Case Presentation

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CASE

- ✓ **First admission:** October 2010
- ✓ **HG, 42 yr, Male**
- ✓ **Complaints:** Persistent cough and dyspnea
- ✓ **History:** Symptoms persisting for about 5 months
- ✓ **Past medical and family history:** No known medical conditions or family history of lung disease

CASE

- ✓ **Occupation:** Teacher
- ✓ **Smoking status:** Non-smoker
- ✓ **Hobbies:** No hobbies
- ✓ **Current medications:** No medication

Physical Examination

- ✓ Good apperence, cooperated, and oriented
- ✓ SpO2: 96% (room air), Pulse rate: 86/min
- ✓ Chest oscultation: **Bilateral posterior lower zone rales**
- ✓ Clubbing (-), Pretibial edema (-/-)
- ✓ Other system examinations were normal



Chest X-ray



LABORATORY

- **Hemogram**: Normal

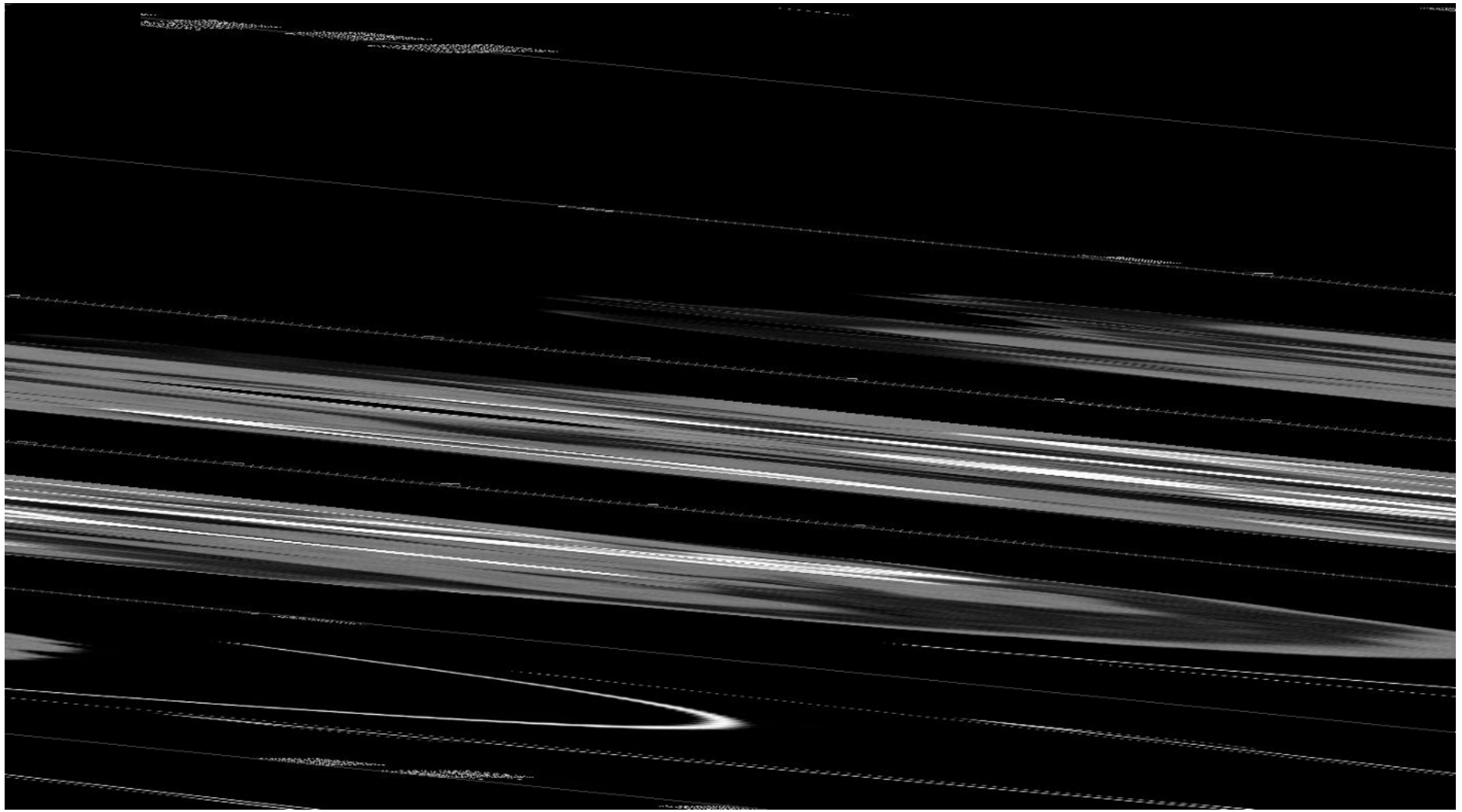
- **Sedimentation:** 10 mm/hr

- **ALT: 66** (N: 5-50), **AST: 42** (N: 0-35), **ALP: 163** (N: 25-130)

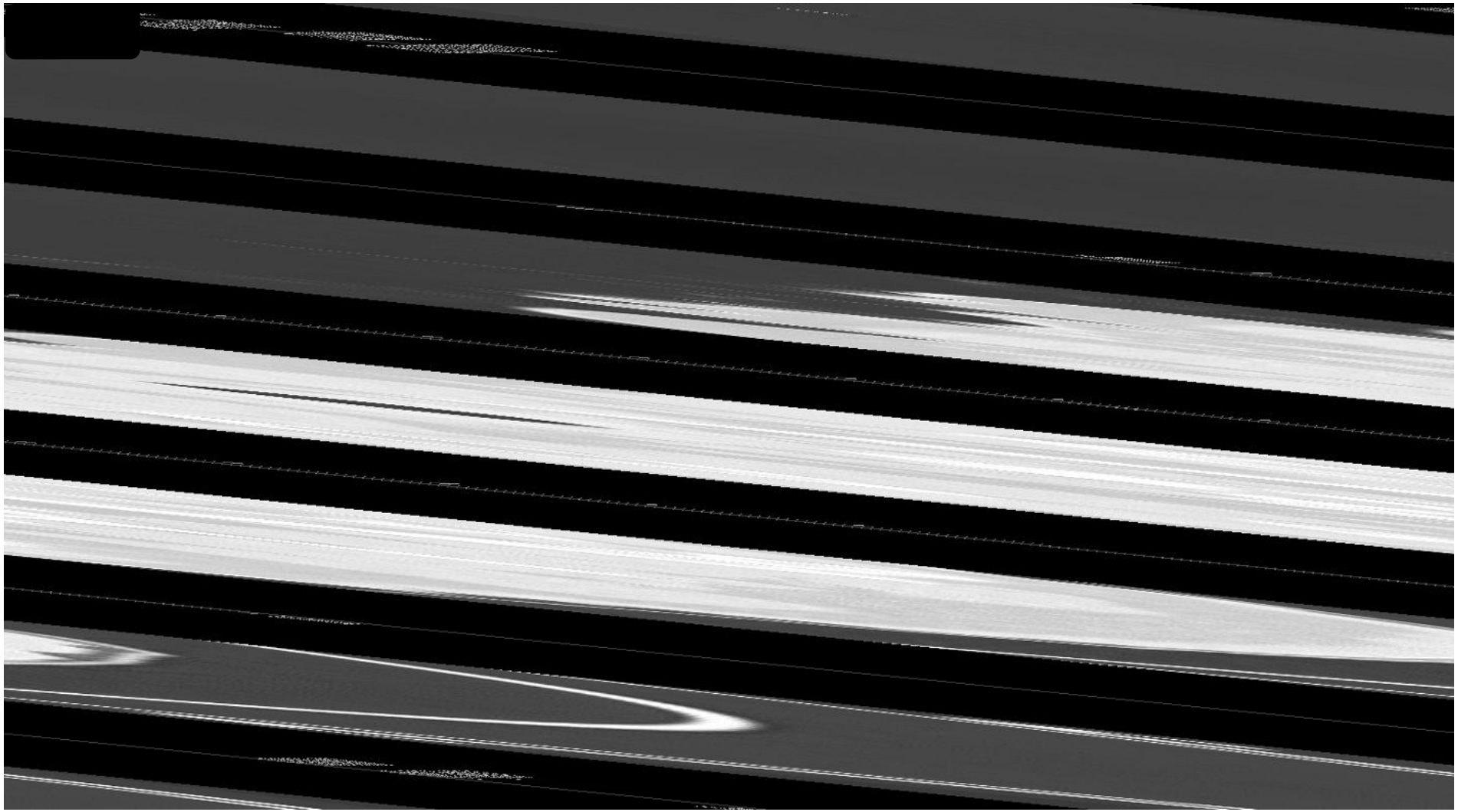
GGT: 120 (N: 5-50) others normal



CHEST CT



CHEST CT



Pulmonary Function Test / 6 MWT / ECG

	FVC (L/%)	FEV1 (L/%)	FEV1/FVC (%)	DLCO ml/min/mmHg (%)
October 2010	**2.9 (76%)**	2.4 (77%)	83%	**21 (72%)**

6 minute walk test: 480 meter
Initial sat: 98% End sat: 96%
Initial BORG: 2, Initial BORG: 4

ECG: Normal

LABORATORY

- **ACE level: 188 IU/mL** (N: 8-52)
- **PPD:** Negative
- **Abdominal USG:** Normal



CP-EBUS

- Bilateral hilar (25 mm), subcarinal (16 mm), and right lower paratracheal (10 mm) LAP were detected

- **Bilateral hilar LAP** was sampled 3 times, **subcarinal LAP** was sampled once



Histopathological Findings

Right/Left Hilar and Subcarinal Needle Aspiration Smear + Cell Block

- Abundant lymphocytes present
- Chronic non-necrotizing granulomatous inflammation observed
- Findings are consistent with **sarcoidosis**

Follow-up

- Budesonide/Formoterol Fumarate therapy initiated

- At the 6th month, an increase in the patient's complaints of dyspnea and cough observed

- PFT: FVC: 2.61(**66%**) FEV1: 2.08(65%) FEV1/FVC: 79% DLCO: 6.17 (**60%**)
  - Initial PFT; FVC:2.9 (**76%**) DLCO: 21 (**72%**)

Chest X-ray



Follow-up

- After clinical-radiological and functional evaluation;
  - 32 mg prednisolone therapy was initiated due to disease progression
  - continued with a gradual reduction to 4 mg

- In the first year of treatment, neurology consultation was sought due to weakness in the legs
  - EMG normal

- Whole body bone densitometry (DEXA)
  - Z-score: -2.2 (osteopenia)

- Steroid therapy discontinued

Follow-up

- After 3 years of medication-free follow-up, ocular involvement of sarcoidosis was observed (June 2015)
  - oral steroid therapy was initiated
  - continued for approximately 9 months until it was discontinued due to cataract formation
  - cataract surgery was performed in March 2016

- Nephrolithiasis (October 2017)
  - Creatinine, BUN, GFR, and 24-hour urine calcium normal
  - Ca: 10.7 mg/dl (N: 8-10.6)
  - Increased fluid intake recommended, advised to reduce dairy products

Follow-up

- Intermittent increase in heart rate (noticeable by the patient) – January 2022

- PFT: FVC: 2.81(79%) FEV1: 2.19(76%) FEV1/FVC: 77% DLCO: **12.03 (48%)**

- proBNP: **188 pg/mL** (N: 0-125), Troponin T: **20 ng/L** (N: <14 ng/L)
- ACE level: **99 U/L** (N: 13.3-63.9)

- ECG: Sinus rhythm, Pulse rate: 85/min
- Echocardiogram: Normal left ventricular dimensions and wall motions, EF: 65%, sPAP: 20 mmHg, TAPSE: 1.7

- Rhythm Holter: Normal

Cardiac MR

- Normal right and left ventricular volumes
- EF normal

- **Suspicion of mild active myocardial edema suggestive of cardiac sarcoidosis**

- No fibrosis observed

- Images are suboptimal; correlation with **PET CT findings and multidisciplinary evaluation are recommended**

PET/CT

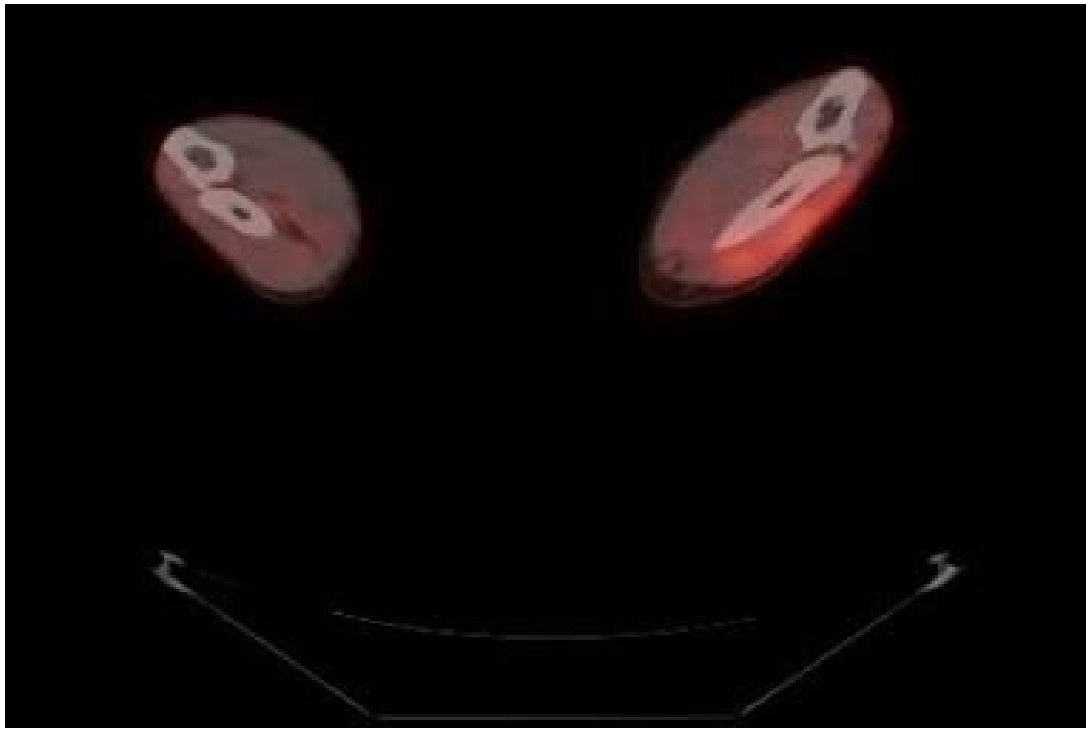
- In the heart, there is increased FDG uptake in the **mid to basal segments of the anterior wall** and the **basal segment of the lateral wall of the left ventricle**

- Multiple lymph nodes with FDG uptake, the largest measuring 21 mm in diameter (SUVmax: 4.8)

Conclusion:

- The increased FDG uptake observed **in the heart is consistent with sarcoid involvement**

- The hypermetabolic lymph nodes in the mediastinum are also consistent with sarcoidosis



Follow-up

- Due to cardiac sarcoidosis;
  - Prednol 32 mg once daily was planned for a 3-month treatment course (with the dose tapered by 8 mg monthly)

- At the 3-month follow-up;
  - Clinically, the patient feels better
  - Previously experienced arrhythmias have resolved, and heartbeats are now regular
  - ACE level: 22
  - proBNP: 97 pg/mL (N: 0-125), Troponin: 8 ng/L (N: <14 ng/L)

- Renal USG
  - Calculi present in the right and left, largest measuring 4 mm

Follow-up

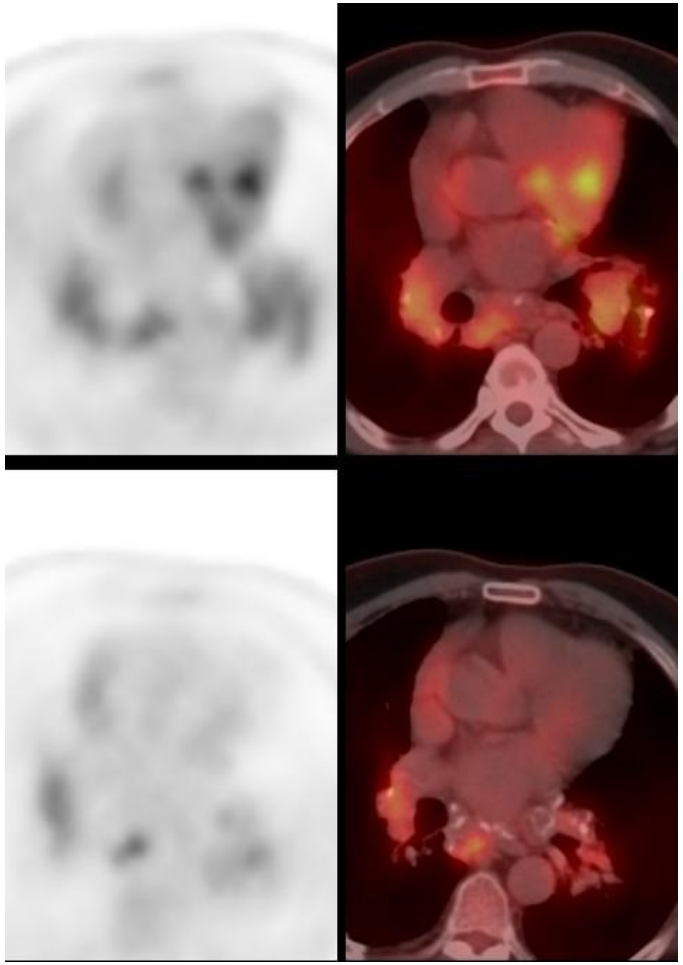
- Due to back pain, lumbar spinal MRI (May 2022) showed a **vertebral fracture**

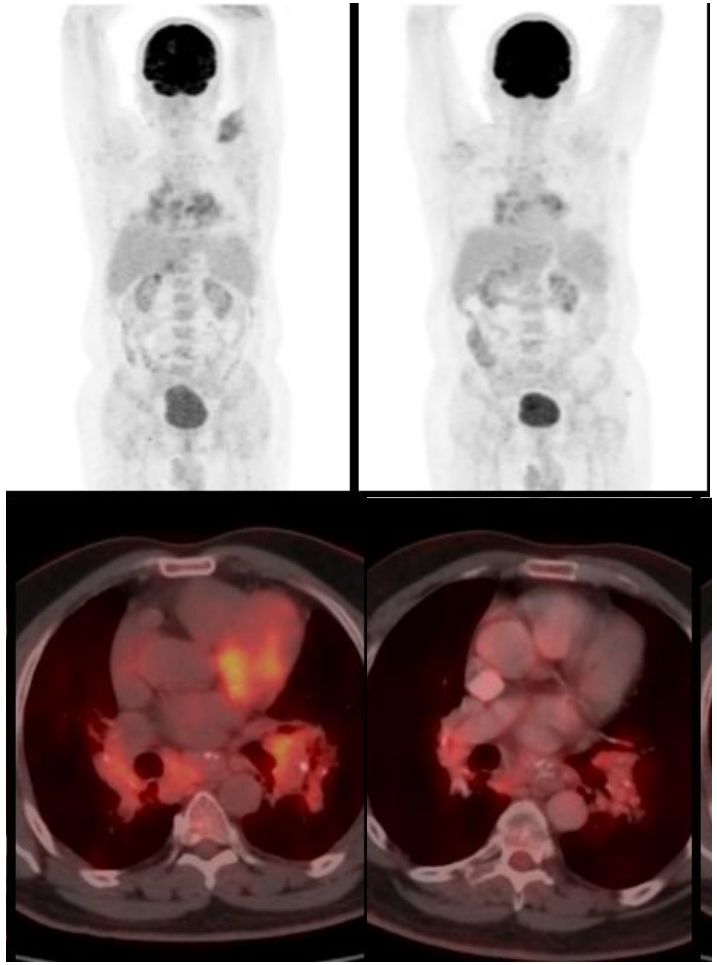
  - **prednol was discontinued**
  - follow-up was conducted with **physical therapy and rehabilitation**
  - **Methotrexate disodyum 12,5 mg subcutaneous** and **folic acid 5 mg tablets once a week** was initiated

Follow-up PET/CT (Month 4)

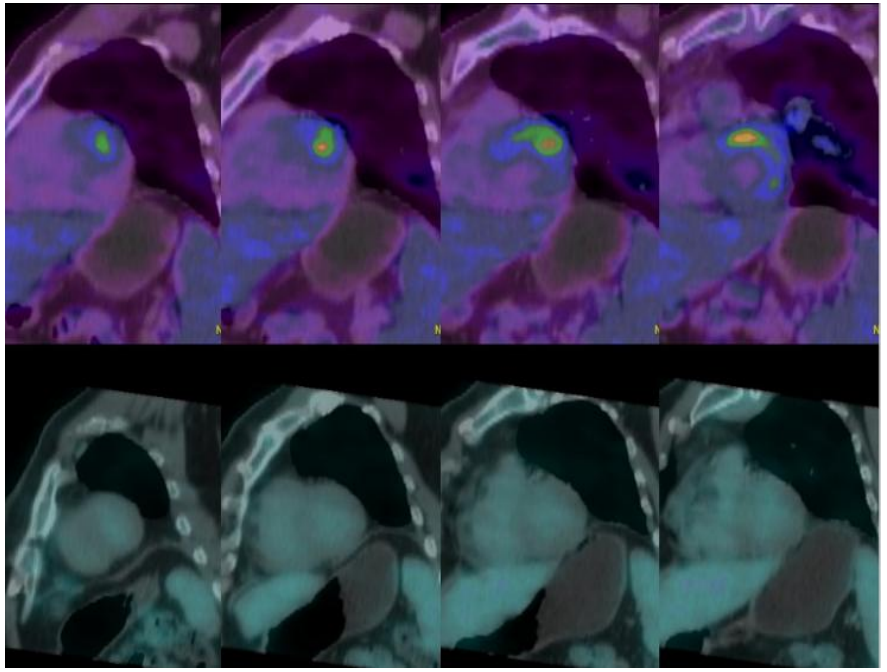


Cardiac Sarcoidosis – PET/CT





MIP
(Maximum Intensity Projection)



Vertical short axis images

Follow-up

- The patient remained clinically stable during two years of treatment but subsequently **self-discontinued therapy**

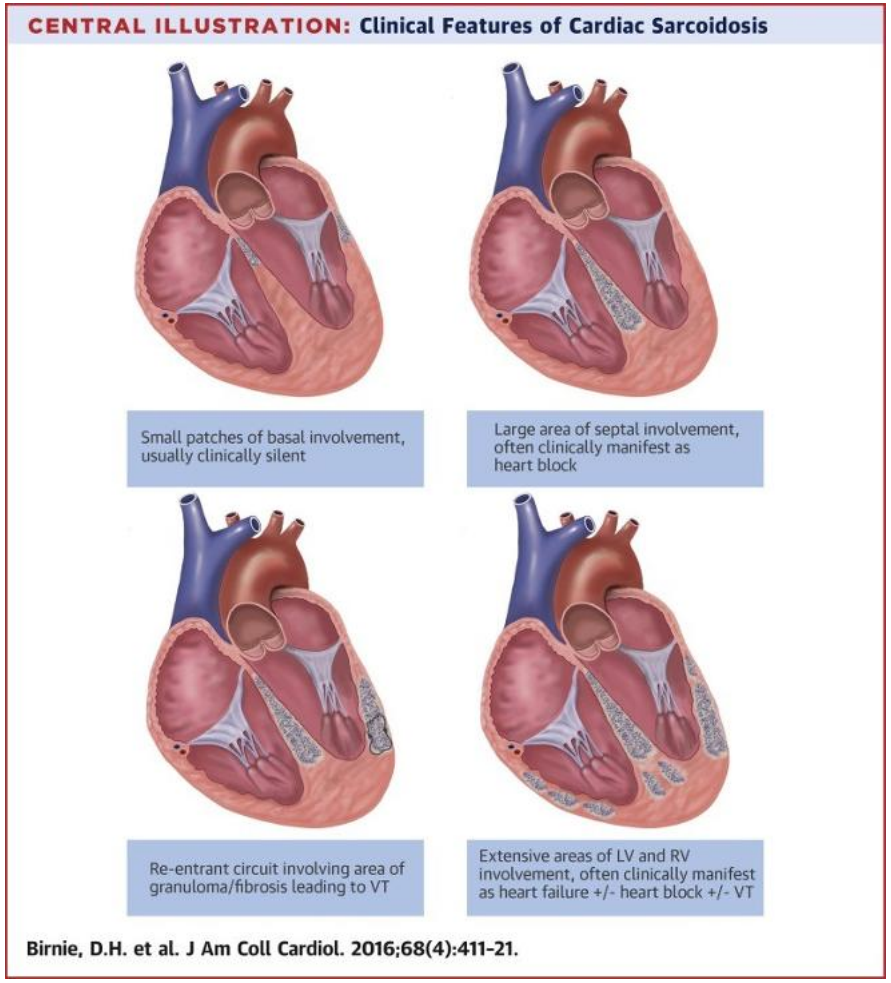
- **Approximately three months later**, posterior uveitis **recurred**, and methotrexate disodium 12.5 mg subcutaneously once weekly was reinitiated

- Under close clinical follow-up

Cardiac Sarcoidosis

- Cardiac involvement is apparent at presentation in **2–5%** of unselected patients

- Autopsy studies and the systematic evaluation of patients with chronic sarcoidosis with MRI suggest possible involvement in **25–30%**



Baughman RP et al. Am J Respir Crit Care Med 2001; 164: 1885–1889
Patel MR et al. Circulation 2009; 120: 1969–1977

Diagnosis of Cardiac Sarcoidosis

There are two pathways to a diagnosis of CS:

1. Histological diagnosis from myocardial tissue CS is diagnosed in the presence of noncaseating granuloma on histological examination of myocardial tissue with no alternative cause identified (including negative organismal stains if applicable).
2. Clinical diagnosis from invasive and noninvasive studies
   It is probable* that CS is present if:
   a) There is a histological diagnosis of extracardiac sarcoidosis
   and
   b) One or more of the following is present:
      - Corticosteroid- and/or immunosuppressant-responsive cardiomyopathy or heart block
      - Unexplained reduced LVEF (<40%)
      - Unexplained sustained (spontaneous or induced) ventricular tachycardia
      - Mobitz type II second-degree heart block or third-degree heart block
      - Patchy uptake on dedicated cardiac positron emission tomography (PET; in a pattern consistent with CS)
      - Late gadolinium enhancement (LGE) on cardiovascular magnetic resonance (CMR; in a pattern consistent with CS)
      - Positive gallium uptake (in a pattern consistent with CS)
   and
   c) Other causes for the cardiac manifestation(s) have been reasonably excluded.

*In general, "probable involvement" is considered adequate to establish a clinical diagnosis of CS.[55]

Birnie DH, et al. HRS expert consensus statement on CS. Heart Rhythm 2014

Prognostic Factors

- Heart failure, ventricular arrhythmias, and advanced conduction abnormalities
- Reduced LVEF and right ventricular dysfunction
- The presence and extent of LGE on CMR, particularly right ventricular and multifocal LG involvement
- Combined perfusion defects and abnormal FDG uptake(SUVmax >4.5), as well as persistent inflammation despite treatment on FDG-PET
- Elevated troponin T and NT-proBNP levels, and positive biopsy-proven cardiac sarcoidosis

Cardiac Sarcoidosis - Treatment Algorithm

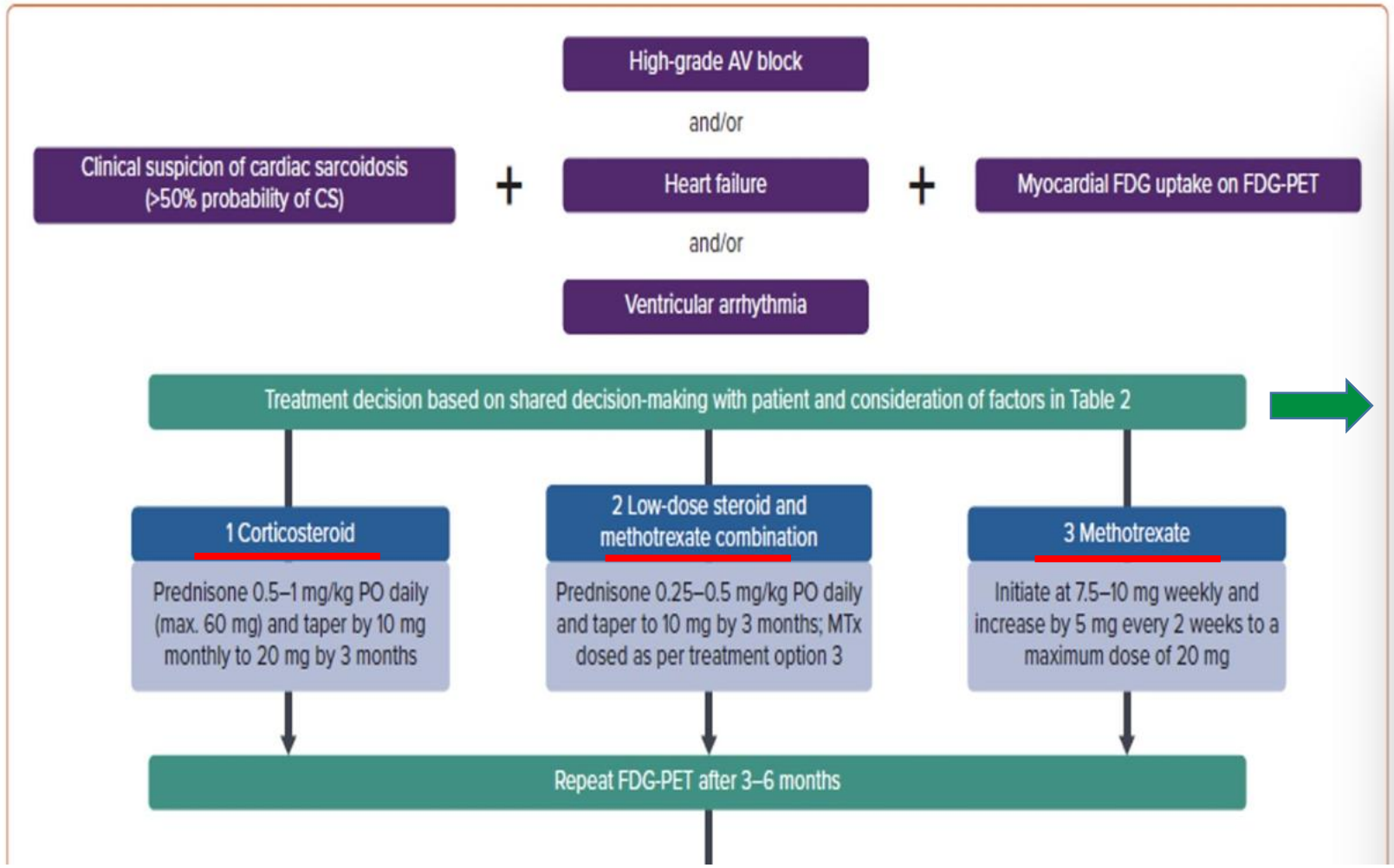
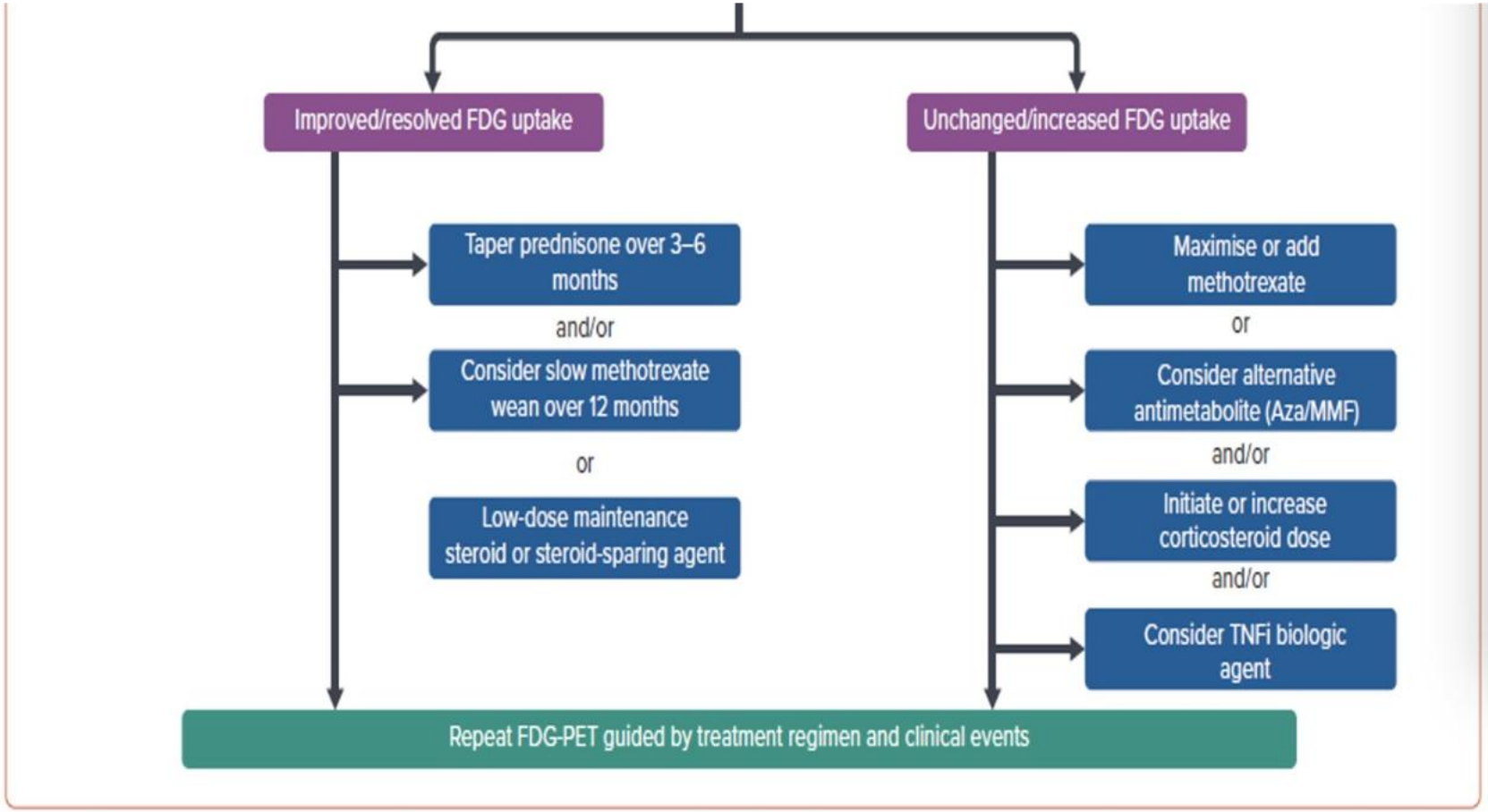


Table 2: Factors Influencing Treatment Decisions in Cardiac Sarcoidosis

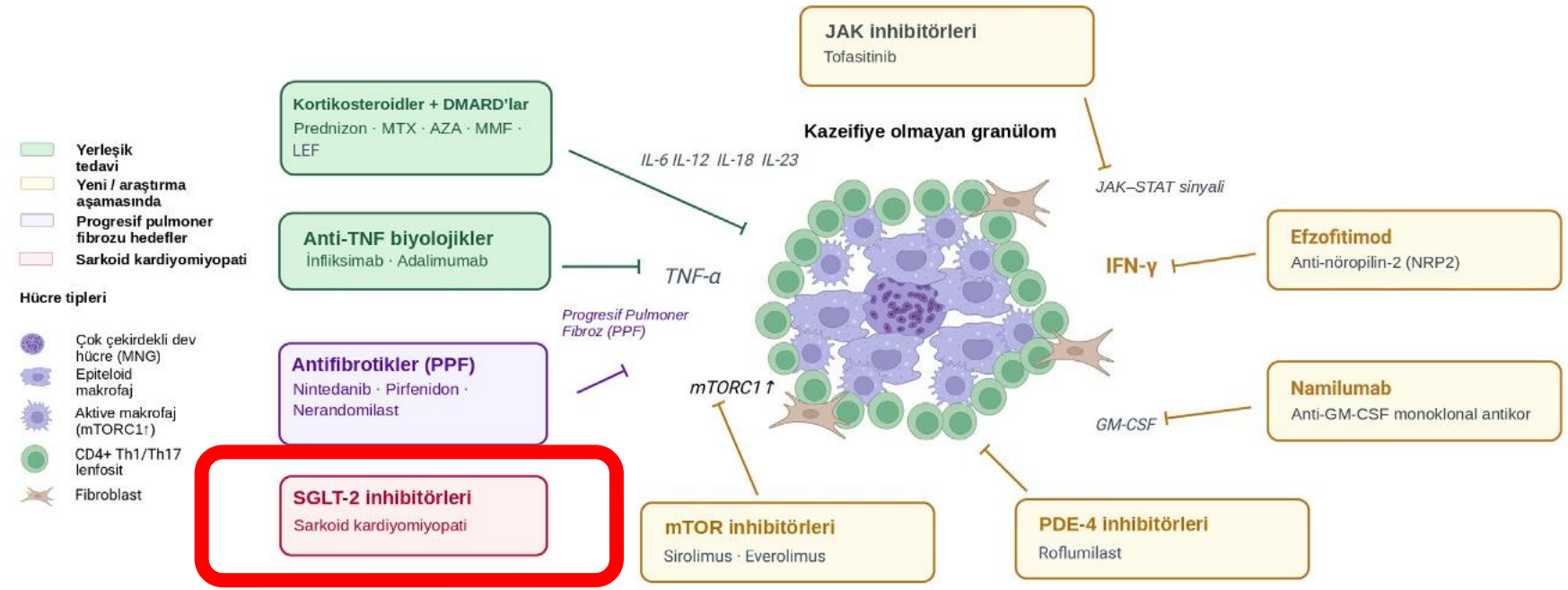
Factors
Degree of LV dysfunction and established fibrosis at diagnosis
Extent of inflammation on cardiac PET
Ventricular arrhythmia burden
Presence of systemic sarcoidosis also warranting immunosuppressive therapy
Metabolic complication risk
Opportunistic infection risk
Malignancy risk with chronic immunosuppression

Giblin GT,et al. Cardiac Failure Review. Radcliffe cardilogy. 2021;7:e17

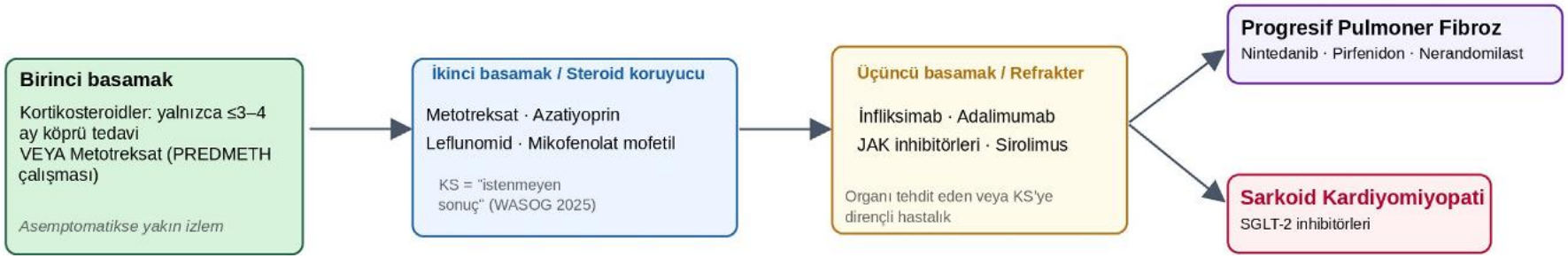
Cardiac Sarcoidosis - Treatment Algorithm



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Sarkoidozda Tedavi Algoritması (WASOG 2025)



Zapata-Huizi JJ ve ark. Arch Bronconeumol 2026





Thank you for your attention...!

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Sarcoidosis

- Sarcoidosis is a multisystem granulomatous disorder
- Usually 20-40 ages, especially ♀
- Prevalence of about 4.7 to 64 in 100,000
- The highest rates are reported in northern Europeans and African Americans

Sarcoidosis

- It is a systemic disease caused by abnormal functioning of the immune system, affecting multiple organs as well as the lungs
- Dysfunction of T-lymphocytes in response to an unknown antigenic stimulus is most commonly blamed in the aetiology
- Unknown aetiology

