
Central and peripheral consequences of obesity



Statue of Bachus in Boboli Gardens, Firenze, Italy

The overlap syndrome of obstructive sleep apnoea (OSA) and COPD, in addition to obesity hypoventilation syndrome, represents growing health concerns.
Patients who share both disorders have inspiratory flow limitation on the one hand (OSA), and expiratory flow limitation on the other hand (COPD). This coincidence of complicated breathing will compromise sleep more than in stand alone disorders, with an accumulation of health risks and complications

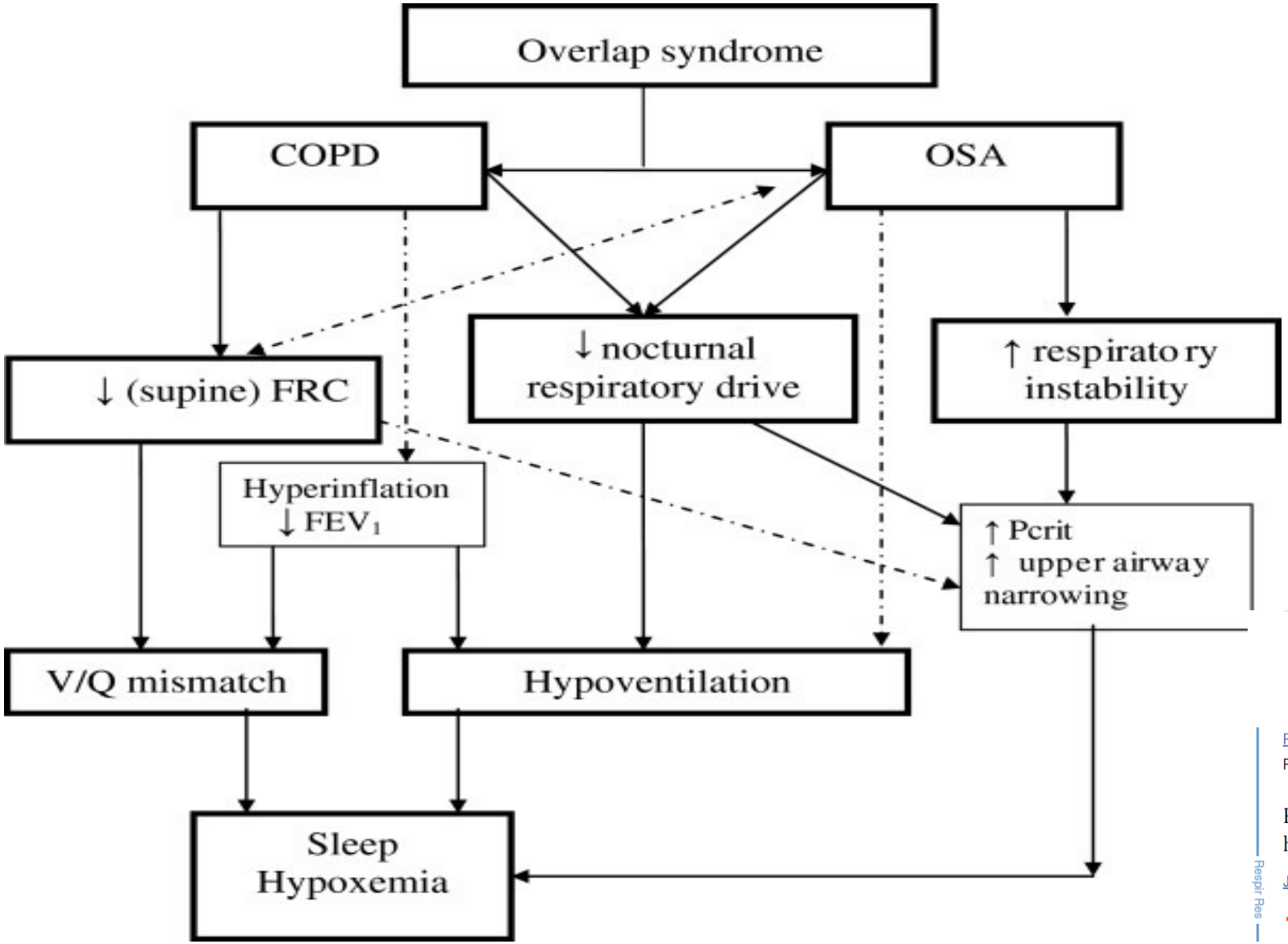
Respiratory Research BMC

Respir Res. 2013; 14(1): 132.
Published online 2013 Nov 20. doi: 10.1186/1465-9921-14-132
PMCID: PMC3871022
PMID: 24256627

Respiratory mechanics and ventilatory control in overlap syndrome and obesity hypoventilation

Johan Verbraecken[✉1] and Walter T McNicholas[2,3]

Mechanisms through which COPD and obstructive sleep apnoea interact during sleep



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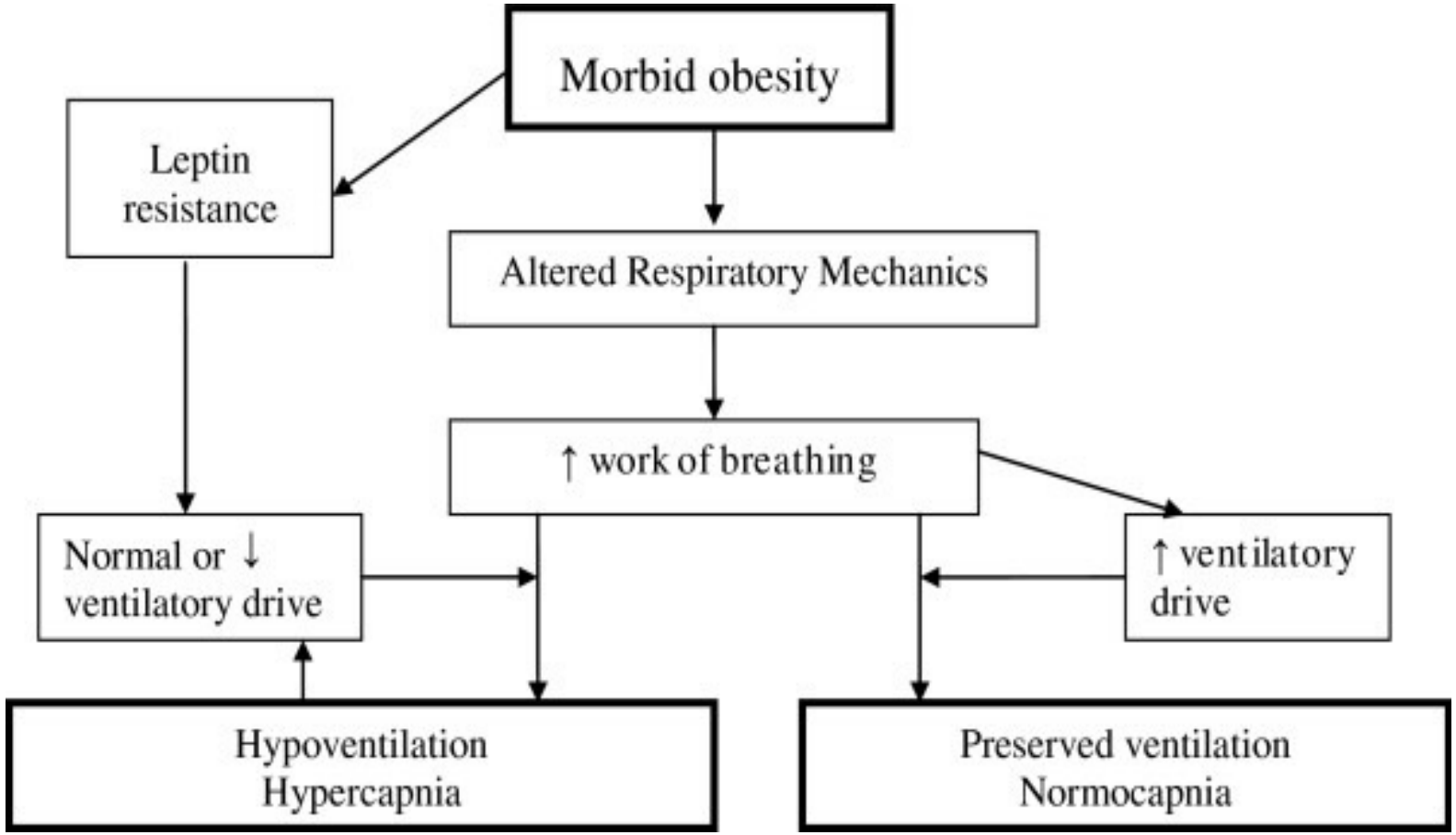
Respiratory mechanics and ventilatory control in overlap syndrome and obesity hypoventilation

Johan Verbraecken[✉1] and Walter T McNicholas[2,3]

Respir Res

Interactions between the cardinal components of obesity and hypoventilation



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Respiratory mechanics and ventilatory control in overlap syndrome and obesity hypoventilation

Johan Verbraecken[✉1] and Walter T McNicholas[2,3]

Sarcopenic Obesity in Chronic Obstructive Pulmonary Disease Patients

- Sarcopenia (depletion of muscle mass) can be associated with preserved fat mass that leads to a specific body composition state known as sarcopenic obesity. The COPD patients with sarcopenic obesity presente the lowest pulmonary function test parameters.
- Sarcopenia and obesity have independent effects in pulmonary function values, and theare are recommend that both of these elements be assessed in all COPD patients.
- Today, it is recommended to measure body mass index (BMI) and lean mass in patients with COPD using dual-energy X-ray absorptiometry, bioimpedance measurement, etc.

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ORGINAL ARTICLE

Sarcopenia and Sarcopenic Obesity in Chronic Obstructive Pulmonary Disease Patients with Different Levels of Severity

Katayoun Samadi[1]*, Shahram Kharabian[1], Atefeh Abedini[2], Foroogh Mohammadi[3], Azam Adeli[3], Niloofar Jafarigahraz[3], Babak Sharif Kashani[1]

Managing Malnutrition in COPD

Malnutrition

- Malnutrition can refer to under nutrition (being underweight or losing weight) or over nutrition (being overweight or obese).

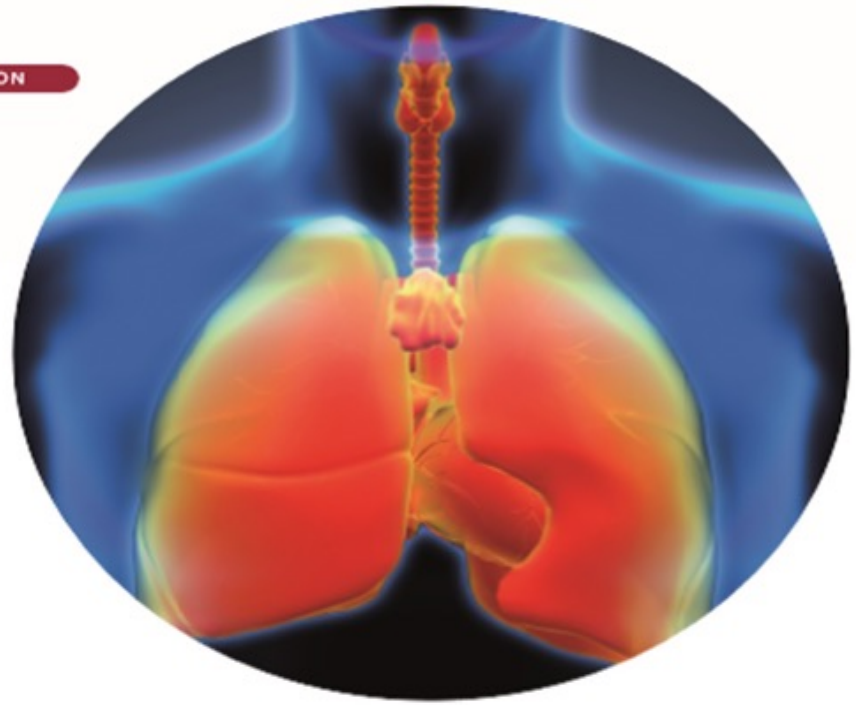
- Malnutrition is an imbalance of energy, protein and other nutrients that causes adverse effects on the body (shape, size and composition), the way in which it functions and clinical outcomes.

- Malnutrition is often associated with increased requirements for energy, protein, vitamins and minerals. It is also linked to a decreased nutritional intake and weight loss.

- Effectively managing malnutrition can bring about significant cost savings. Savings of at least £123,530 per 100,000 of the general population could be achieved by managing individuals at risk of malnutrition according to the National Institute for Health and Care Excellence (NICE) guidance.

- Malnutrition in this patient group to be a predictor of healthcare use, associated with significantly higher emergency hospitalisation and increased length of hospital admission, up to twice the usual duration.

2nd EDITION



Managing Malnutrition in COPD

Including a pathway for the appropriate use of ONS to support community healthcare professionals

www.malnutritionpathway.co.uk/copd/

2nd Edition: January 2020
1st Edition produced June 2016
(Document to be reviewed January 2023)

BERNICA
Building Educational and Research Capacities in Nutrition and Dietetics in Central Asia

Identification of Malnutrition - Nutritional Screening

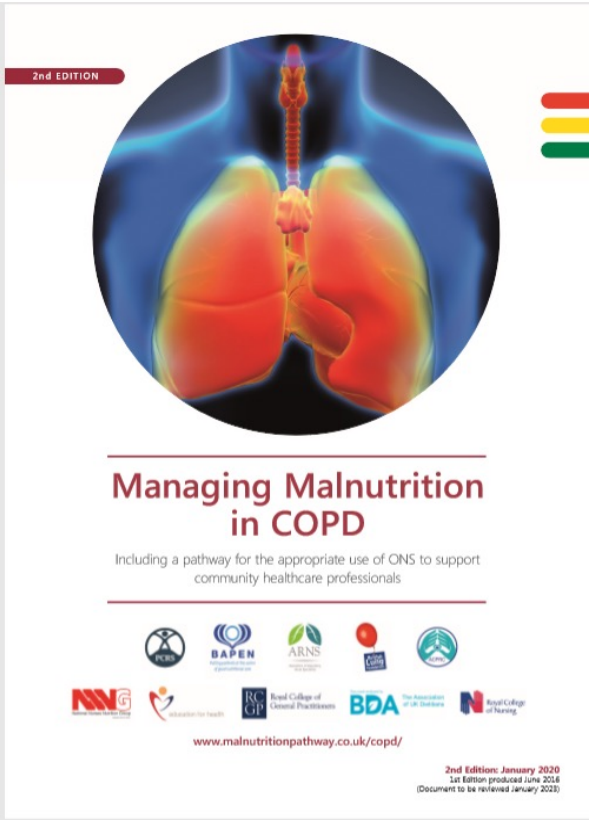
• Identifying and managing malnutrition (in the general population and in individuals with COPD) can improve nutritional status, clinical outcomes and reduce healthcare use

• Routine nutritional risk screening with a validated screening tool should be performed in all COPD patients across all settings

• NICE guidelines recommend BMI is calculated in all patients with COPD and that attention should be paid to unintentional weight loss particularly in older people

• Screening should take place on first contact with a patient and/or upon clinical concern e.g. recent exacerbation, change in social or psychological status. A review should take place at least annually and more frequently if risk of malnutrition is identified

• It should be noted that BMI alone will not identify all patients who are at risk of malnutrition as a high BMI can mask unintentional weight loss including loss of muscle mass (lean tissue)

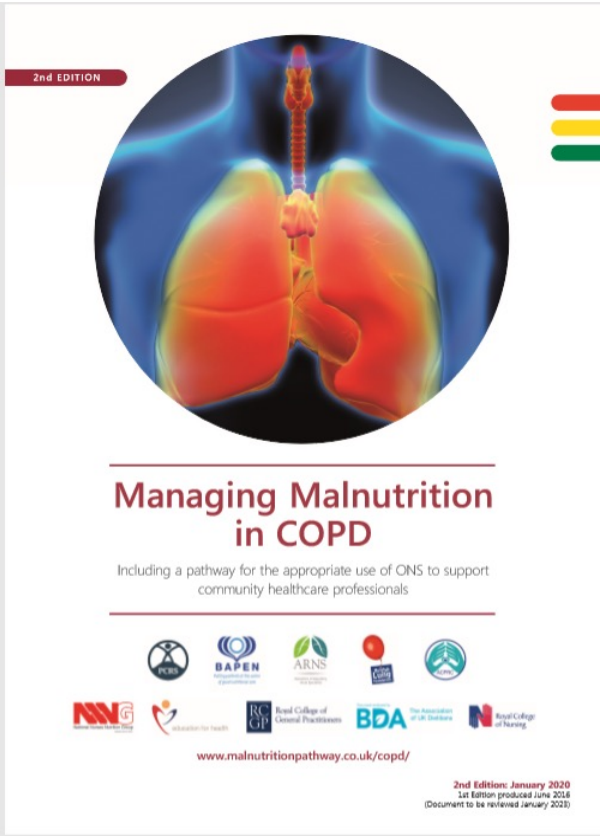


Identification of Malnutrition - Nutritional Screening

• **NICE NG115** recommends attention is paid to changes in weight in older people, particularly if the change is more than 3 kg - such weight changes should however be taken within the context of the individuals original weight as a 3 kg weight loss in a 100 kg individual and a 45 kg individual is very different. Weight change should also be considered in terms of % change from usual weight e.g. 10% unplanned weight loss over 6 months, and in the context of time e.g. rapid daily changes can reflect fluid balance.

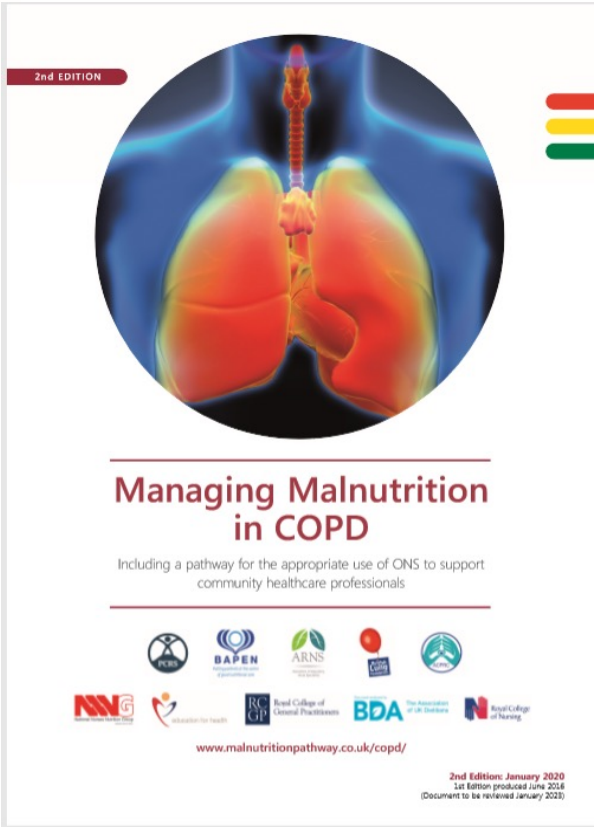
• **The Malnutrition Universal Screening Tool ('MUST')** is a simple 5 step screening tool that can be used across care settings to identify adults who are at risk of malnutrition (see www.bapen.org.uk/ pdfs/must/must_full.pdf). It combines assessment of BMI, recent unplanned weight loss and presence of acute illness:

- Unintentional weight loss of 5-10% over 3-6 months indicates risk of malnutrition irrespective of BMI.
- 'MUST' is a predictor for risk of death and readmission in patients with COPD.



Considerations

- Weight loss may be a sign of other conditions e.g. malignancy. Other conditions should therefore be considered and excluded before assuming the weight loss is COPD related. Nutritional advice can be instigated and should not be delayed whilst awaiting further investigations
- Care should be taken when interpreting BMI or percentage weight loss if oedema is present. Mid upper arm circumference (MUAC) can be used in the presence of severe oedema, or in the absence of weight measurement, to estimate BMI (MUAC of <23 cm often indicates a BMI <20 kg/m^2)[34] (see **www.bapen.org.uk/pdfs/must/must_explan.pdf**)
- Hand grip strength may be used as a surrogate marker for muscle strength[35]
- Depression and social isolation may be a problem in this group. Being housebound or having limited social activity can impact on ability to prepare and eat food



Identifying Malnutrition According to Risk Category Using 'MUST'* [33] - First Line Management Pathway

BMI score		Weight loss score Unplanned weight loss score in past 3-6 months		Acute disease effect score *(unlikely to apply outside hospital)*	
>20 kg/m²	Score 0	<5%	Score 0	If patient is acutely ill and there has been, or is likely to be, no nutritional intake for more than 5 days	Score 2
18.5 – 20 kg/m²	Score 1	5 – 10%	Score 1		
<18.5 kg/m²	Score 2	>10%	Score 2		

Total score 0-6

Low risk - score 0
Routine clinical care

- **Provide green leaflet:** 'Eating Well for your Lungs' to raise awareness of the importance of a healthy diet
- If BMI >30 (obese) treat according to local guidelines
- **Review / re-screen** annually.

Medium risk - score 1
Observe

- **Dietary advice** to maximise nutritional intake. Encourage small frequent meals and snacks, with high energy and protein food and fluids [43]
- **Provide yellow leaflet:** 'Improving Your Nutrition in COPD' to support dietary advice

NICE recommends [6] COPD patients with a BMI <20 kg/m² should be:
- prescribed oral nutritional supplements (ONS). See ONS pathway, page 9
- encouraged to exercise to augment the effects of nutritional supplementation

- **Review progress** after 1-3 months:
- if improving continue until 'low risk'
- if deteriorating, consider treating as 'high risk'.

High risk - score 2 or more
Treat**

- **Dietary advice** to maximise nutritional intake. Encourage small frequent meals and snacks, with high energy and protein food and fluids [43]
- **Provide red leaflet:** 'Nutrition Support in COPD' to support dietary advice
- **Prescribe oral nutritional supplements (ONS)** and monitor (see ONS pathway, page 9)
- **Review progress** according to ONS pathway, page 9
- On improvement, consider managing as 'medium risk'
- **Refer to dietitian** if no improvement or more specialist support is required.

** The 'Malnutrition Universal Screening Tool' ('MUST') is reproduced here with the kind permission of BAPEN (British Association for Parenteral and Enteral Nutrition). For more information and supporting materials see http://www.bapen.org.uk/musttoolkit.html*
*** Treat, unless detrimental or no benefit is expected from nutritional support e.g. imminent death.*

Consider factors contributing to malnutrition/poor nutritional intake and whether they can be treated or managed:
• Shortness of breath • Dry Mouth • Taste changes • Nausea • Early satiety • Poor appetite • Fatigue • Anorexia • Polypharmacy
See relevant patient and carer leaflets for advice: **www.malnutritionpathway.co.uk/copd**

The following indicators can be used collectively to estimate risk of malnutrition in the absence of height and weight (measured or recalled) [33]

- Thin or very thin in appearance, or loose fitting clothes/jewellery
- History of recent unplanned weight loss
- Changes in appetite, need for assistance with feeding or swallowing difficulties affecting ability to eat and drink
- A reduction in current dietary intake compared to 'normal'

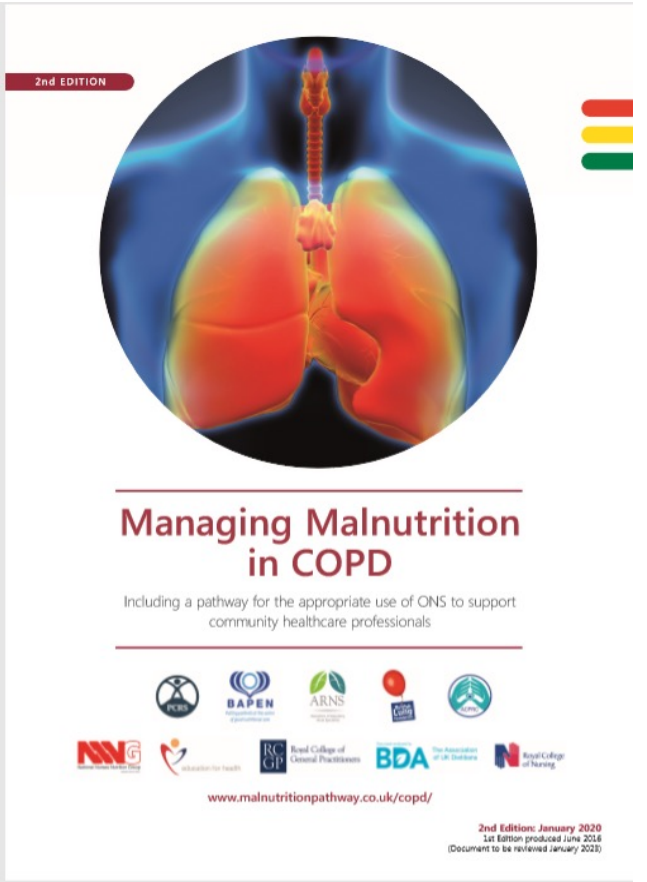
Estimated risk of malnutrition	Indicators
Unlikely to be at-risk (low)	Not thin, weight is stable or increasing, no unplanned weight loss, no reduction in appetite or intake
Possibly at-risk (medium)	Thin as a result of COPD or other condition, or unplanned weight loss in past 3-6 months, reduced appetite or ability to eat
Likely to be at risk (high)	Thin or very thin and/or significant unplanned weight loss in previous 3-6 months, reduced appetite or ability to eat and/or reduced dietary intake

For all individuals
- Discuss when to seek help e.g. ongoing weight loss, changes to body shape, strength or appetite
- Refer to other HCPs if additional support is required (e.g. dietitian, physiotherapist, GP)

BERNICA

- 'MUST' is a five- step nationally recognised and validated screening tool to identify **ADULTS** who are malnourished or at risk of malnutrition. It is the most commonly used screening tool in the UK and is suitable for use in hospitals, community and other care settings.

- This tool can be completed electronically using the on line 'MUST' calculator or manually as outlined below: http://www.bapen.org.uk/screening-and-must/must-calculator



Pathway for Using Oral Nutritional Supplements (ONS) in the Management of Malnutrition in COPD

Low BMI (<20 kg/m²) or at high risk ('MUST' score 2 or above) of malnutrition [6,32,60]

Record details of malnutrition risk (screening result/risk category, or clinical judgement)
Agree goals of intervention with individual/carer
Consider underlying symptoms and cause of malnutrition e.g. nausea, infections and treat if appropriate
Consider social requirements e.g. ability to collect prescription
Reinforce advice to optimise food intake*, confirm individual is able to eat and drink and consider any physical issues e.g. dysphagia, dentures

Prescribe:
Average 2 ONS per day [58-59] ** in addition to oral intake (or 1 'starter pack', then 60 of the preferred ONS per month)

12 week duration according to clinical condition/nutritional needs [1,32,58]

Patients may benefit from a **high protein, high energy, low volume ONS in addition to dietary advice** due to symptoms of COPD [43]

If following a pulmonary rehabilitation programme consider increased energy and protein requirements

Monitor compliance to ONS after 4 weeks
Amend type/flavour if necessary to maximise nutritional intake

Monitor progress and review goals after 12 weeks
Monitor thereafter every 3 months or sooner if clinical concern
Consider weight change, strength, physical appearance, appetite, ability to perform daily activities etc

Have nutritional goals been met?

NO

Goals not met/limited progress:
Check ONS compliance; amend prescription as necessary, e.g. suitability of flavours prescribed
If patient is non-compliant reassess clinical condition, refer to a Specialist Dietitian and/or assess the need for more intensive nutrition support e.g. tube feeding
Consider goals of intervention, ONS may be provided as support for individuals with deteriorating conditions
Review every 3-6 months or upon change in clinical condition [32]

YES

Goals met/good progress:
Encourage oral intake and dietary advice
Consider reducing to 1 ONS per day for 2 weeks before stopping
Maximise dietary intake, consider powdered nutritional supplements/self-purchase
Ensure patient has received dietary advice leaflet to support meeting nutritional needs using food
Monitor progress, consider treating as 'medium risk'

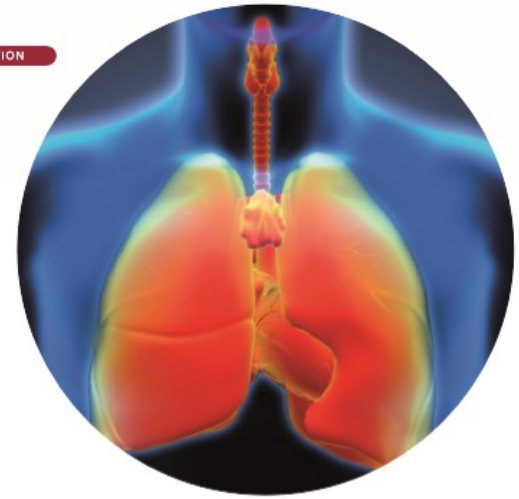
When to stop ONS prescription:
If goals of intervention have been met and individual is no longer at risk of malnutrition reinforce advice given on nourishing diet and the importance of avoiding unintentional weight loss
If individual is clinically stable/acute episode has abated
If individual is back to an eating and drinking pattern which is meeting nutritional needs [32]
If no further clinical input would be appropriate

ONS – oral nutritional supplements / sip feeds / nutrition drinks as per BNF section 9.4.2 [61]
** 'Your Guide to Making the Most of Your Food' is available from www.malnutritionpathway.co.uk*
For more detailed support or for patients with complex conditions seek advice from a Dietitian
*** Some individuals may require more than 3 ONS per day – seek dietetic advice*

***NOTE**: ONS requirement will vary depending on nutritional requirements, patient condition and ability to consume adequate nutrients, ONS dose and duration should be considered*

BERNICA
Building Educational and Research Capacities in Nutrition and Dietetics in Central Asia

2nd EDITION



Managing Malnutrition in COPD

Including a pathway for the appropriate use of ONS to support community healthcare professionals

www.malnutritionpathway.co.uk/copd/

2nd Edition: January 2020
1st Edition produced June 2016
(Document to be reviewed January 2023)

Optimising Nutritional Intake - An Evidence Based Approach to Managing Malnutrition

- NICE COPD guideline (NG115) recommends ONS are provided for individuals with COPD with a low BMI (<20 kg/m2).

- Dietary advice to optimise nutritional intake.

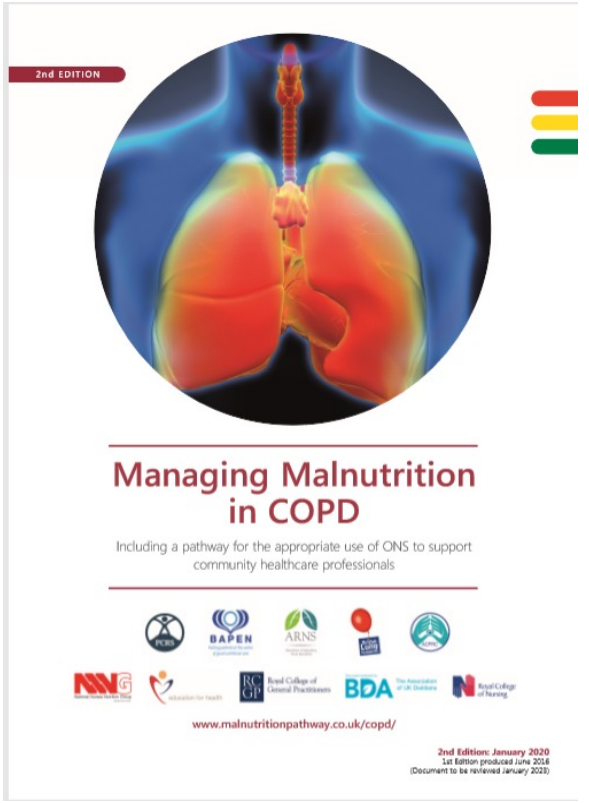
- Dietary advice in malnourished patients with COPD should be used with care to ensure that requirements for all essential nutrients i.e. energy, protein, vitamins and minerals, are met or given due consideration.

- Energy and protein requirements are likely to be higher or increased for patients who are:

  - at nutritional risk/moderately or severely malnourished;

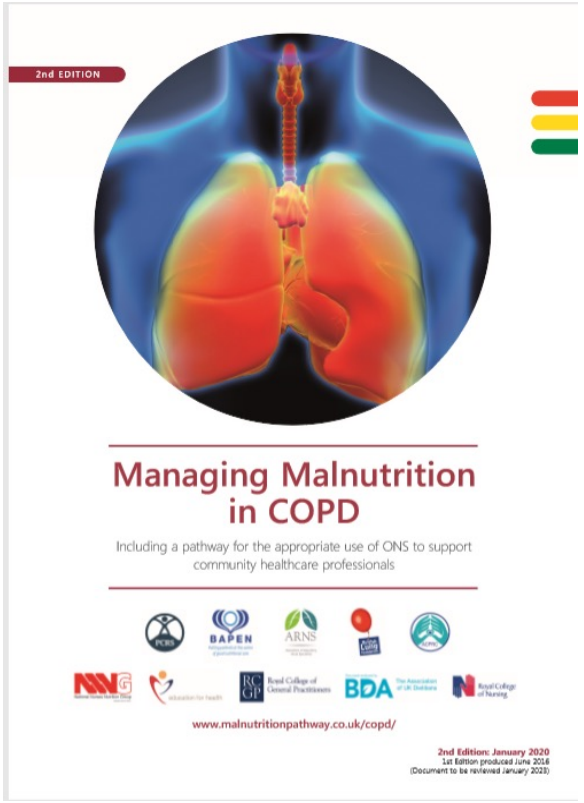
  - acutely unwell/have an infection;

  - exercising where accrual of muscle mass is the aim.



Optimising Nutritional Intake - An Evidence Based Approach to Managing Malnutrition

- The amount of protein recommended in those with COPD is estimated as follows:
  - 0.8-1.5 g protein/kg of body weight/day for non-malnourished/not at nutritional risk/stable COPD;
  - up to 1.5 g protein/kg of body weight/day in acutely unwell (exacerbating) patients where the aim is to meet requirements/attenuate further losses.
  - Where the goal is to gain or retain lean mass, in conjunction with exercise (e.g. pulmonary rehabilitation) and/or in malnourished outpatients where weight gain is the goal, it is possible up to 1.5 g protein/kg of body weight/day may be required (NB: in obese or overweight patients protein requirements should be calculated on ideal body weight).
  - In the absence of being able to translate the above requirements into amounts of protein required by an individual, patients should be encouraged to eat 3-4 portions of high protein foods per day - for further information/ideas on protein see www.malnutritionpathway.co.uk/proteinfoods.



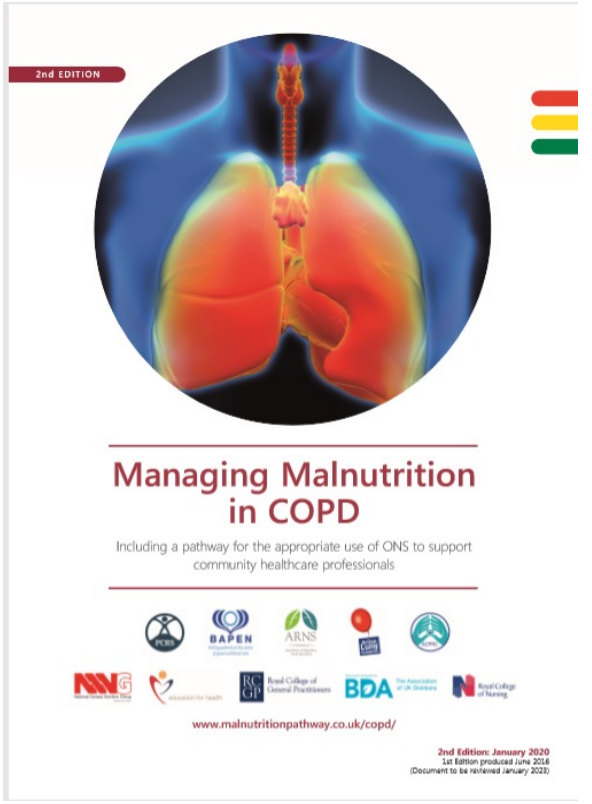
Optimising Nutritional Intake - An Evidence Based Approach to Managing Malnutrition

- Patients with COPD are at high risk of osteoporosis if they require frequent steroid therapy, are inactive and/or have little exposure to sunlight e.g. are housebound. Attention should be given to addressing requirements for Vitamin D and calcium including the need for supplementation.

- Dietary advice should be an integral part of COPD management across the continuum of care.

- Individuals with COPD may have concerns which affect the acceptability of dietary advice e.g. reservations about weight gain. Patient-centred discussions should be undertaken to discuss the potential benefit of nutritional interventions e.g. to maintain lung strength, overcome infection, improve ability to perform activities of daily living etc.

- Consideration should be given to the patient/carer's ability to act on the dietary advice given, with regular monitoring built into clinical reviews

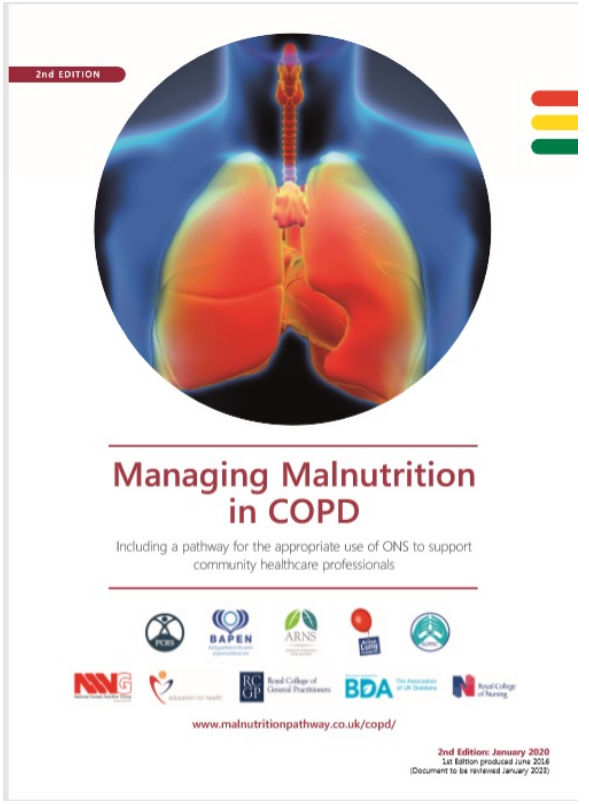


Oral nutritional supplements (ONS) to optimise nutritional intake

- Dietary advice forms an important component of the management pathway, and should be used alongside ONS where indicated, i.e. where BMI is low (<20 kg/m2) or in high risk individuals (unintentional weight loss >10% over 3-6 months).

- Evidence from systematic reviews show that ONS in addition to diet in COPD can:

- Significantly improve hand grip strength.
- Significantly improve respiratory muscle strength.
- Enhance exercise performance.
- Significantly improve patients' nutritional intake.
- Significantly improve weight.
- Improve quality of life.

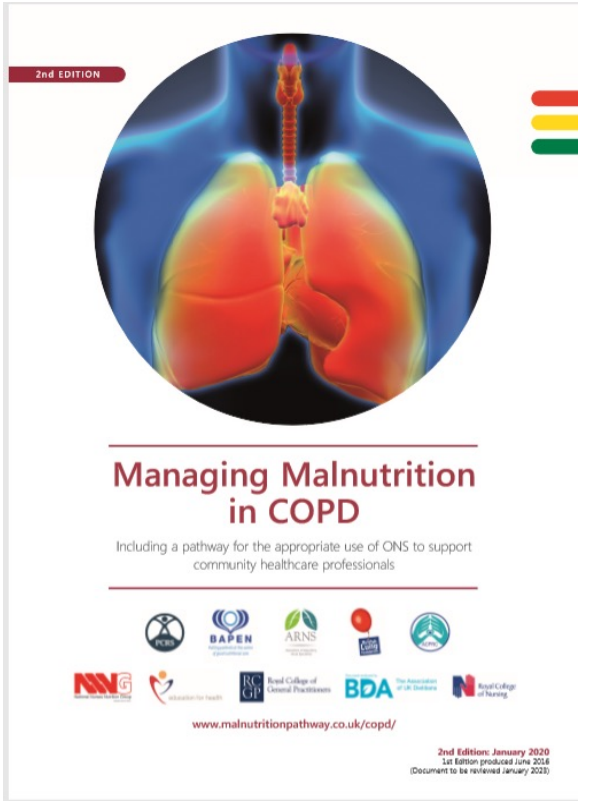


Oral nutritional supplements (ONS) to optimise nutritional intake

- ONS increase total nutrient intakes (energy, protein and micronutrients) without affecting dietary intake.

- Higher energy ONS (≥2 kcal/ml) or low volume, high energy ONS (125 ml) may aid complianceand be easier to manage for individuals with early satiety and/or breathlessness.

- Increased requirements for protein and other nutrients in COPD may be managed with a high protein, high energy, low volume ONS.

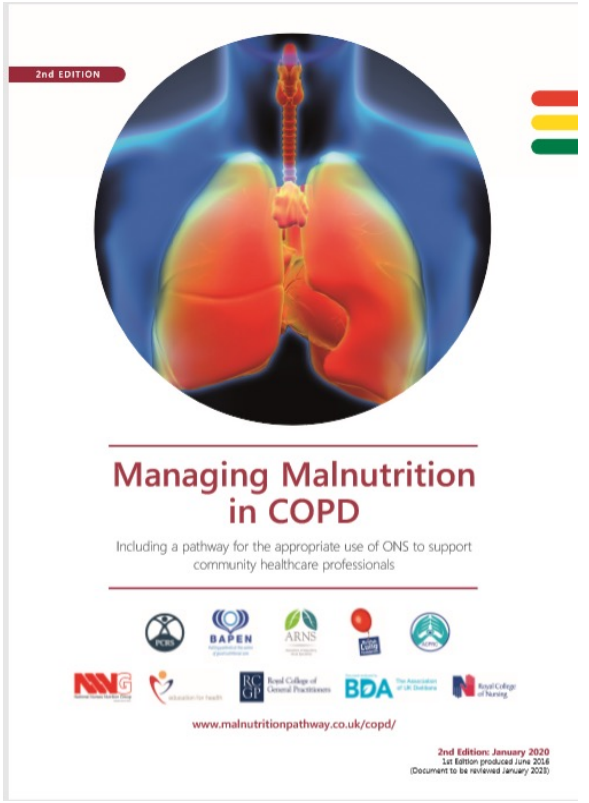


Oral nutritional supplements (ONS) to optimise nutritional intake

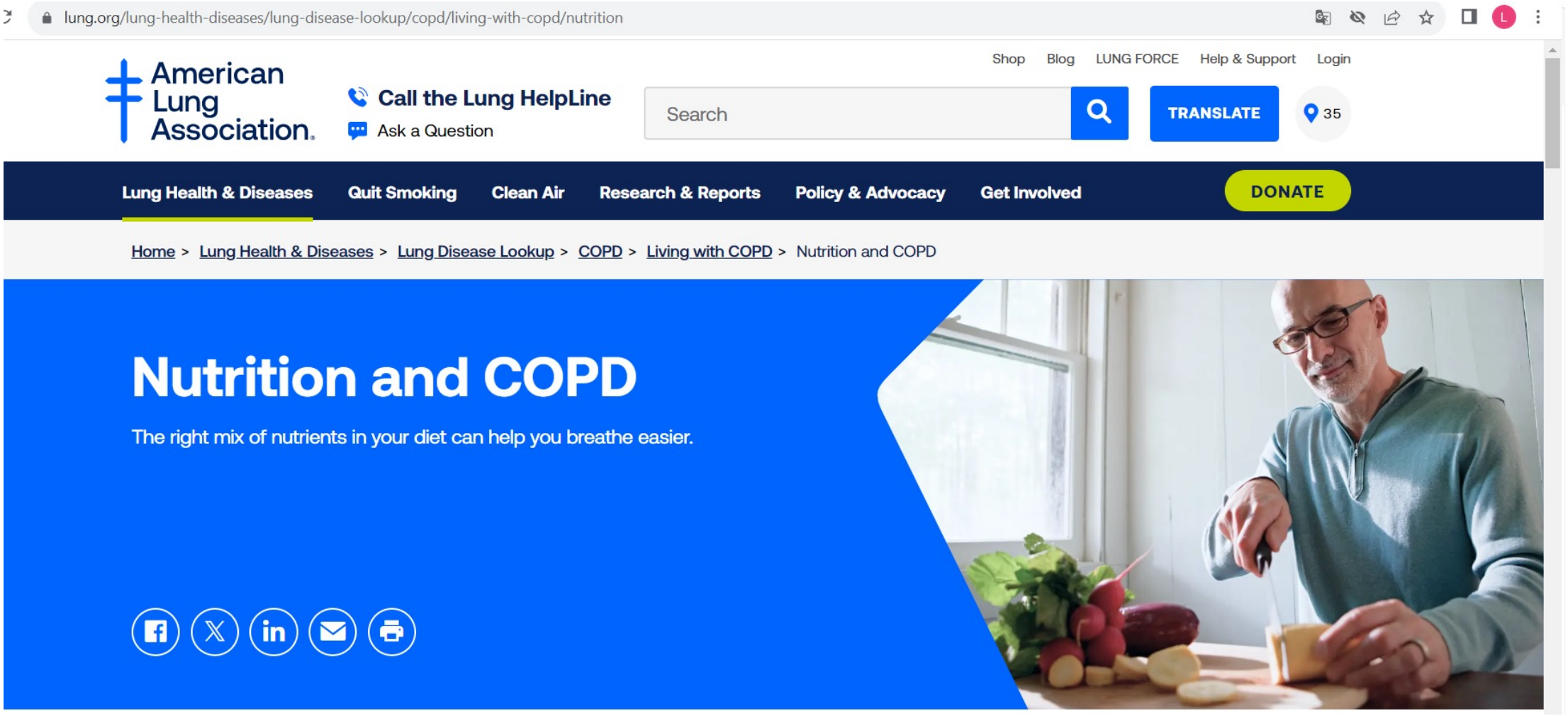
- Low volume, energy dense ONS to be taken in small, frequent doses e.g. between meals (frequent small amounts of ONS are preferred to avoid postprandial dyspnoea and satiety as well as to improve compliance).

- Clinical benefits of ONS are often seen with 300-900 kcal/day (average 2 bottles), typically within 2-3 months of supplementation.

- The exact choice of ONS should be based on a detailed nutritional assessment and patient preferences, and be in line with the recommendation to achieve an additional intake in the region of ~600 kcal/day.



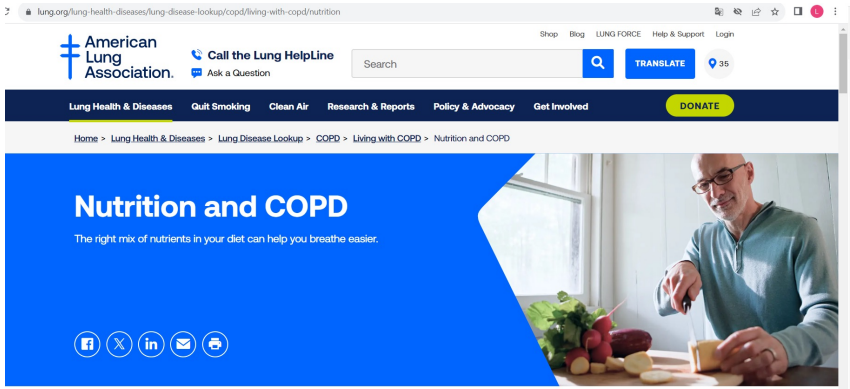
Nutritional Guidelines: recommendations for patients with COPD



How Does Food Relate to Breathing?

- The process of changing food to energy in the body is called **metabolism.** During metabolism, oxygen and food are changed into energy and carbon dioxide. Carbon dioxide is a waste product that you exhale. Breathing requires more energy for people living with COPD. Your muscles may require 10 times more calories than someone without COPD.

- The foods you eat provide your body with nutrients like carbohydrates, fats and proteins. Eating a diet with less carbohydrates and more fat may help you breathe easier. When your body metabolizes carbohydrates, it produces more carbon dioxide for the amount of oxygen used. When your body metabolizes fat, it produces the least.



Carbohydrates

- CHO produce the most CO2 during metabolism
- CHO should be 40% of intake
- Complex CHO best

When limited carbohydrate intake

- Follow a high-protein diet with moderate carbohydrates.
- Reduce carbohydrates consumed.
- Start by limiting these foods:
  - soda
  - sweet tea
  - candy
  - cake and desserts
  - starches
  - fruits
  - milk

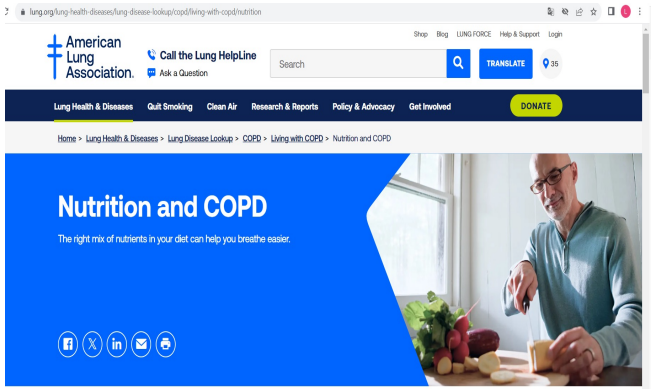
Nutritional Guidelines: Carbohydrates

- **Choose complex carbohydrates**, such as whole-grain bread and pasta, fresh fruits and vegetables.

- *To lose weight*: Choose fresh fruits and veggies over bread and pasta for the majority of your complex carbohydrates.

- *To gain weight:* Eat a variety of whole-grain carbohydrates and fresh fruits and vegetables.

- **Limit simple carbohydrates**, including table sugar, candy, cake and regular soft drinks.

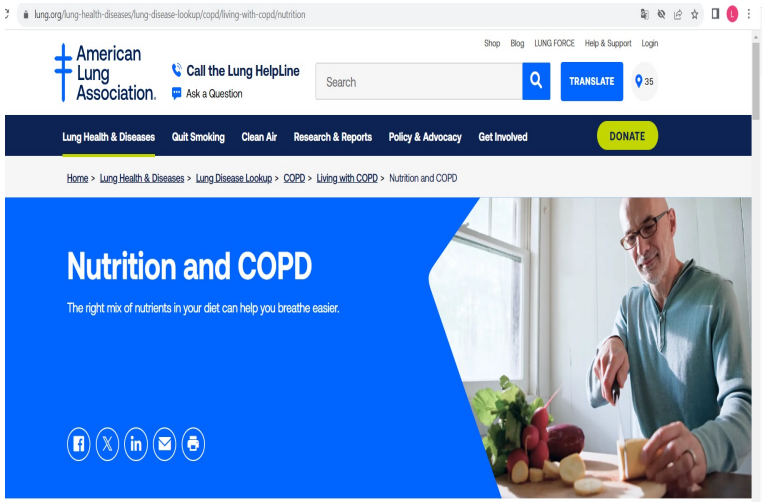


Fats and proteins

- Need at least 30% of calories from fat, whole dairy encouraged.
- Need 30% from protein when in malnutrition.

Nutritional Guidelines: Fiber

- **Eat 20 to 30 grams of fiber each day**, from items such as bread, pasta, nuts, seeds, fruits and vegetables.

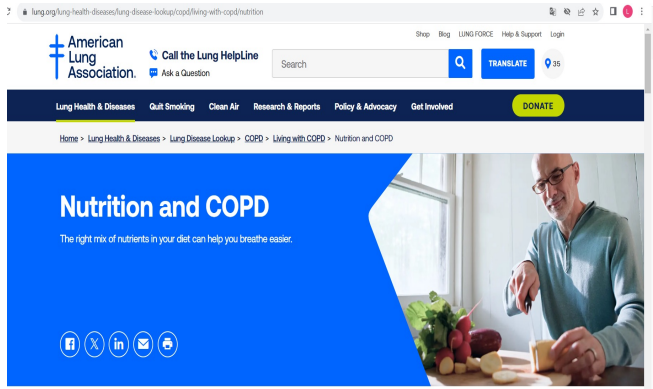


Nutritional Guidelines: Protein

- **Eat a good source of protein** at least twice a day to help maintain strong respiratory muscles. Good choices include milk, eggs, cheese, meat, fish, poultry, nuts and dried beans or peas.

- *To lose weight*: Choose low-fat sources of protein such as lean meats and low-fat dairy products.

- *To gain weight*: Choose protein with a higher fat content, such as whole milk, whole milk cheese and yogurt.



Increase Protein Intake

- Protein needs increased up to 1.2-1.7 grams/kg/day.

- To calculate how much protein is needed:

  - Take the weight of the patient and divide by 2.2

  - Take that number and multiply it by 1.2 and 1.7

  - This will give you the range of protein needed

  - Example: 150 pounds divided by 2.2 = 68

    68 x 1.2 = 82

    68 x 1.7 = 116

  Protein needs are 81-116 g/day

How to meet protein needs

1 egg	6 g protein
1 ounce (oz) nuts	2-4 g protein
6 oz yogurt	6 g protein
½ cup (C) cottage cheese	14 g protein
3 oz canned tuna	25 g protein
6 oz steak	42 g protein
4 oz hamburger	28 g protein
3 oz chicken breast	26 g protein

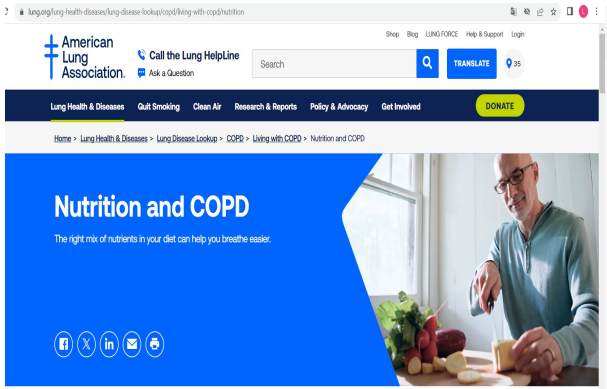
Nutritional Guidelines: Fats

- **Choose mono- and poly-unsaturated fats**, which do not contain cholesterol. These are fats that are often liquid at room temperature and come from plant sources, such as canola, safflower and corn oils.

- *To lose weight*: Limit your intake of these fats.

- *To gain weight*: Add these types of fats to your meals.

- **Limit foods that contain trans fats and saturated fat.** For example, butter, lard, fat and skin from meat, hydrogenated vegetable oils, shortening, fried foods, cookies, crackers and pastries.



Increase Dietary Fats

- Increase calories to compensate for reduced carbohydrates by increasing dietary fats.

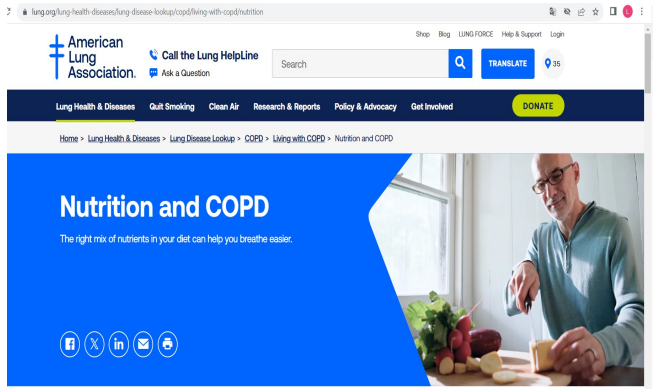
- Increase your intake of omega-3 fatty acids:
  - salmon
  - haddock
  - mackerel
  - tuna
  - flaxseed
  - omega-3 fatty acid eggs

Get enough Vitamins and Minerals

- Increased need for vitamin A.
- Increased need for vitamin C:
  - ***Smokers need double the dose of vitamin C.***
- Get adequate calcium, magnesium, and phosphorus.
- Increased need for vitamin D and vitamin K if reduced bone minerals.
- A multivitamin with minerals is appropriate.

Nutritional Guidelines: Vitamins and Minerals

- Many people find taking a general-purpose multivitamin helpful.
- Often, people with COPD take steroids. Long-term use of steroids may increase your need for calcium.
- Consider taking calcium supplements. Look for one that includes vitamin D.
- Calcium carbonate or calcium citrate are good sources of calcium.



Reduce Gas-Forming Foods

- Gas-forming foods can cause bloating and displacement of the diaphragm.

- If this occurs, avoid the following:
  - Broccoli
  - Cabbage
  - Onions
  - Leeks
  - Asparagus
  - Carbonated beverages
  - Dried beans and peas

Limit Salt Intake

- Reduce sodium (or salt) consumed by limiting these foods:

  - canned foods;

  - snack foods, such as chips, pretzels, crackers, and popcorn;

  - packaged starchy foods, such as stuffing and rice mixes;

  - cured/luncheon meats and cheeses;

  - condiments, such as ketchup, barbecue sauce, and soy sauce;

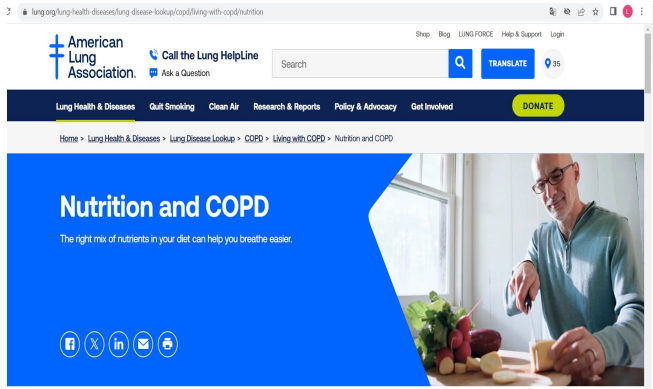
  - salt and seasoning with the world “salt” in it.

Flavor Foods Without Salt

- Here are some ways to season food without salt:
- For a tart flavor, add lemon juice, lime juice, or vinegar
- For a hot flavor, add peppers or 1-2 drops of hot sauce
- Add onions or season with herbs and spices, such as garlic and salt-free seasonings, including Mrs. Dash (come in more than 15 varieties)

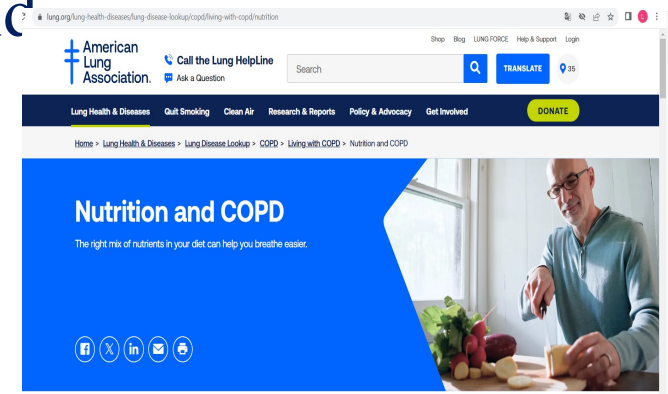
Nutritional Guidelines: Sodium

- Too much sodium may cause edema (swelling) that may increase blood pressure.
- If edema or high blood pressure are health problems for you, talk with your doctor about how much sodium you should be eating each day.
- Ask your RDN about the use of spices and herbs in seasoning your food and other ways you can decrease your sodium intake.



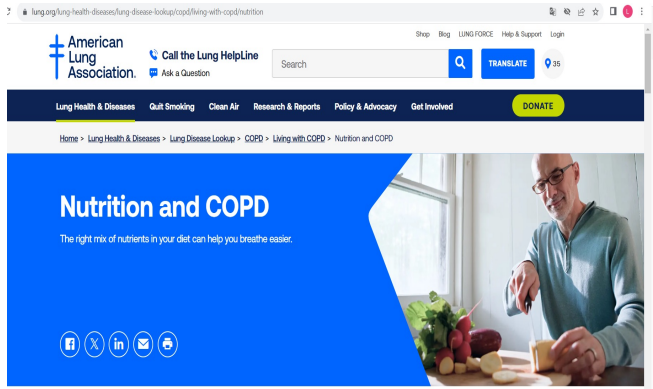
Nutritional Guidelines: Fluids

- Drinking plenty of water is important not only to keep you hydrated, but also to help keep mucus thin for easier removal.
- A good goal for many people is 6 to 8 glasses (8 fluid ounces each) daily.
- Don't try to drink this much fluid at once; spread it out over the entire day.
- Some people find it helpful to fill a water pitcher every morning with all the water they are supposed to drink in one day. They then refill their glass from that pitcher and keep track of their progress during the course of the day.
- Remember, any healthy caffeine-free fluid counts toward your fluid goal, and most foods contribute a substantial amount of fluid as well.



Nutritional Guidelines: using medical nutrition products

- You may find it difficult to meet your nutritional needs with regular foods, especially if you need a lot of calories every day. Also, if your RDN has suggested that you get more of your calories from fat—the polyunsaturated, monounsaturated, and low-cholesterol variety—you may not be able to meet this goal easily with ordinary foods. Your RDN or doctor may suggest you drink a liquid called a medical nutritional product (supplement). Some of these products can be used as a complete diet by people who can't eat ordinary foods, or they can be added to regular meals by people who can't eat enough food.
- ***Read more on our Each Breath Blog about*** *COPD and Nutrition: Managing Difficulties with Weight Gain*



Tips for Comfortable Eating

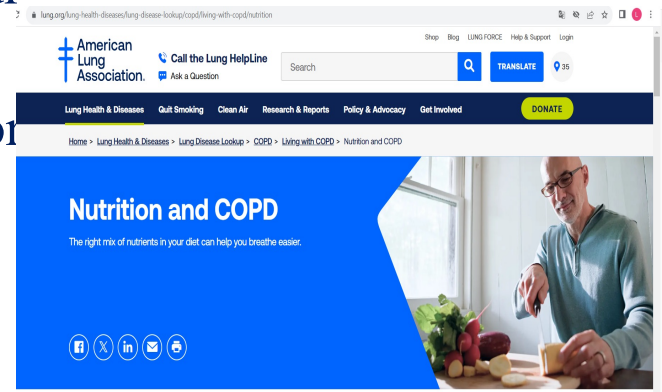
- Avoid overfeeding
- Have frequent, small meals
- Choose nutrient-dense foods
- Rest before meals
- Eat slowly
- Wear oxygen during meals
- Eat soft, easy-to-chew foods
- Remain upright for 1 hour after meals
- Drink beverages between meals
- Eat main meal with your family or others
- Try to avoid constipation and straining to pass hard stools
- Increase fiber
- Increase antioxidants
- Try milk shakes
- Reduce caffeinated beverages
- Eat chicken soup to clear respiratory tract

To Help with Proper Nutrition

- Prepare meals early
- Rest and medicate before eating
- Oral care before meal
- Stimulate the appetite
- Liquefy foods to reduce chewing
- Eat small, frequent meals
- Adequate water intake daily

If you find yourself short of breath while eating or right after your meals, try these tips:

- Rest just before eating.
- Eat slowly, take smaller bites of food.
- Sit upright while eating.
- Take a break in between bites and practice deep breathing exercises.
- Eat more food early in the morning if you're usually too tired to eat later in the day.
- Avoid foods that cause gas or bloating. They tend to make breathing more difficult.
- Eat 4 to 6 small meals a day. This enables your diaphragm to move freely and lets your lungs fill with air and empty out more easily.
- If drinking liquids with meals makes you feel too full to eat, limit liquids with meals or drink after meals.
- Consider adding a nutritional supplement at nighttime to avoid feeling full during the day.



What to discuss between the doctor/nutritionist and the patient

- Regular review of lab results.
- Need for a nutritional supplement.
- If oral intake is not meeting needs, other options, such as a tube feeding.

THANK YOU FOR YOUR ATTENTION!