

# Clinical Myocarditis:

## *Clinical Presentation and Management*

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# Disclosure:

*Mariell Jessup MD*

- Speakers Bureau:
- Advisory Board:
- Honorarium:

None

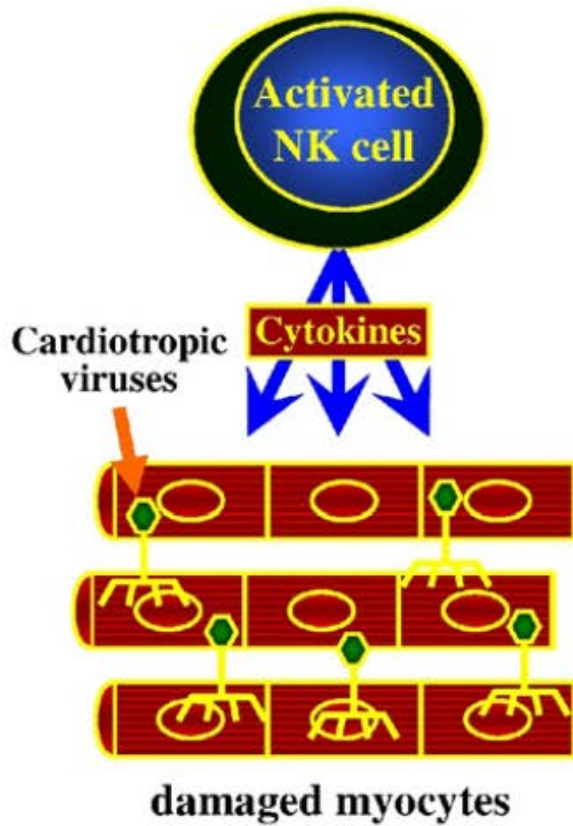
# Update on Myocarditis

J Am Coll Cardiol 2012;59:779-92

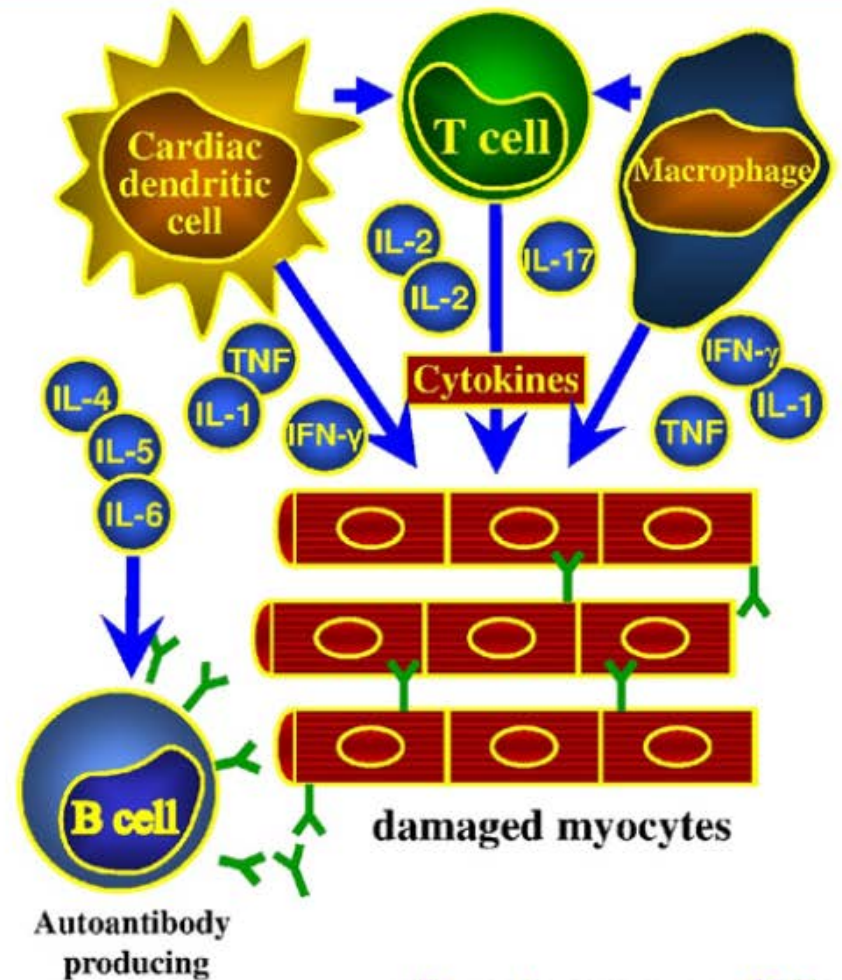
Ingrid Kindermann, MD,\* Christine Barth,\* Felix Mahfoud, MD,\* Christian Ukena, MD,\* Matthias Lenski, MD,\* Ali Yilmaz, MD,† Karin Klingel, MD,‡ Reinhard Kandolf, MD,‡ Udo Sechtem, MD,† Leslie T. Cooper, MD,§ Michael Böhm, MD\*

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.

Etiology	Subgroups Examples
Infectious	Bacterial: <i>Chlamydia</i> , <i>Corynebacterium diphtheria</i> , <i>Legionella</i> , <i>Mycobacterium tuberculosis</i> , <i>Mycoplasma</i> , <i>Staphylococcus</i> , <i>Streptococcus A</i> , <i>Streptococcus pneumoniae</i> Fungal: <i>Actinomyces</i> , <i>Aspergillus</i> , <i>Candida</i> , <i>Cryptococcus</i> Helminthic: <i>Echinococcus granulosus</i> , <i>Trichinella spiralis</i> Protozoal: <i>Toxoplasma gondii</i> , <i>Trypanosoma cruzi</i> 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 Rickettsial: <i>Coxiella burnetti</i> , <i>Rickettsia typhi</i> Spirochetal: <i>Borrelia burgdorferi</i> , <i>Leptospira</i> , <i>Treponema pallidum</i>
Autoimmune diseases	Celiac disease, Churg-Strauss syndrome, Crohn's disease, dermatomyositis, giant cell myocarditis, hypereosinophilic syndrome, Kawasaki disease, lupus erythematoses, lymphofollicular myocarditis, rheumatoid arthritis, sarcoidosis, scleroderma, ulcerative colitis
Hypersensitivity reactions to drugs	Penicillin, ampicillin, cephalosporins, tetracyclines, sulfonamids, antiphlogistics, benzodiazepines, clozapine, loop and thiazide diuretics, methyl dopa, smallpox vaccine, tetanus toxoid, tricyclic antidepressants
Toxic reactions to drugs	Amphetamines, anthracyclines, catecholamines, cocaine, cyclophosphamide, 5-fluorouracil, phenytoin, trastuzumab
Toxic	Ethanol
Others	Arsenic, copper, iron, radiotherapy, thyrotoxicosis



**acute myocarditis**



**subacute myocarditis**

**Pathophysiology of Viral Myocarditis**

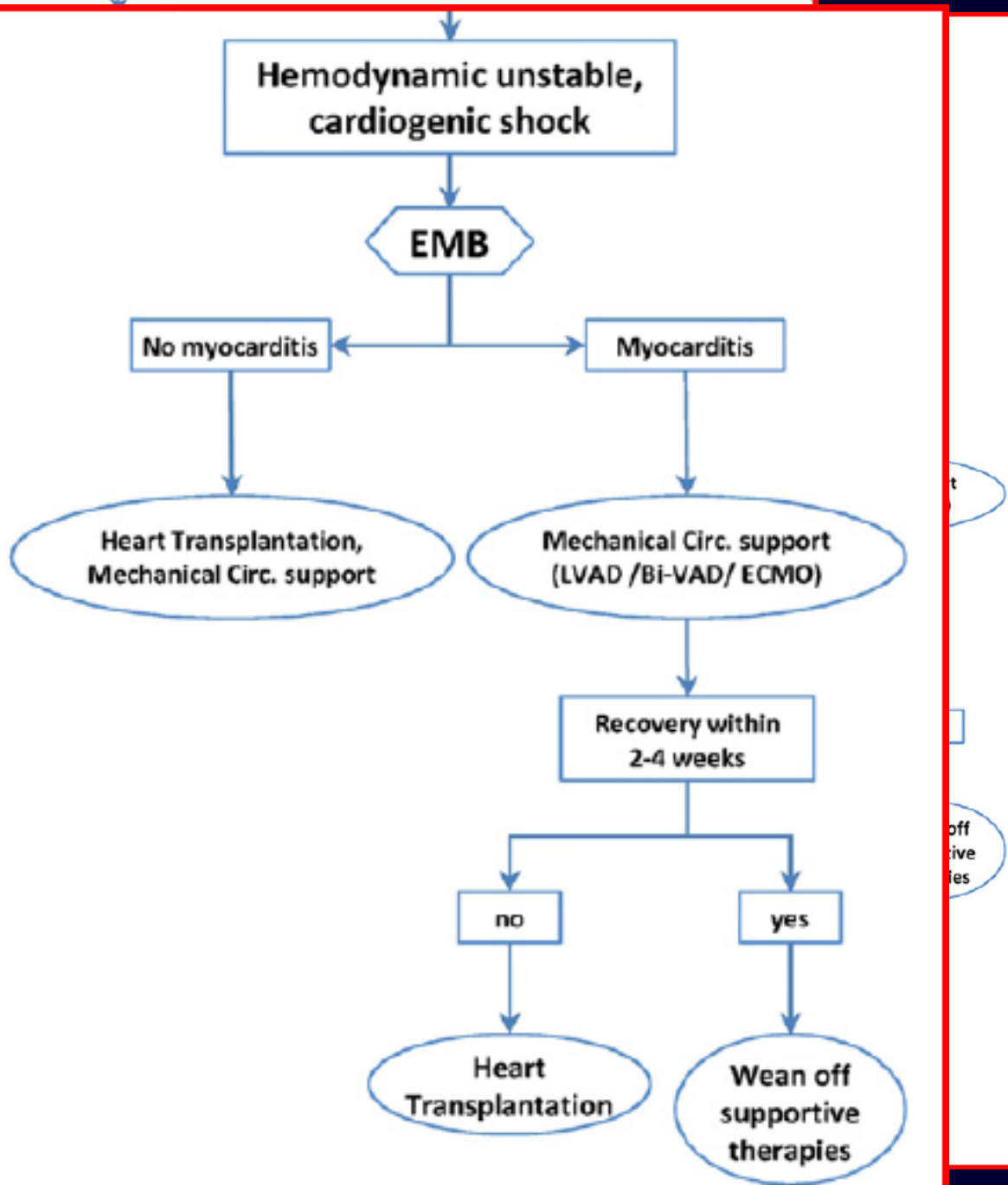
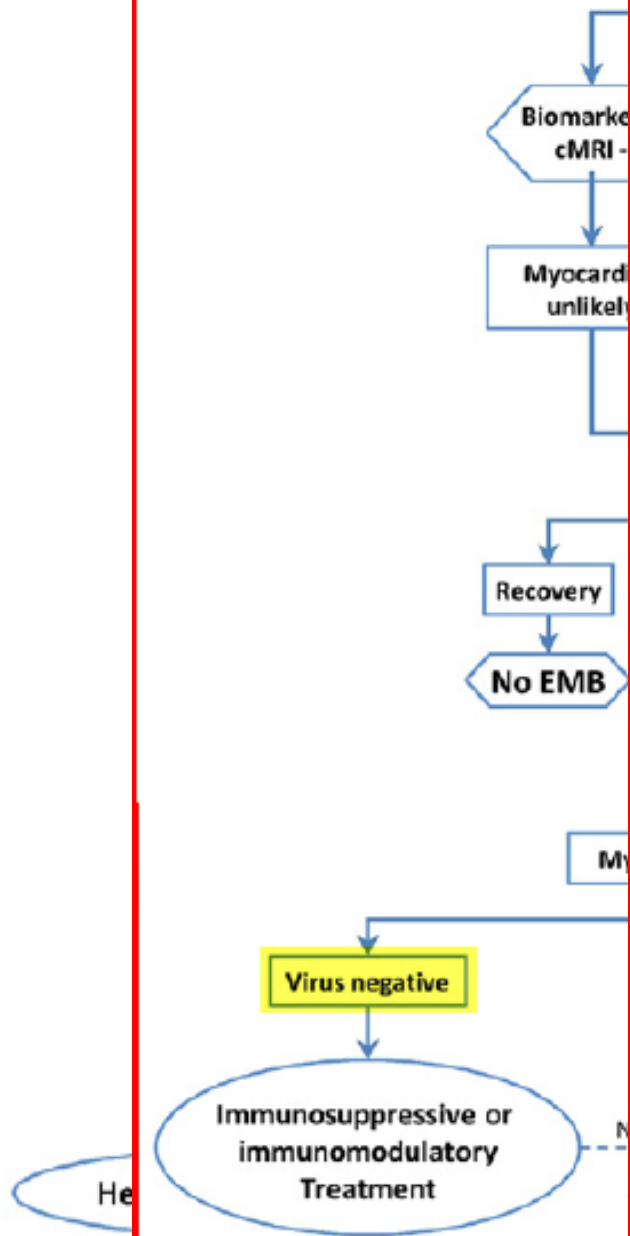


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- **Diagnosis:**
  - Viral serology, EKG are non-specific
  - Biomarkers helpful
  - Imaging very helpful
  - Role of endomyocardial biopsy (EMB): critical
  - *Viral PCR from EMB, immunohistochemical*
- **Treatment:**
  - *UNCLEAR*, but treat the heart failure.

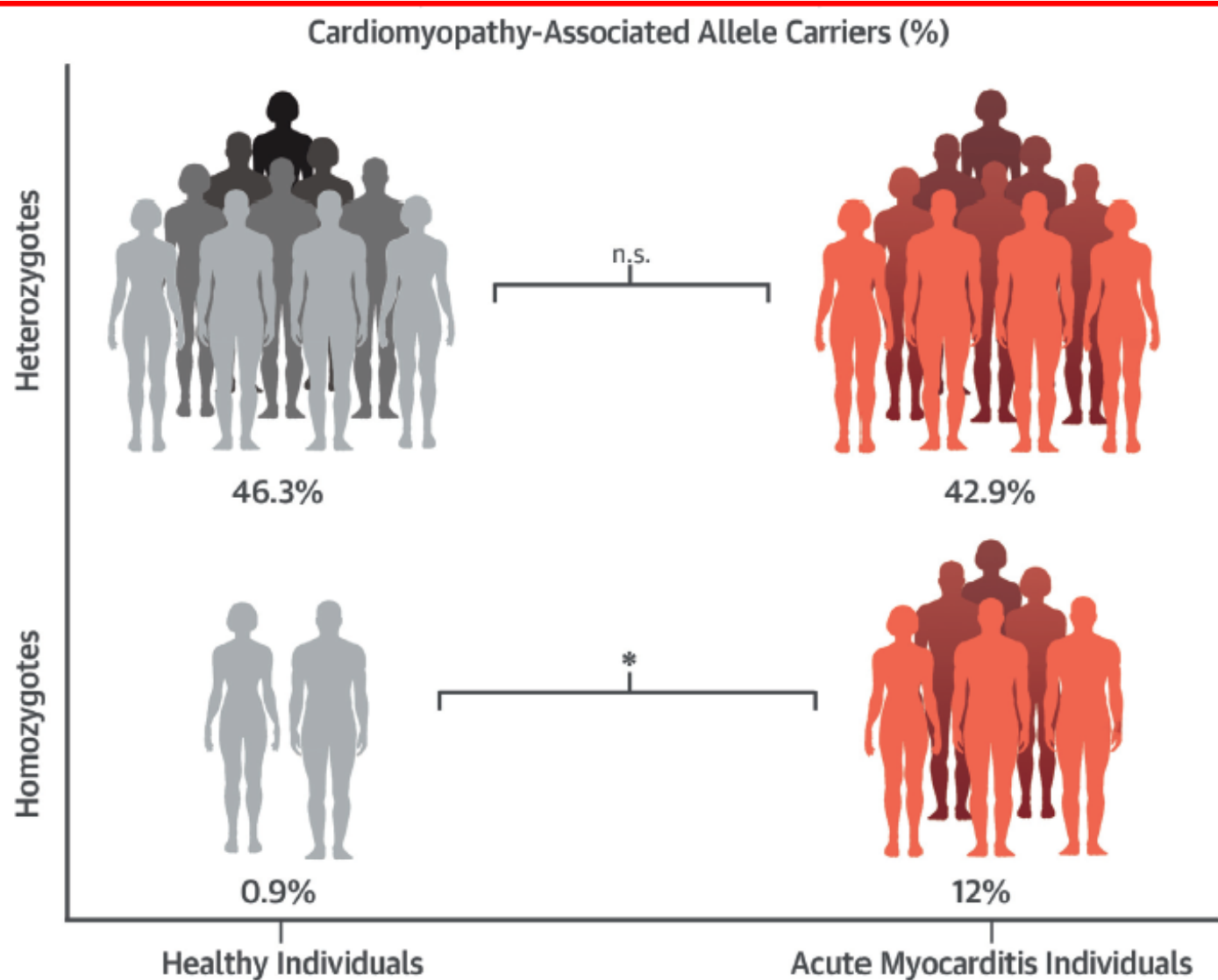


# Autosomal Recessive Cardiomyopathy Presenting as Acute Myocarditis

J Am Coll Cardiol 2017;69:1653-65

Serkan Belkay  
Fanny Bajolle  
Raphaelle Qui  
Sylvie Di Filip  
Bruce D. Gelb

MD, PhD,<sup>d</sup>



# Myocarditis

## An Intersection Between Genetic and Acquired Causes of Human Cardiomyopathy

Kirk U. Knowlton, MD

*JACC* VOL. 69, NO. 13, 2017

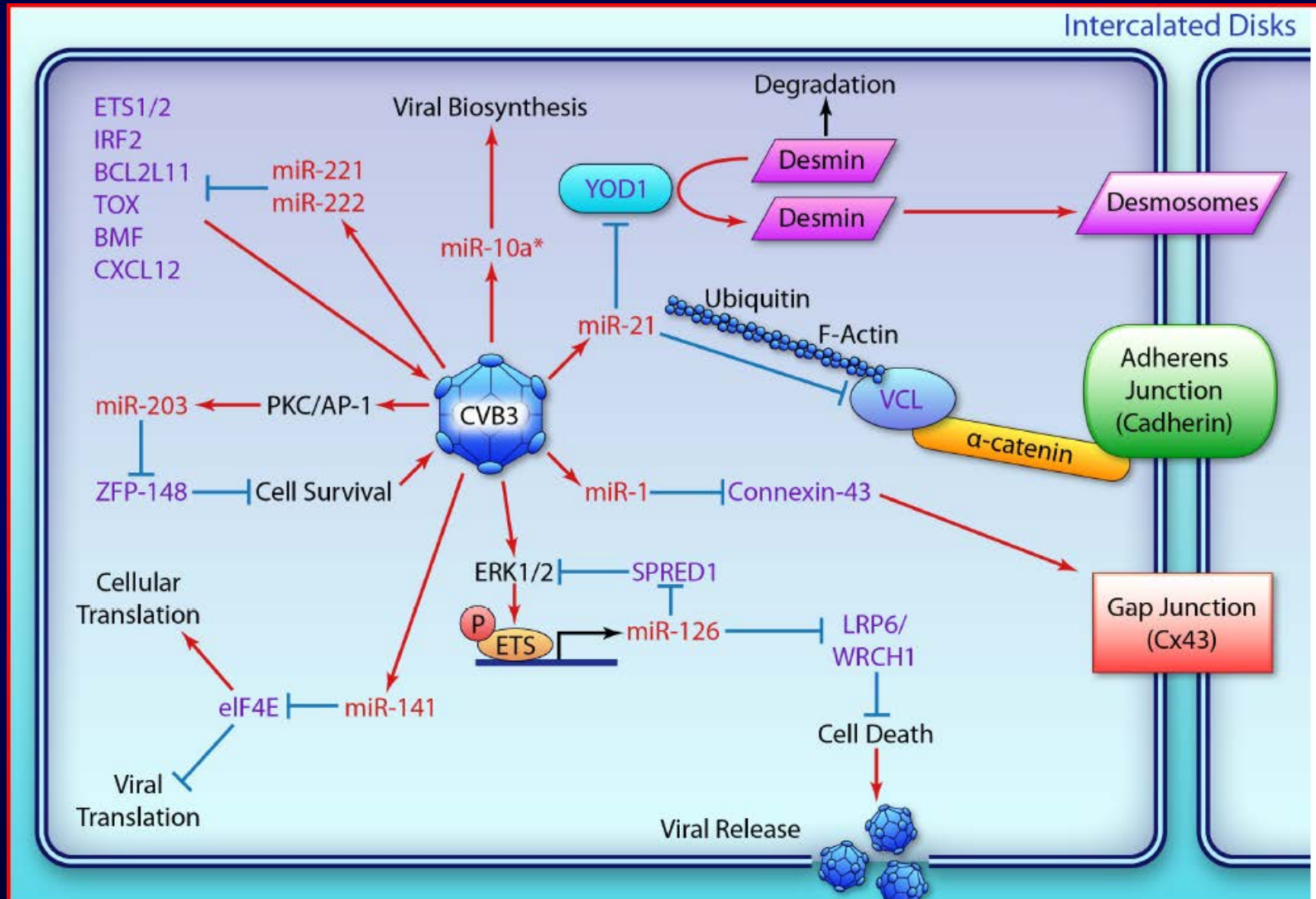
This suggests that a combination of genetic factors that increase susceptibility to cardiomyopathy combined with acquired causes of cardiomyopathy, such as viral infection, may be an explanation for the variable penetrance and severity of dilated cardiomyopathy.



# 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

# Survival and Left Ventricular Function Changes in Fulminant Versus Nonfulminant Acute Myocarditis

Ammirati et al. *Circulation*. 2017;136:529-545.

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