Disclosure:

Mariell Jessup MD

University of Pennsylvania

• **Speakers Bureau:**
• **Advisory Board:**
• **Honorarium:**

None
In 1995, myocarditis was defined by the World Health Organization /International Society and Federation of Cardiology as an inflammatory disease of the heart muscle, diagnosed by established histological, immunological, and immunohistochemical criteria.

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Subgroups Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infectious</td>
<td>Bacterial: Chlamydia, Corynebacterium diphtheria, Legionella, Mycobacterium tuberculosis, Mycoplasma, Staphylococcus, Streptococcus A, Streptococcus pneumoniae</td>
</tr>
<tr>
<td></td>
<td>Fungal: Actinomyces, Aspergillus, Candida, Cryptococcus</td>
</tr>
<tr>
<td></td>
<td>Helminthic: Echinococcus granulosus, Trichinella spiralis</td>
</tr>
<tr>
<td></td>
<td>Protozoal: Toxoplasma gondii, Trypanosoma cruzi</td>
</tr>
<tr>
<td></td>
<td>Viral: Adenoviruses, Echoviruses, Enteroviruses (e.g., Coxsackieviruses), Herpes Viruses (Human Cytomegalovirus, Epstein-Barr virus, Human Herpesvirus 6), Hepatitis C Virus, Human Immunodeficiency Virus (HIV), Influenza A virus, Parvovirus B19</td>
</tr>
<tr>
<td></td>
<td>Rickettsial: Coxiella burnetii, Rickettsia typhi</td>
</tr>
<tr>
<td></td>
<td>Spirochetal: Borrelia burgdorferi, Leptospira, Treponema pallidum</td>
</tr>
<tr>
<td>Autoimmune diseases</td>
<td>Celiac disease, Churg-Strauss syndrome, Crohn’s disease, dermatomyositis, giant cell myocarditis, hypereosinophilic syndrome, Kawasaki disease, lupus erythematoses, lymphoepitheliomatous myocarditis, rheumatoid arthritis, sarcoidosis, scleroderma, ulcerative colitis</td>
</tr>
<tr>
<td>Hypersensitivity reactions to drugs</td>
<td>Penicillin, ampicillin, cephalosporins, tetracyclines, sulfonamids, antiphlogistics, benzodiazepines, clozapine, loop and thiazide diuretics, methyldopa, smallpox vaccine, tetanus toxoid, tricyclic antidepressants</td>
</tr>
<tr>
<td>Toxic reactions to drugs</td>
<td>Amphetamines, anthracyclines, catecholamines, cocaine, cyclophosphamide, 5-fluorouracil, phenytoin, trastuzumab</td>
</tr>
<tr>
<td>Toxic</td>
<td>Ethanol</td>
</tr>
<tr>
<td>Others</td>
<td>Arsenic, copper, iron, radiotherapy, thyreotoxicosis</td>
</tr>
</tbody>
</table>
Pathophysiology of Viral Myocarditis

• **Diagnosis:**
  – Viral serology, EKG are non-specific
  – Biomarkers helpful
  – Imaging very helpful
  – Role of endomyocardial biopsy (EMB): critical
    – *Viral PCR from EMB, immunohistochemical*

• **Treatment:**
  – *UNCLEAR*, but treat the heart failure.
Autosomal Recessive Cardiomyopathy Presenting as Acute Myocarditis

J Am Coll Cardiol 2017;69:1653-65

Serkan Belkay
Fanny Bajolle
Raphaelle Quitte
Sylvie Di Filippo
Bruce D. Gelb
This suggests that a combination of genetic factors that increase susceptibility to cardiomyopathy combined with acquired causes of cardiomyopathy, such as viral infection, may be an explanation for the variable penetrance and severity of dilated cardiomyopathy.
Myocarditis

Circ Res. 2016;118:496-514

Gabriel Fung, Honglin Luo, Ye Qiu, Decheng Yang, Bruce McManus

Putative role of micro-RNAs (miR) in coxsackievirus B3 (CVB3) pathogenesis
Immunosuppressive treatment was not standardized, reflecting the substantial lack of data on the treatment of lymphocytic/viral myocarditis.

We did not perform molecular analysis to search for viral genome systematically because of financial constraints and a lack of strong evidence supporting viral search in endomyocardial samples to guide therapy,

Although most patients with myocarditis have a good long-term prognosis, those with fulminant presentation are more likely to have worse LV function at follow-up.

Last, because of the diagnostic accuracy of CMR we believe that EMB is indicated in patients with NFM only if LV systolic dysfunction persists despite medical therapy or when a systemic disorder is suspected.
Clinical Myocarditis: Clinical Presentation and Management

- **Symptoms:**
  - Chest pain, arrhythmias, heart failure

- **Diagnostic evaluation:**
  - Take a good history !!!
  - Biomarkers, imaging (including cath in aged patients)
  - Biopsy

- **Management:**
  - Telemetry, bedrest
  - Treat heart failure with evidence based drugs
Thank you