

CYSTIC FIBROSIS

MEDICAL STAFF INFORMATION SHEET

What is it?

- The commonest autosomal recessive inherited lethal condition in caucasian populations
- Reduced expression of functional cystic fibrosis transmembrane regulator (CFTR) gene results in abnormal anion transport in those tissues that express the CFTR protein
- Reduced or absent CFTR protein expression results in the clinical characteristics that typify Cystic Fibrosis (CF)

Affected organs:

- (1) **Lungs** – the organ that is generally most severely affected in CF
 - **progressive lung disease is the cause of death in the vast majority of cases**
 - abnormally dehydrated respiratory secretions result in impaired mucociliary transport and retained secretions
 - retained secretions create a haven for bacterial superinfection, resulting in colonisation by a limited spectrum of respiratory pathogens, initially *Haemophilus* and *Staphylococcus aureus*, and eventually *Pseudomonas aeruginosa* and sometimes other organisms (e.g. *burkholderia cepacia*)
 - chronic pulmonary infection results in progressive decline in respiratory function that is often relentless and fatal
 - **treatment must focus upon preserving lung function** by reducing pulmonary bacterial load (e.g. by regular nebulised antibiotics, intermittent IV antibiotic administration), improving clearance of respiratory secretions (chest physiotherapy, nebulised Dnase) and potentially by reducing the excessive pulmonary inflammatory response within the lung.
- (2) **Pancreas (exocrine)** - dehydrated and overly acidic pancreatic secretions are unable to adequately drain through the pancreatic ducts due to duct obstruction by viscid secretions
 - secretions are retained within the pancreatic ducts where they result in pancreatic autolysis, with the vast majority of CF subjects pancreatic insufficient at birth or shortly after
 - this results in maldigestion and malabsorption of foods, vitamins (particularly fat-soluble) and minerals, and malnutrition often results
 - therapy is directed at exogenous pancreatic enzyme replacement with meals, and ensuring adequate nutrition by replacement of vitamins, minerals, and supplementation with additional calories
 - **adequate nutrition is central to CF care, and along with lung disease is linked to survival**
- (3) **Pancreas (endocrine)** –endocrine insufficiency is less common than exocrine insufficiency and results in CF-related diabetes mellitus (CFRD) in up to 25% of adult CF subjects
 - always consider CFRD in a patient who is losing weight or having repeated pulmonary exacerbations

- (4) **Liver/ gall bladder** – cystic fibrosis related liver disease (CFLD) represents a form of biliary cirrhosis due to obstruction of small biliary ducts by inspissated secretions, with resultant fibrosis
 - minor CFLD is probably very common (and often unrecognised) in CF, however severe CFLD is said to present almost exclusively in childhood and not beyond 18 years
 - cholelithiasis is also relatively common in CF subjects

 - (5) **Male infertility** – very common (approaching 100%), due primarily to bilateral absence of the vas deferens
 - sperm extraction and intracytoplasmic sperm injection is an option for selected CF subjects wanting children

 - (6) **Female infertility** – a common, although not universal problem in CF females that relates to viscous cervical secretions that impede sperm transport
 - contraception is still necessary for sexually active CF females

 - (7) **Sinus disease** – inspissated secretions within the sinuses result in chronic sinusitis in a large number of CF subjects, and many have hypoplastic sinuses
 - nasal polyposis is also common, although probably represents a propensity to atopy in CF subjects rather than being directly related to sinus disease

 - (8) **Other complications of CF:**
 - (a) **Osteoporosis** – very common complication in CF adults (affecting up to 50%)
 - results from a combination of excessive inflammation, poor nutrition, malabsorption of vitamins especially D and K, and reduced weight bearing exercise
 - (b) **Allergic bronchopulmonary aspergillosis (ABPA)** – more common in the CF population, probably as a result of an atopic diathesis (due to chronic pulmonary inflammation)
 - may be difficult to diagnose in CF subjects!
 - (c) **CF related arthropathy** – an inflammatory arthropathy that probably results from excessive dysregulated systemic inflammation
 - tends to exacerbate during periods of excessive inflammatory stimulus (e.g. infective exacerbations)
 - (d) **Pulmonary non-tuberculous mycobacterial disease** – much more common in CF subjects than the general population
 - difficult to diagnose and treat
 - (e) **Social impact** – CF has a massive psychosocial impact upon both subjects affected by CF and their families
 - there are few (even chronic) diseases that compare to CF in terms of this impact
 - Many of our patients are also dealing with adolescent issues that are extremely difficult in any event
 - An appreciation of this impact is essential to effectively managing young adults with CF
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Management of complications of CF

- **General principles:**

(1) An appreciation of the social circumstances of young CF adults is vital (including compliance issues, whether an additional therapy is “achievable” within the framework of lifestyle, etc, etc)

(2) CF patients have generally had multiple admissions to hospital, been reviewed by countless doctors and often had several unpleasant experiences – they like to maintain “control” of their disease by controlling how they are managed

- it is vital that you listen carefully to what they have to say about their disease and how they wish to be cared for

(3) Maintenance management of CF adults who are otherwise “well” must incorporate an assessment of pulmonary function that considers whether a gradual (otherwise asymptomatic) decline in lung function can be better controlled. Progressive respiratory failure is the cause of death in the vast majority of CF subjects, and CF patients are very adept at gradually accommodating to this.

(4) CF patients should be isolated from each other as much as is practically (and compassionately) possible due to the risk of cross-contamination. Subjects with different colonising organisms (*Staphylococcus aureus* vs. *Pseudomonas aeruginosa* vs. *Burkholderia cepacia*) MUST NOT be managed together

- **Specific complications**

1. Infective exacerbations – intravenous antibiotic therapy for 10 – 14 days reduces the pulmonary bacterial load, improves symptoms and lung function
 - an infective exacerbation is diagnosed on the basis of symptoms (of increased sputum production or purulence, SOB, etc), decline in lung function (FEV₁ decline of 10% or greater usually) and/ or weight loss, with or without systemic/ constitutional features
 - patients who feel that they require IV antibiotic therapy should not be denied this
2. Osteoporosis – quarterly IV pamidronate (30 mgs) with prednisone cover (2 doses)
3. CFLD – ursodeoxycholic acid
4. CFRD – insulin therapy; ??repaglinide
5. Malnutrition/ maldigestion – ensure pancreatic enzyme supplementation is adequate, enhance nutrition by increasing calories (oral supplements, NG feeding, or PEG/ gastrostomy feeding)
Adequacy of nutrition indicated by BMI (<20 commence supps, <18 either NG or gastrostomy feeds)
6. Vitamin deficiency – replace
7. Sinus disease – intranasal steroids; in selected cases sinus surgery may be beneficial

- **Maintenance therapy for lung disease:**

1. Nebulised antipseudomonal antibiotics – consider for any patient with chronic colonisation by *Pseudomonas aeruginosa*
2. Dnase therapy – one month trial of therapy should be considered in all subjects

?“Take-home” messages

1. Survival is linked to pulmonary disease and nutrition – must attempt to maintain lung function and nutrition at highest possible levels even when symptomatically well
2. Delaying or preventing chronic colonisation by *Pseudomonas aeruginosa* and other organisms is likely to improve prognosis – therefore ensure segregation of patients on the basis of colonising organisms, and aggressively manage new organisms
3. The psychosocial impact of CF is considerable and must be considered in all dealings with CF subjects.