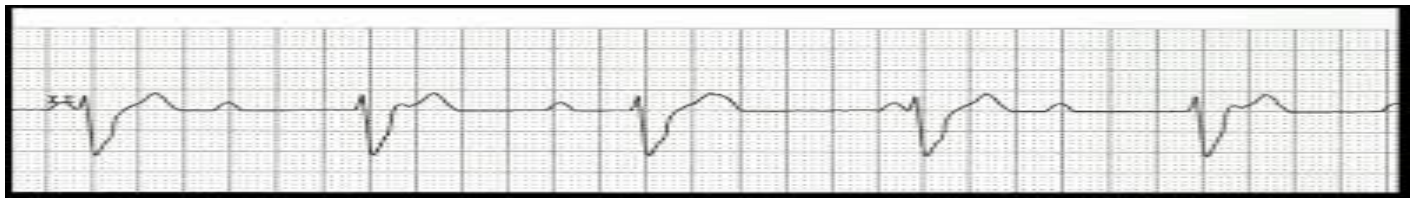
Lyme Carditis: Update 2020



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Professor of Medicine
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Canadian Lyme Disease Research Network (CLyDRN)
Virtual Annual General Meeting (AGM) 2020

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Disclosures

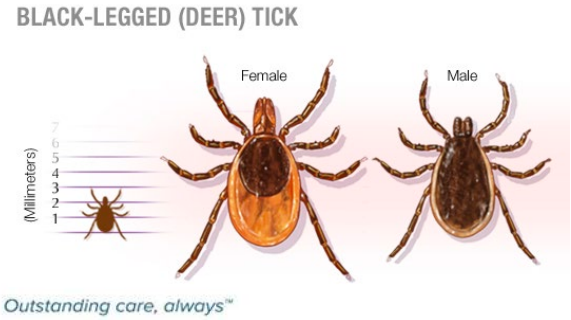
- No conflict of interest to report
- I am not an ID doctor
- I am an EP doctor
- Do not ask tough questions

Overview

- Epidemiology of Lyme Disease
- Prevalence and Risk Factors
- Stages with Associated Symptoms - Lyme Carditis
- Clinical Assessment, Diagnosis and Treatment: The “Queen’s approach”
- Future Considerations

Epidemiology

- Lyme disease is a spirochetal infection caused by *Borrelia burgdorferi* in North America
- Transmitted by infected ticks, primarily black-legged ticks
- Ticks typically must attach to humans for 36-48 hours to transmit infection
- Peak onset of Lyme disease occurs during the summer months of June, July and August



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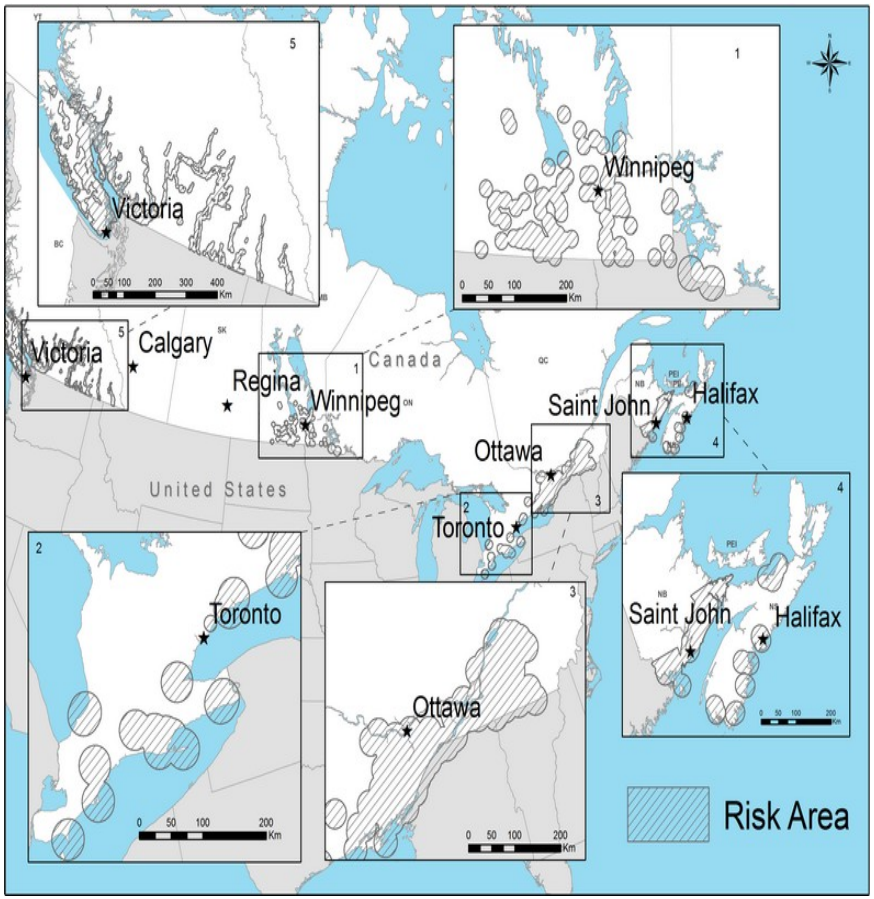
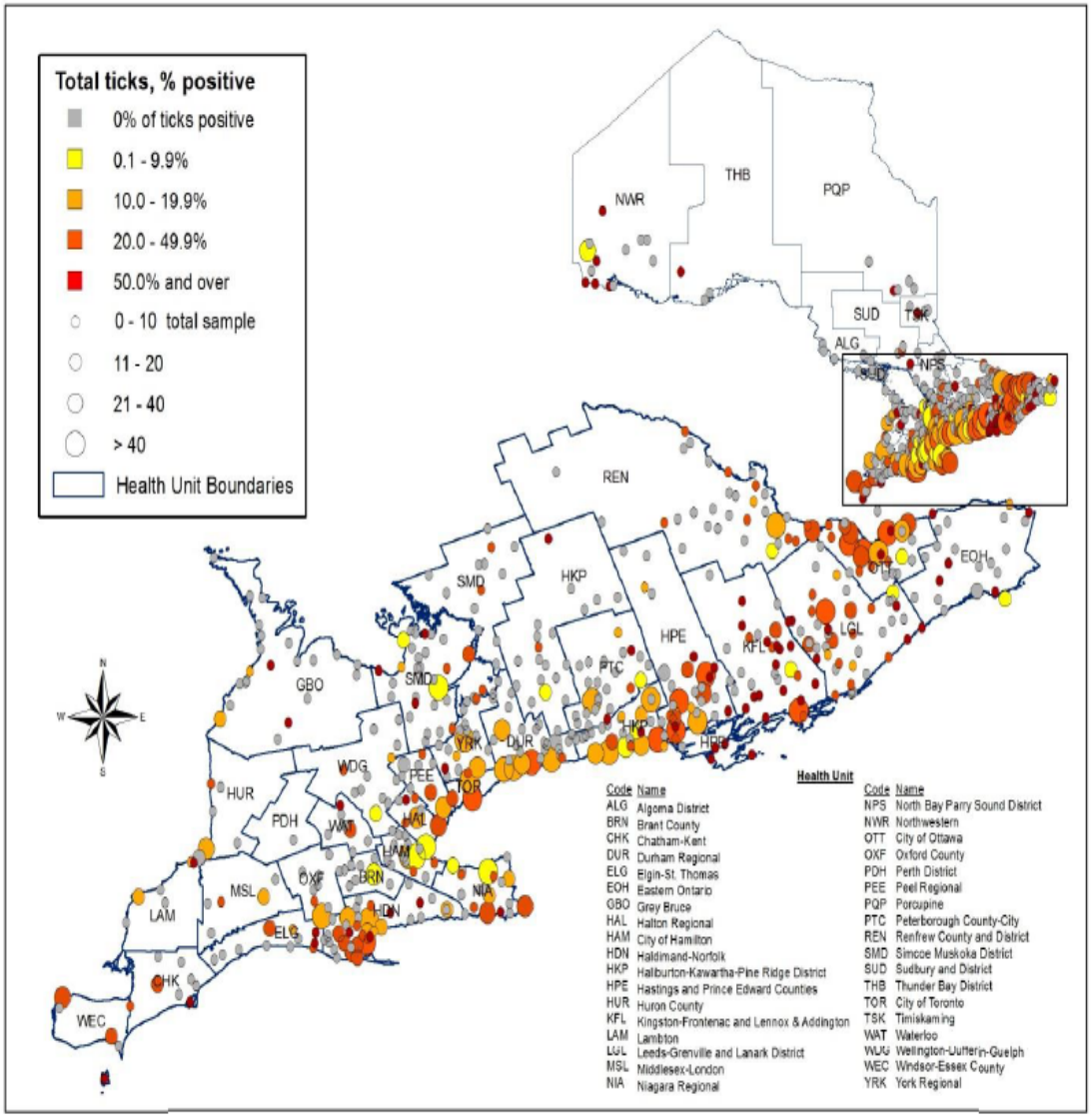
Lyme Disease Incidence

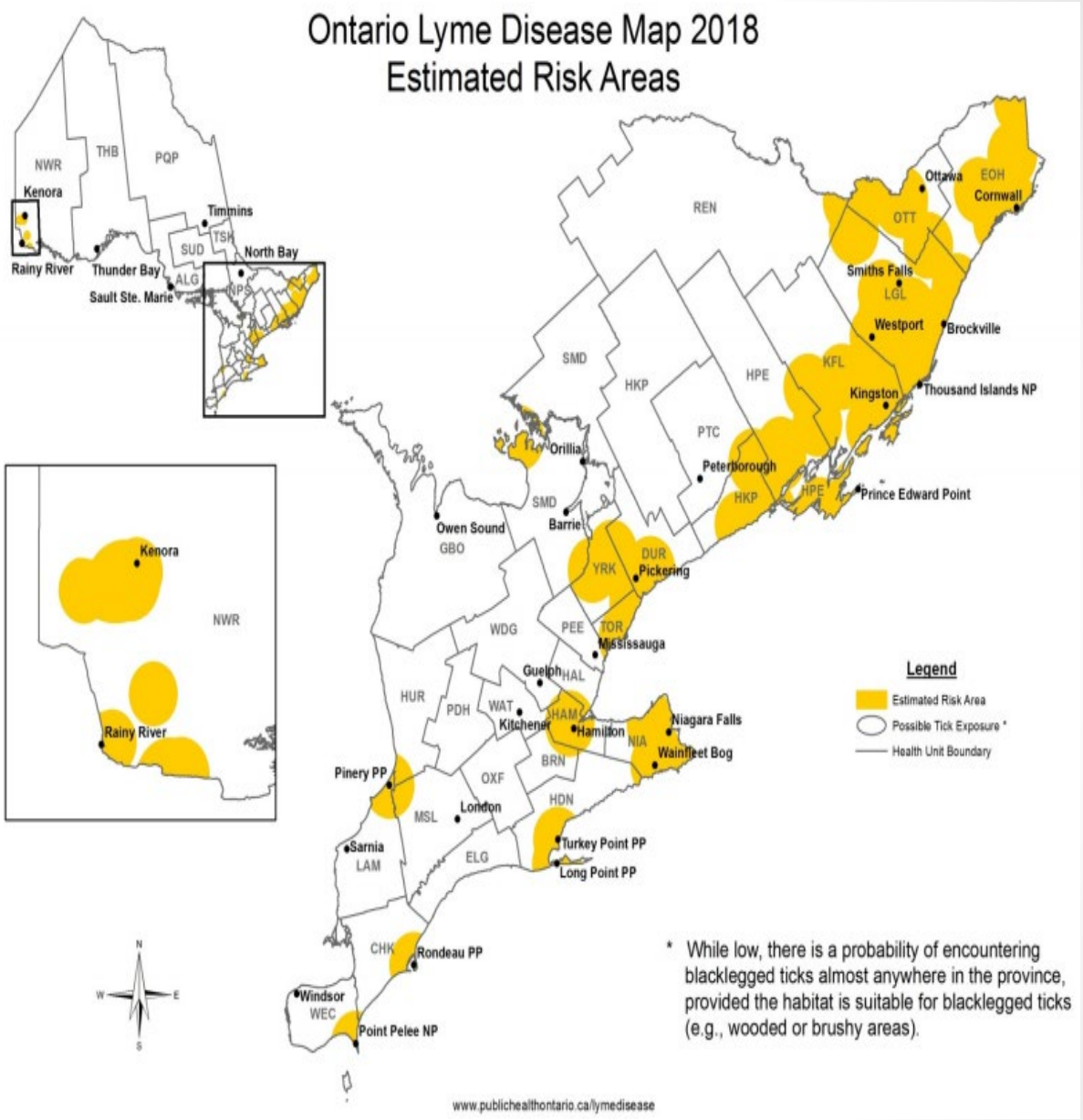


Source: Government of Canada, https://www.canada.ca/en/public-health/services/diseases/lyme-disease/risk-lyme-disease.html#map
Accessed on August 23rd, 2018

Figure 5: Number of *Ixodes scapularis* samples and percent positivity for *Borrelia burgdorferi* based on most-likely location of acquisition: Ontario, 2017

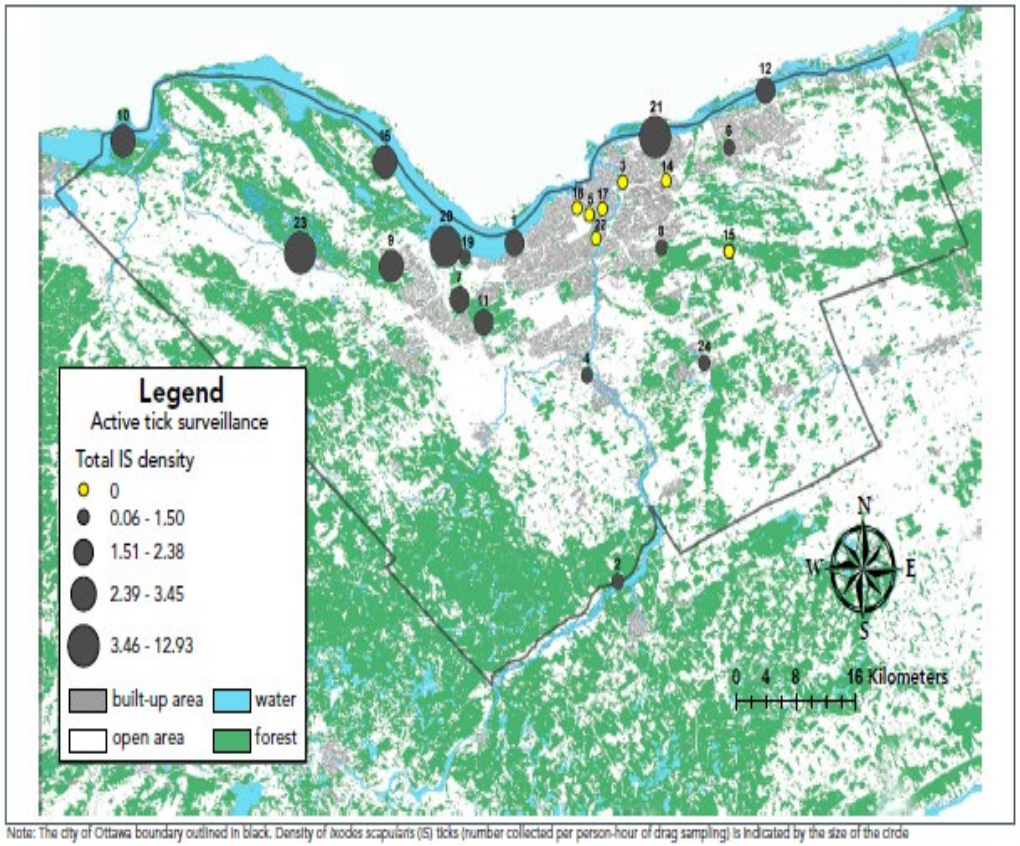


Data source: PHO Tick Database and National Microbiology Laboratory (NML) data, extracted [2018/04/26].



Source: Public Health Ontario, https://www.publichealthontario.ca/en/eRepository/Lyme_disease_risk_areas_map.pdf Accessed on January 31st, 2019

Tick Density



Map of Ottawa illustrating tick density in sites surveyed for active tick surveillance, 2017

Source: Public Health Agency of Canada, Canada Communicable Disease Report: Climate Change and Lyme Disease. October 4, 2018. Volume 43-10.

Lyme Disease Incidence

- **The Government currently has data for Lyme disease cases reported between 2009 and 2017:**
- **2009: 144 cases**
- **2010: 143 cases**
- **2011: 266 cases**
- **2012: 338 cases**
- **2013: 682 cases**
- **2014: 522 cases**
- **2015: 917 cases**
- **2016: 992 cases**
- **2017: 2025 cases**

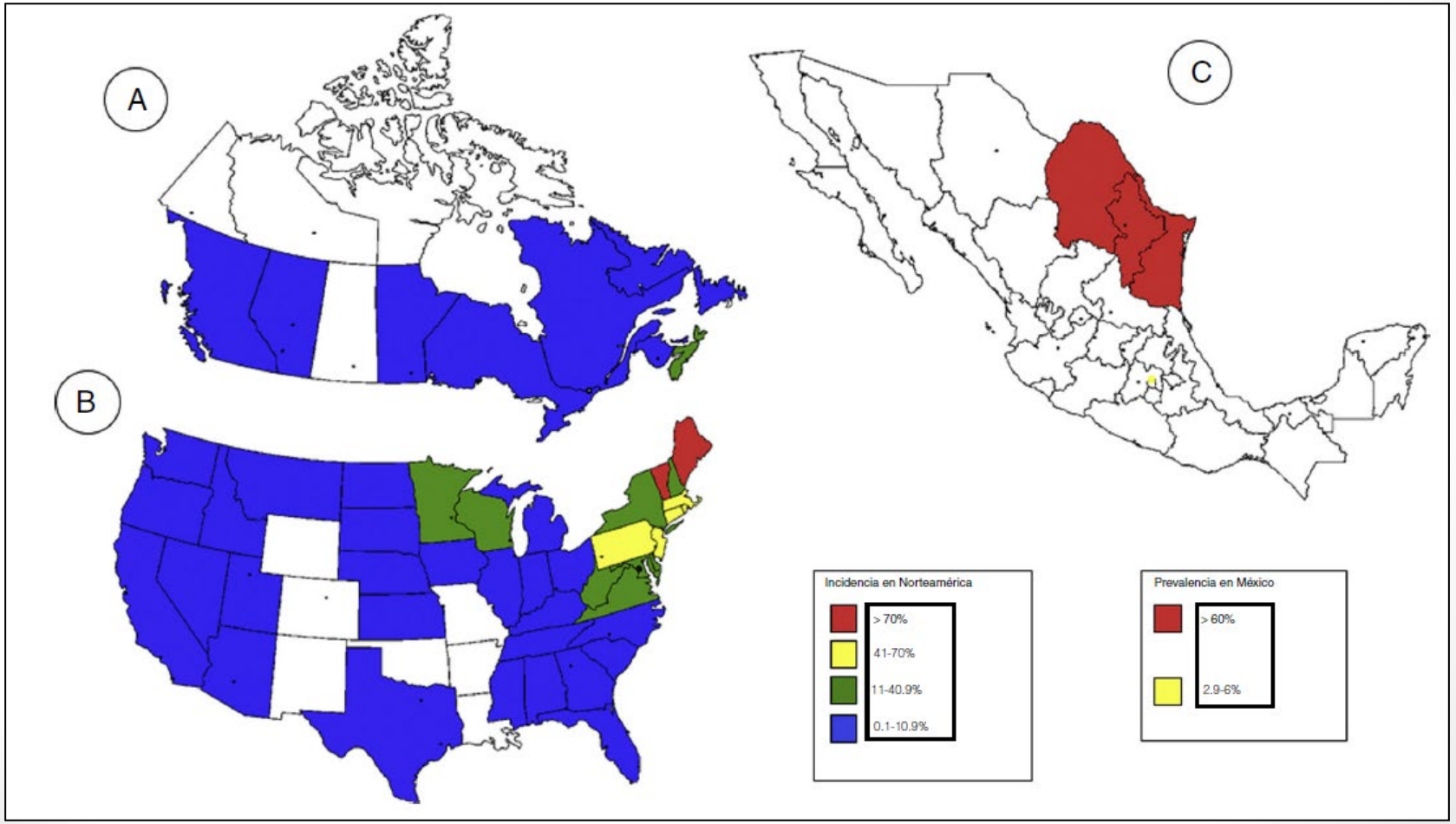
Source: Government of Canada, https://www.canada.ca/en/public-health/services/diseases/lyme-disease/surveillance-lyme-disease.html
Accessed on: January 31st, 2019.

Afección cardíaca de la enfermedad de Lyme: ¿Por qué México debe de prestar atención a este tema?

Lyme carditis: Why should Mexico pay attention to this problem?

Diego R. Sánchez-Vázquez[a], Manlio F. Márquez[b] y Adrian Baranchuk[c,*]

Arch Mex Cardiol 2018



Stages with Associated Symptoms

Early Localized	*Early Disseminated*	*Late Disseminated*
Occurs days to weeks after infection	Occurs weeks to months after infection	Occurs months to years after infection
Characterized by: appearance of erythema migrans with or without symptoms • Fever • Fatigue • Malaise • Lethargy • Headache • Neck stiffness • Myalgias • Arthralgias	Characterized by: multiple erythema migrans lesions and/or acute neurologic and cardiac symptoms • Meningitis cranial neuropathy, facial nerve palsy and sensory/motor neuropathy • Varying degrees of AV block, myopericarditis, syncope, dyspnea, and chest pain	Characterized by: intermittent or persistent arthritis and certain neurological problems including: • Encephalopathy • Neuropathy • Encephalomyelitis

Clinical Assessment, Diagnosis and Treatment

- Early symptoms of Lyme disease often mimic those of other conditions including viral illnesses, unexplained infections, meningitis, etc. and should be considered as a differential diagnosis

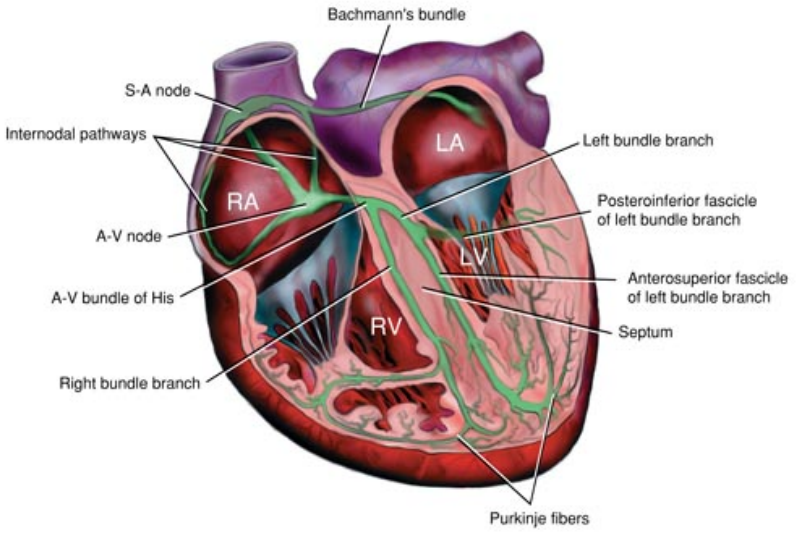
- Diagnosis is made by history and physical assessment as well as positive Lyme serology

- Treatment with antibiotics :
  - Early localized (10-21 day course)
  - Early disseminated (14-28 day course)
  - Late disseminated (28 day course)

Lyme Carditis

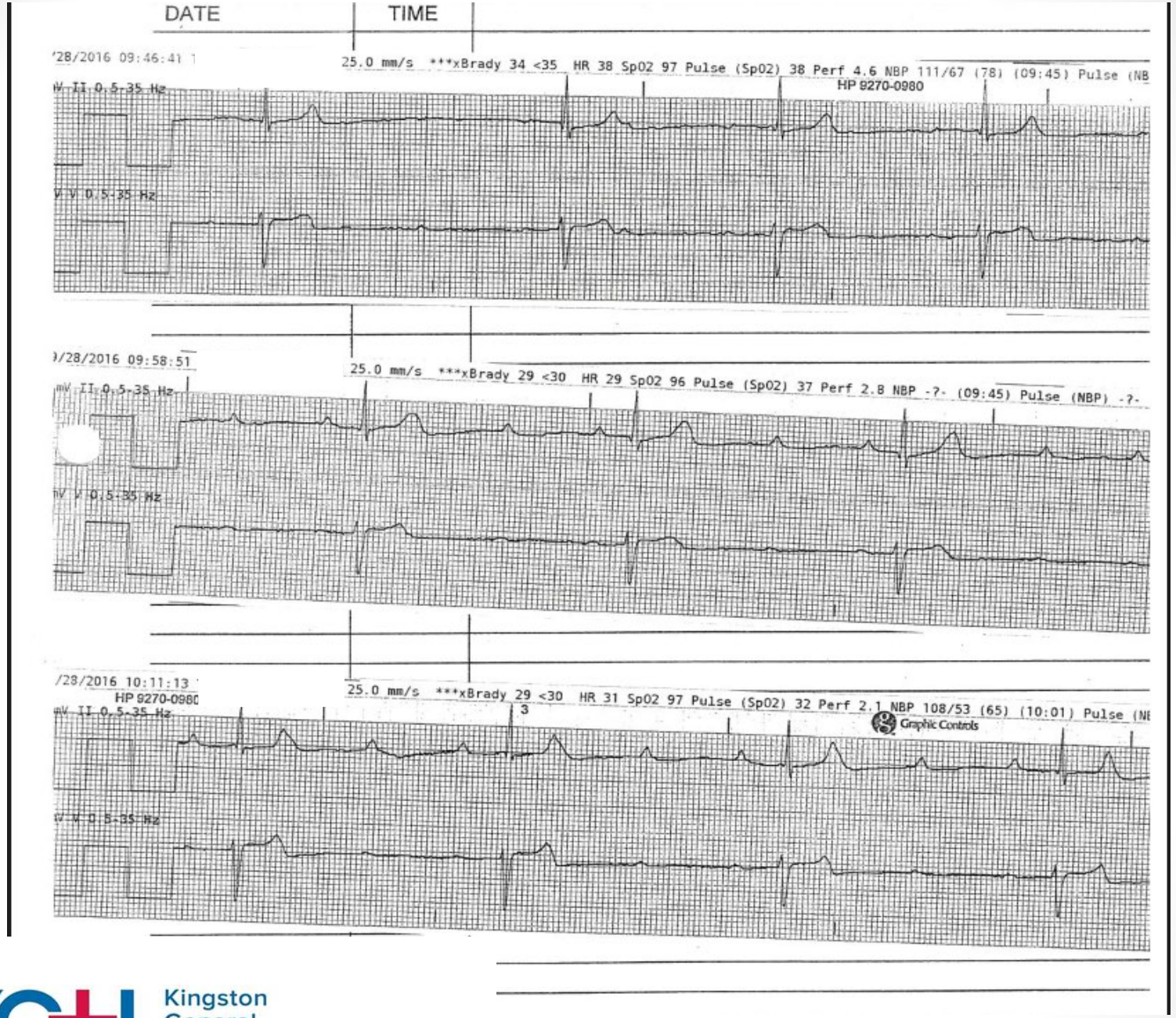
- Direct invasion of spirochetes into the layers of the heart tissues
- Can infect all parts of the heart: conduction system, inner and outer membranes, cardiac muscle, cardiac blood vessels or heart valves
- More common in males (male: female = 3:1)
- Uncommon: 4-10% of untreated patients with Lyme disease develop Lyme carditis, while only 1% develop AV conduction blocks
- Clinical manifestations:
  - AV conduction block – can progress rapidly from 1st to 3rd degree
  - Syncope
  - Lightheadedness/dizziness
  - Dyspnea
  - Palpitations
  - Chest pain

(Forrester & Mead. 2014: Krause & Bockenstedt, 2013)



Case Study #1

- 30 year old male
- Risk factors: lives in rural area, bug bite approx. 2 weeks prior, no classic target lesions
- ER visit Campbellford– September 23rd , 2016
  - Developed left facial nerve palsy – dx: Bell's Palsy
  - Reports of fatigue, malaise, myalgias, arthralgias, fever, chills, sweats, headaches and neck stiffness
  - Sent home with prescription for prednisone
- ER visit and Admission Picton– September 28th, 2016
  - 2 episodes of syncope and reports of exercise intolerance
  - ECG showed 2nd degree AV block with HR 38 bpm
  - Transferred to Belleville – heart block progressed – temporary wire inserted for transvenous pacing. Lyme serology sent. Ceftriaxone IV initiated.
  - Transferred to Kingston for consideration of permanent pacemaker insertion



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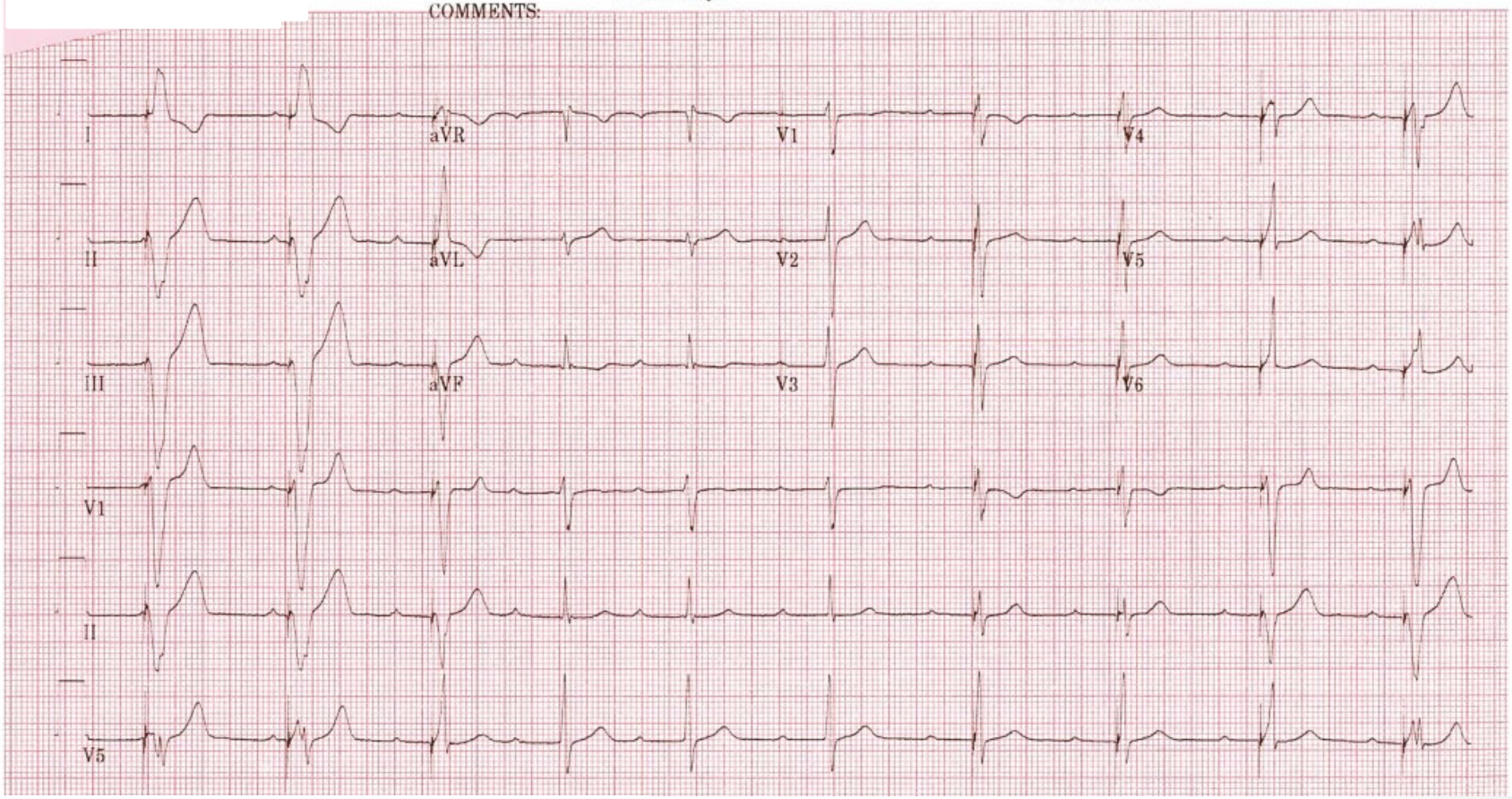
29-Sep-2016 12:47:42 Kingston General Hospital

Vent. rate	59 bpm
PR interval	320 ms
QRS duration	104 ms
QT/QTc	414/409 ms
P-R-T axes	68 71 -2

Sinus bradycardia with 1st degree AV block with frequent ventricular-paced complexes
Abnormal QRS-T angle, consider primary T wave abnormality
Abnormal ECG

Referred by: Unconfirmed

COMMENTS:



Kingston General Hospital
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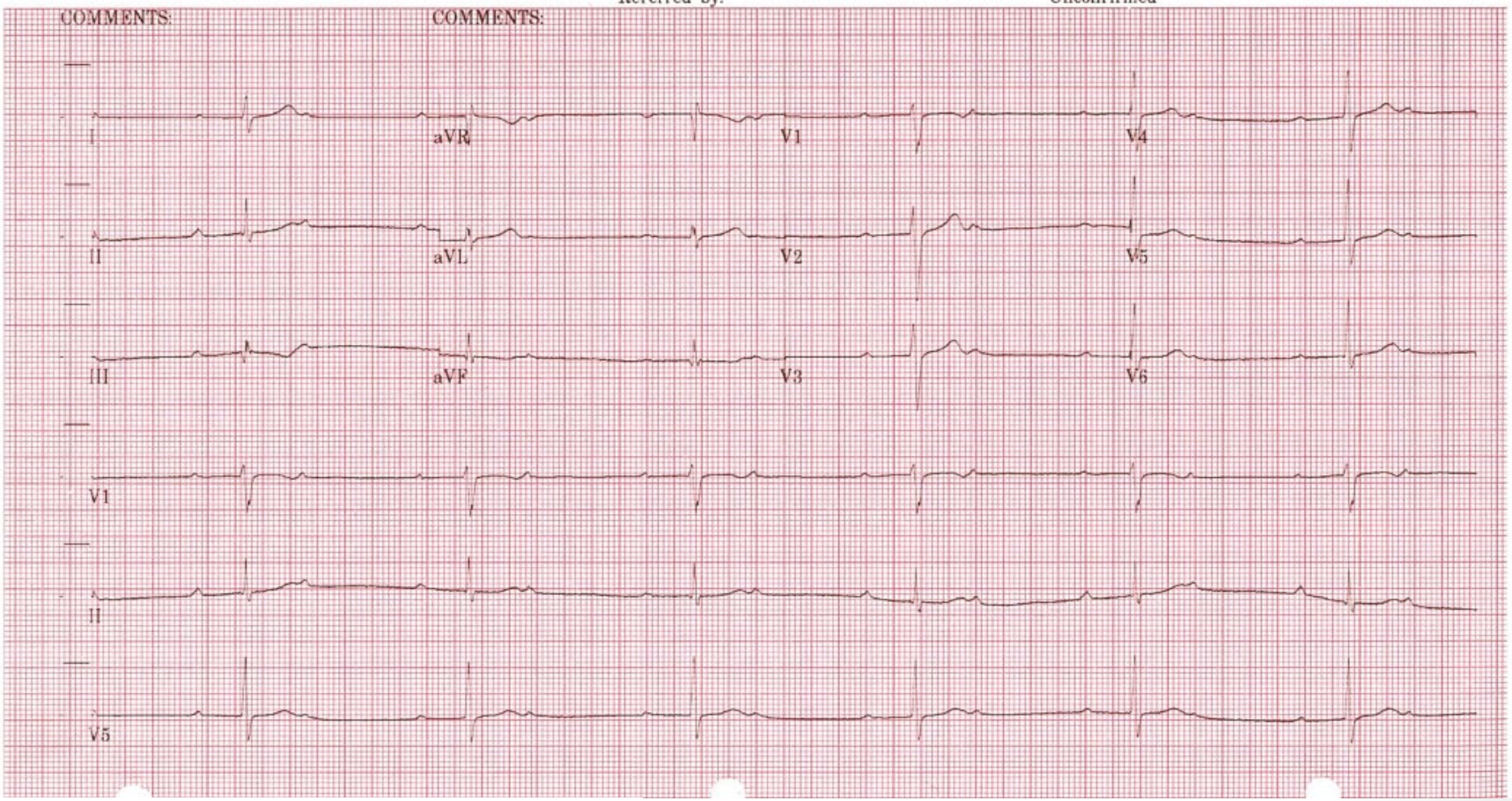
1-Oct-2016 8:54:28 Kingston General Hospital

Vent. rate	38	bpm
PR interval	354	ms
QRS duration	102	ms
QT/QTc	418/332	ms
P-R-T axes	59 48	-2

Sinus rhythm with 2nd degree AV block with 2:1 AV conduction
Cannot rule out Inferior infarct, age undetermined
Abnormal ECG

Technician: 509

Referred by: Unconfirmed



Kingston General Hospital
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2-Oct-2016 8:34:31 Kingston General Hospital

Vent. rate	53 bpm
PR interval	* ms
QRS duration	96 ms
QT/QTc	428/401 ms
P-R-T axes	* 48 5

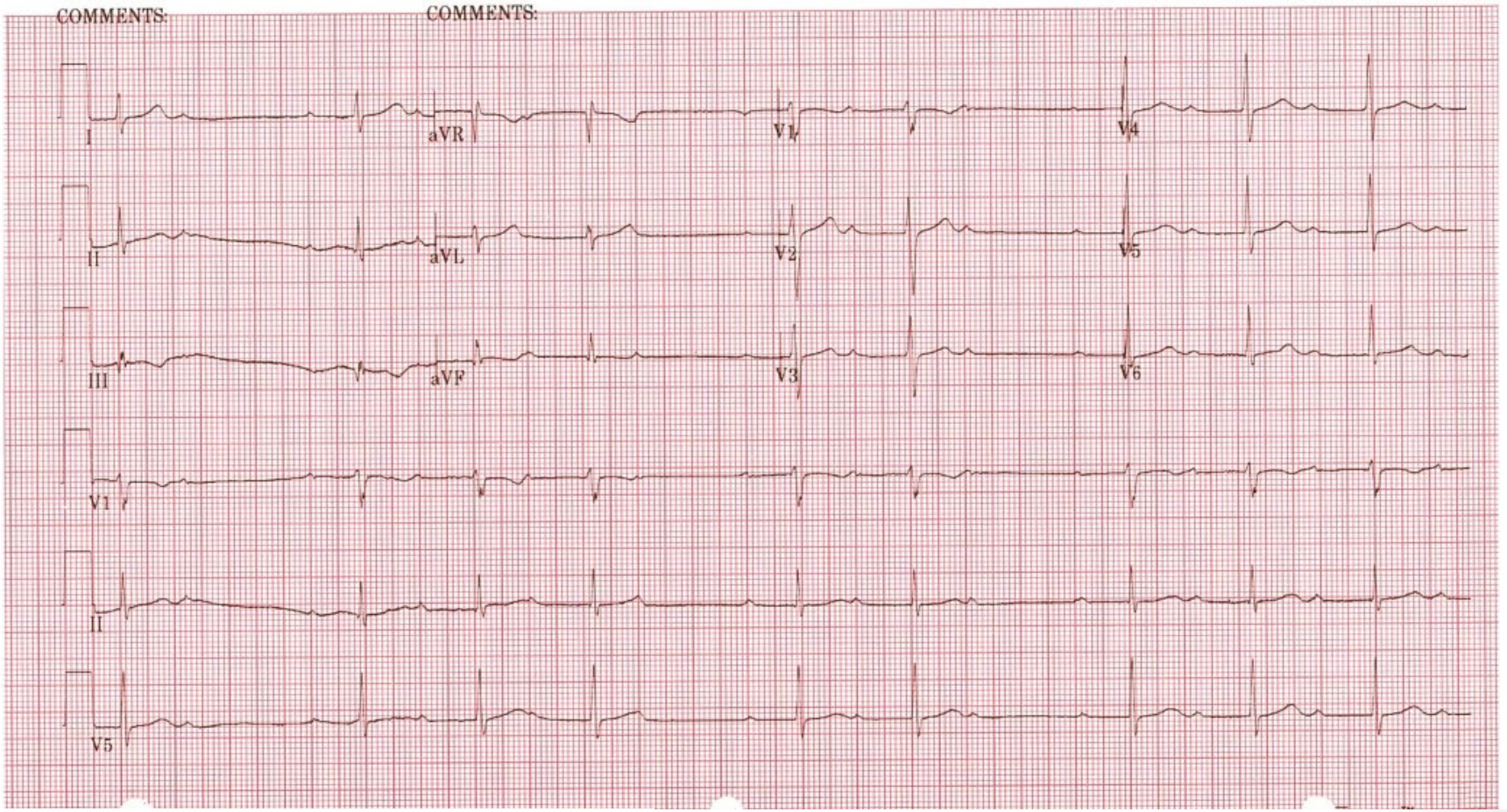
Sinus rhythm with 2nd degree AV block (Mobitz I)
Cannot rule out Inferior infarct, age undetermined
Abnormal ECG

Technician:

Unconfirmed

COMMENTS:

COMMENTS:



4-Oct-2016 7:09:08 Kingston General Hospital

Vent. rate	50 bpm
PR interval	312 ms
QRS duration	100 ms
QT/QTc	420/382 ms
P-R-T axes	36 58 11

Sinus bradycardia with 1st degree AV block
Otherwise normal ECG

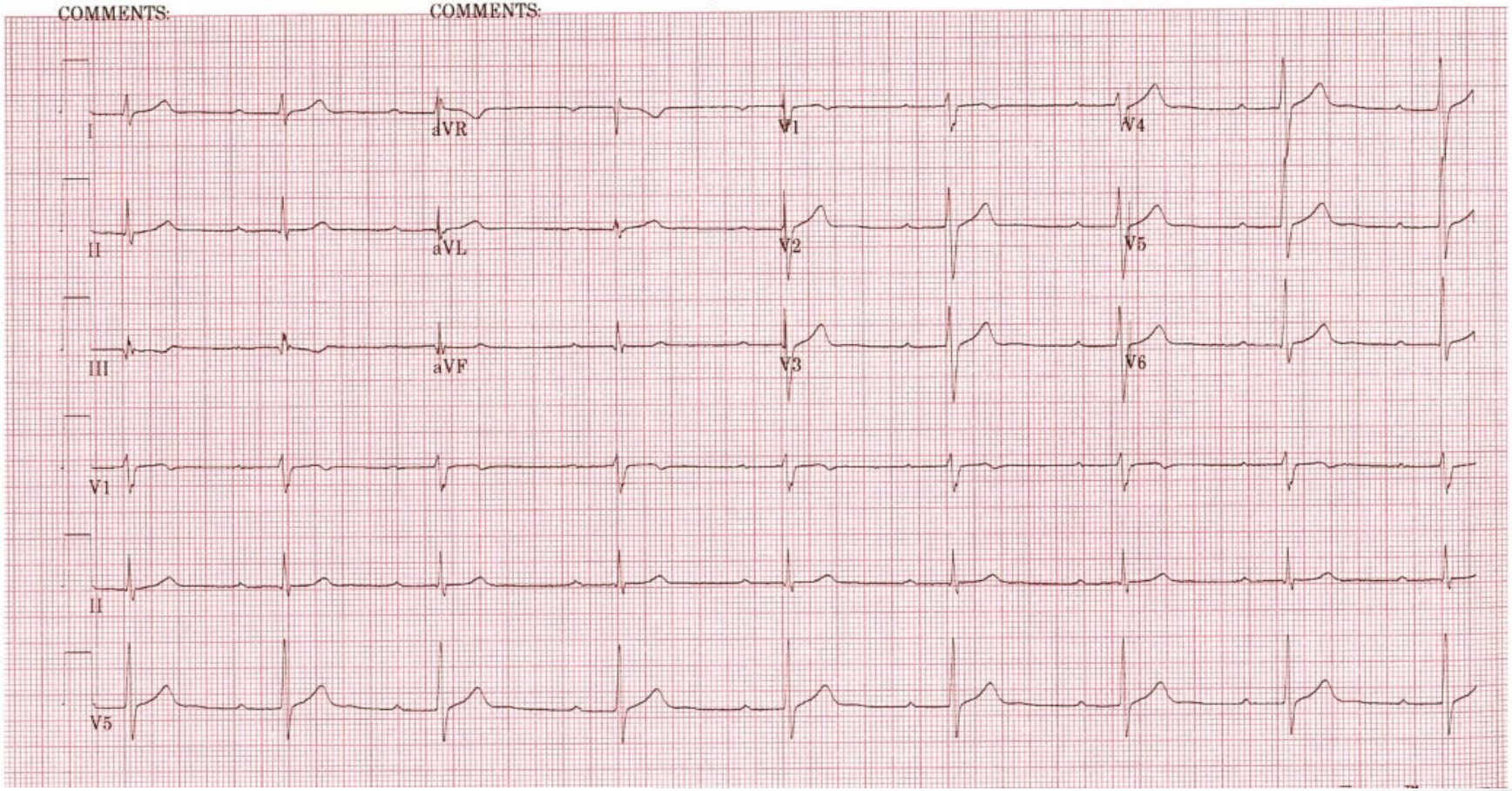
Technician: 4

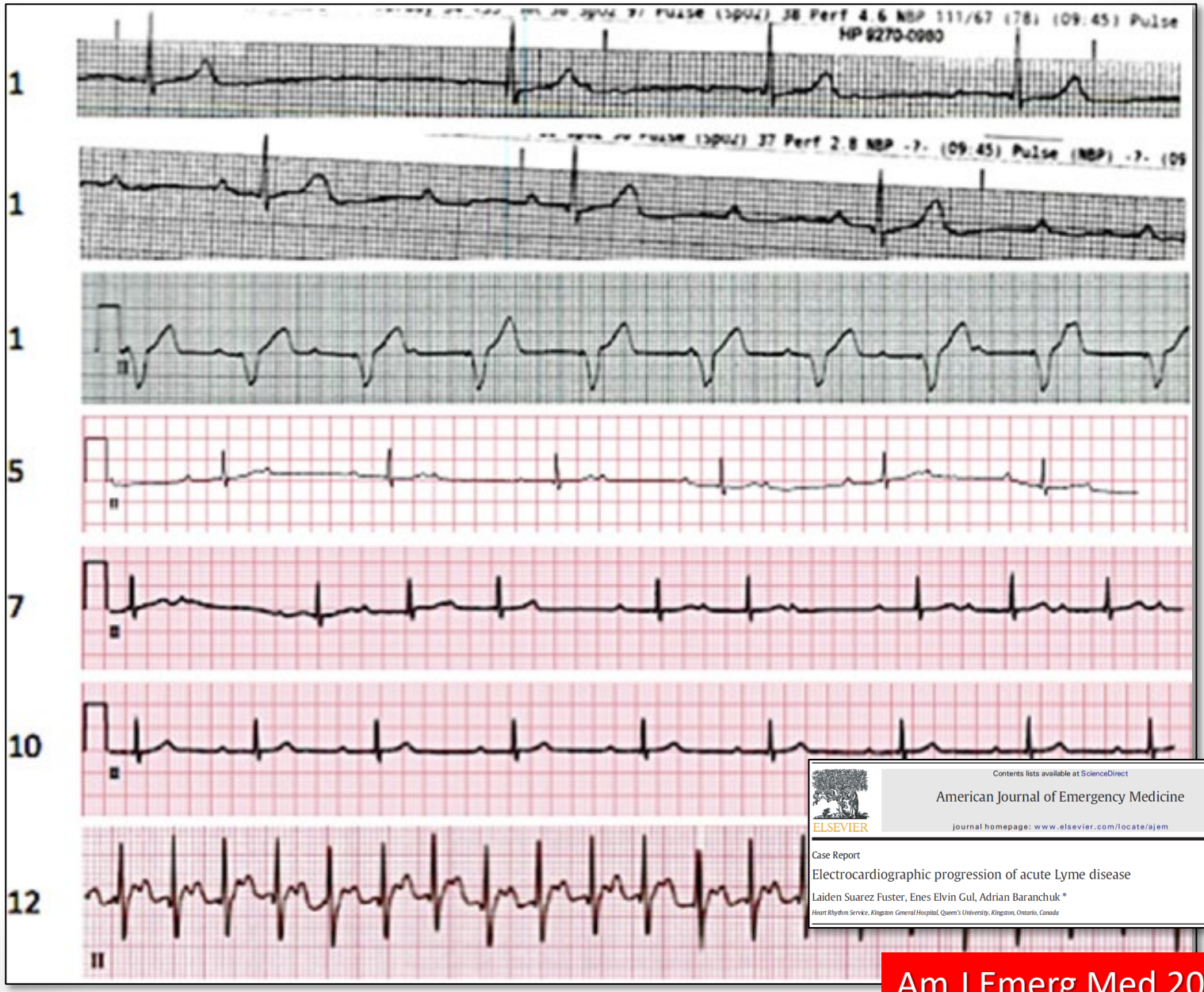
Referred by:

Unconfirmed

COMMENTS:

COMMENTS:





Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Case Report

Electrocardiographic progression of acute Lyme disease

Laiden Suarez Fuster, Enes Elvin Gul, Adrian Baranchuk *

Heart Rhythm Service, Kingston General Hospital, Queen's University, Kingston, Ontario, Canada

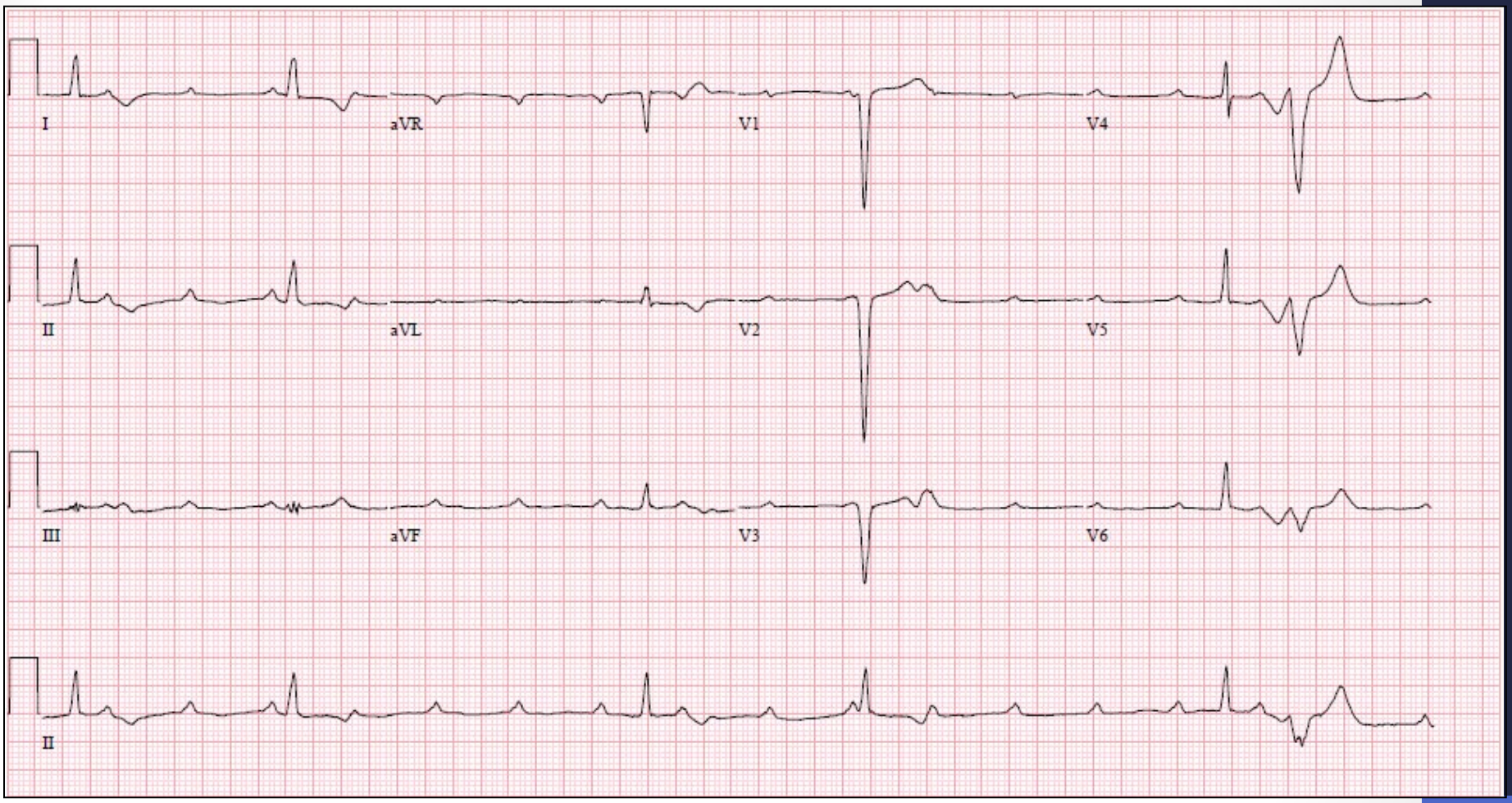
Am J Emerg Med 2017

Case Study #2

- 35 year old male
- Risk factors: works as a *roofer* in the Kingston area, no bug bite recollection, no classic target lesions, abuse of cocaine and marijuana
  - Reports syncope with facial trauma preceeded by “flu-like” symptoms
- Admitted to KGH with high-degree AV block
- ECG showed high-degree AV block with HR <35 bpm
- Serology for Lyme sent day 1 (positive); Ceftriaxone IV started (21 days)
- Temporary pacemaker inserted
  - Temporary pacemaker removed at day 5th
  - Echo: mild-moderate RV dysfunction
  - MRI: Mild RV dilation, RVEF 47%, no gadolimium enhancement
  - Angio: normal
  - Stress test pre-discharge: 1:1 conduction above 160 bpm

Case Study #2

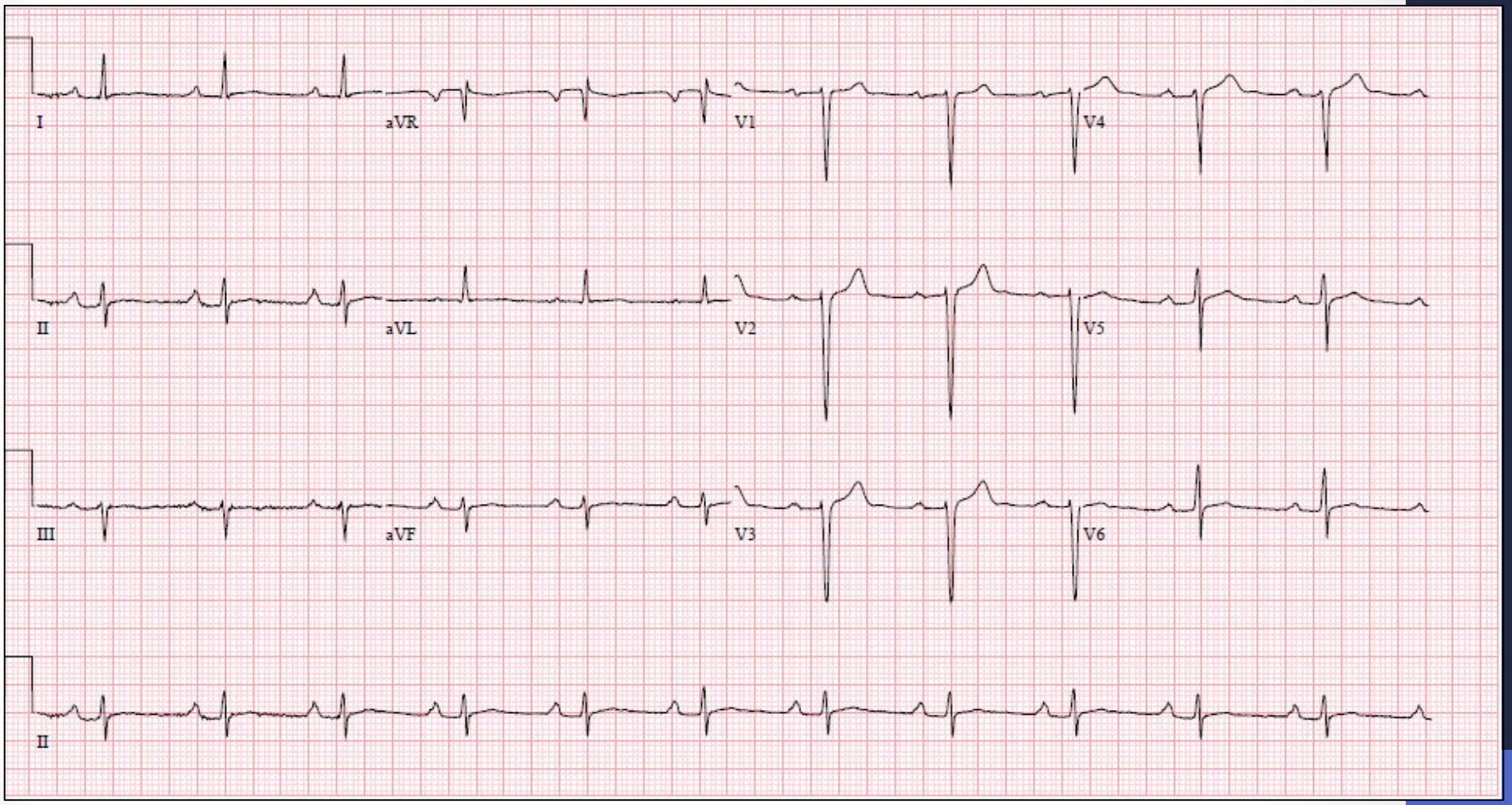
Day 1



High degree AV Block

Case Study #2

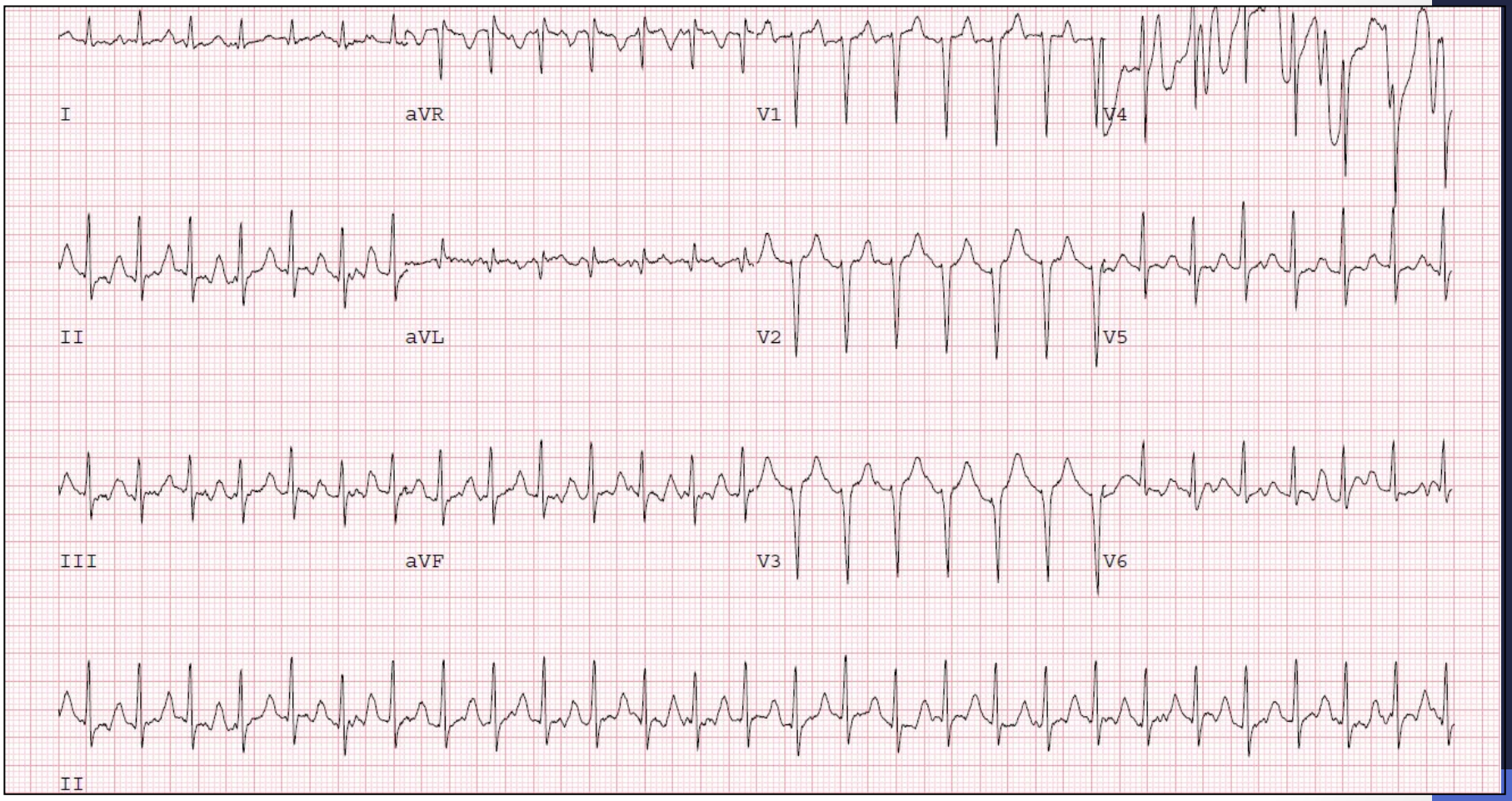
Day 6



1st degree AV Block

Case Study #2

Stress test
pre-D/C



1:1 conduction up to 175 bpm

Lyme Carditis and High-Degree Atrioventricular Block

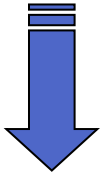
Douglas Wan, MD, Crystal Blakely, RN, Pamela Branscombe, RN, Laiden Suarez-Fuster, MD, Benedict Glover, MD, and Adrian Baranchuk, MD*

The American Journal of Cardiology

Am J Cardiol 2018

Findings in 5 males with symptomatic Lyme disease and positive Lyme serology

	1	2	3	4	5
Age (years)	23	35	30	14	19
Recognized tick bite	Y	N	Y	N	Y
Erythema migrans	N	N	N	Y	N
Lyme suspected on visit #	4th	1st	2st	2nd	1st
Atrioventricular block	3°	3°	3°	2°	2°
Temporary pacing wire	N	Y	Y	N	N
High degree AVB resolution (days)	5d	3d	10d	6d	2d



NO PERMANENT PACEMAKER IMPLANTED!!!

CMAJ
Medical knowledge that matters

Lyme carditis and atrioventricular block

Douglas Wan MD, Adrian Baranchuk MD

CMAJ 2018

1 **Lyme carditis may be an early manifestation of Lyme disease**

Lyme disease is a tick-borne bacterial infection (mainly *Borrelia burgdorferi*)

2 **A diagnosis of Lyme carditis should be considered in younger patients with severe conduction abnormalities**

3 **Atrioventricular block in Lyme carditis can progress rapidly and be fatal**

4 **Early treatment with antibiotics may prevent irreversible conduction disease in Lyme carditis**

5 **Before considering implantation of a permanent pacemaker, clinicians should wait for response to antibiotic treatment for atrioventricular block requiring temporary pacing**

The Queen's approach to the diagnosis & treatment of LC

Clin Cardiol 2018

Suspicious index in Lyme carditis: Systematic review and proposed new risk score

Georgia Besant | Douglas Wan | Cynthia Yeung | Crystal Blakely | Pamela Branscombe | Laiden Suarez-Fuster | Damian Redfearn | Christopher Simpson | Hoshiar Abdollah | Benedict Glover | Adrian Baranchuk

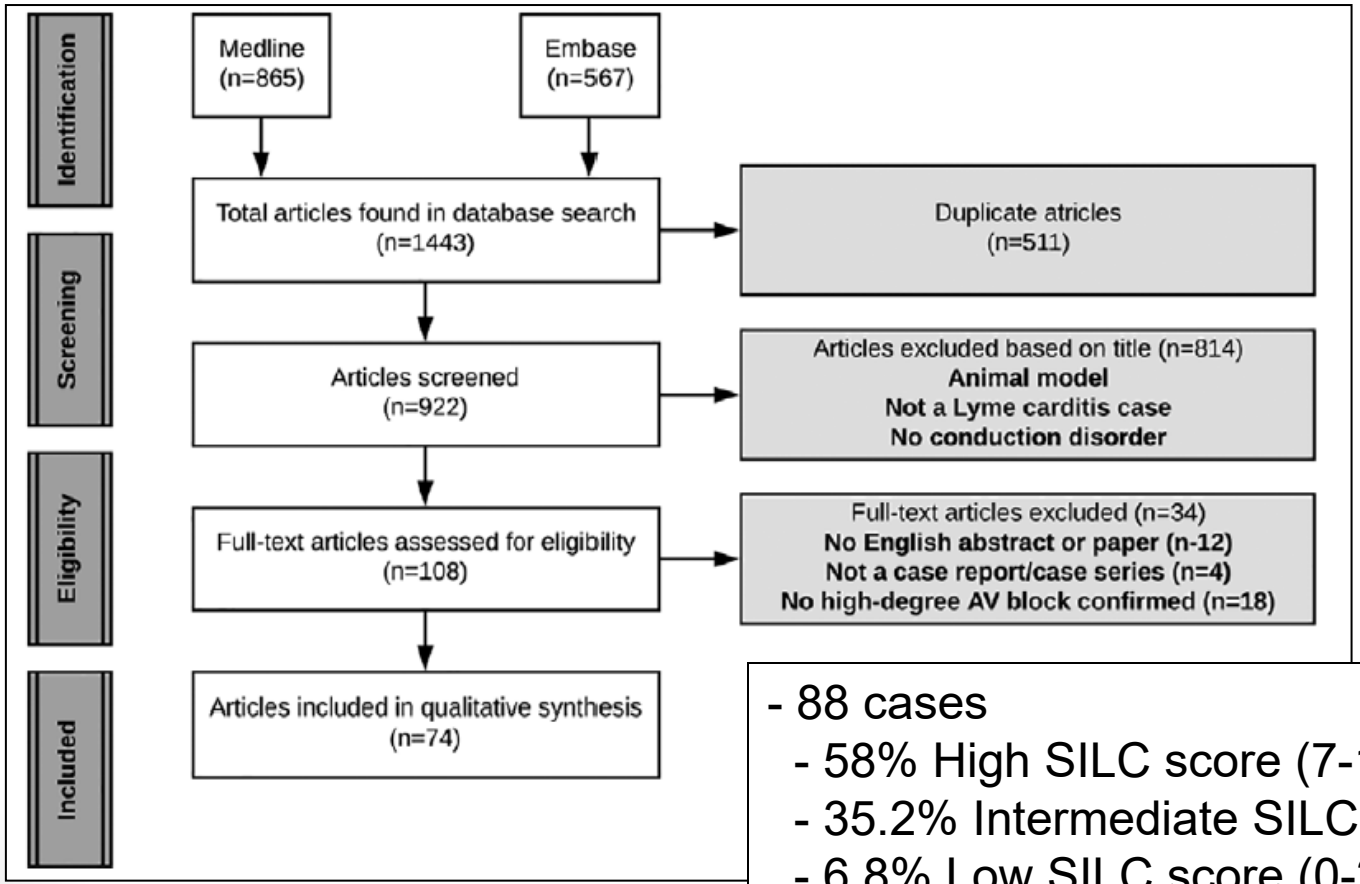
COSTAR

Variable	Value
Constitutional symptoms[a]	2
Outdoor activity/endemic area	1
Sex = male	1
Tick bite	3
Age < 50	1
Rash = erythema migrans	4

Suspicious index in Lyme carditis: Systematic review and proposed new risk score

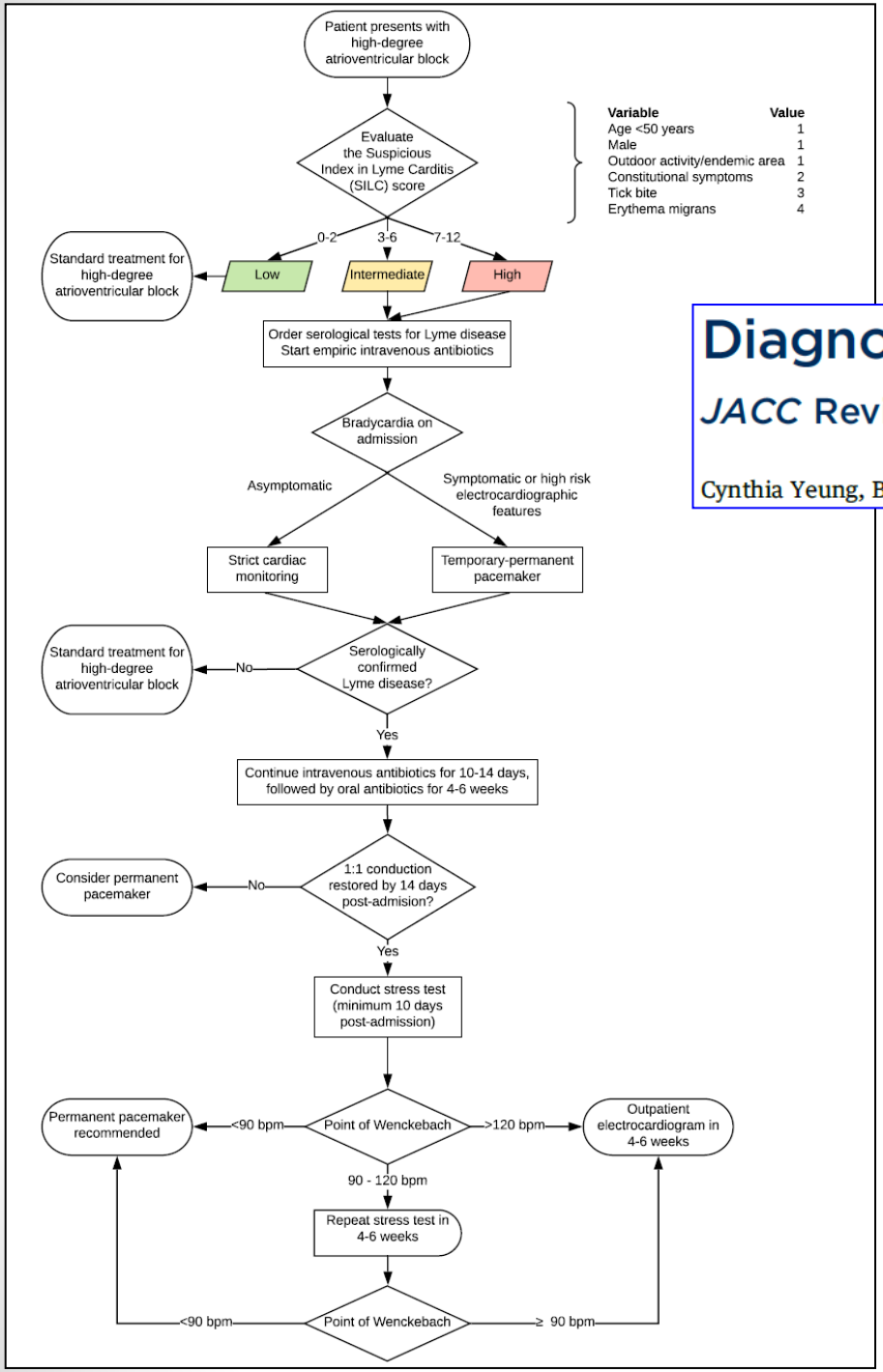
Georgia Besant | Douglas Wan | Cynthia Yeung | Crystal Blakely | Pamela Branscombe | Laiden Suarez-Fuster | Damian Redfearn | Christopher Simpson | Hoshiar Abdollah | Benedict Glover | Adrian Baranchuk

Clin Cardiol 2018



Sens 93.2%

- 88 cases
  - 58% High SILC score (7-12)
  - 35.2% Intermediate SILC (3-6)
  - 6.8% Low SILC score (0-2)



Diagnosis and Treatment of Lyme Carditis

JACC Review Topic of the Week

Cynthia Yeung, BSc, Adrian Baranchuk, MD

JACC
JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY

JACC; Feb 19 2019

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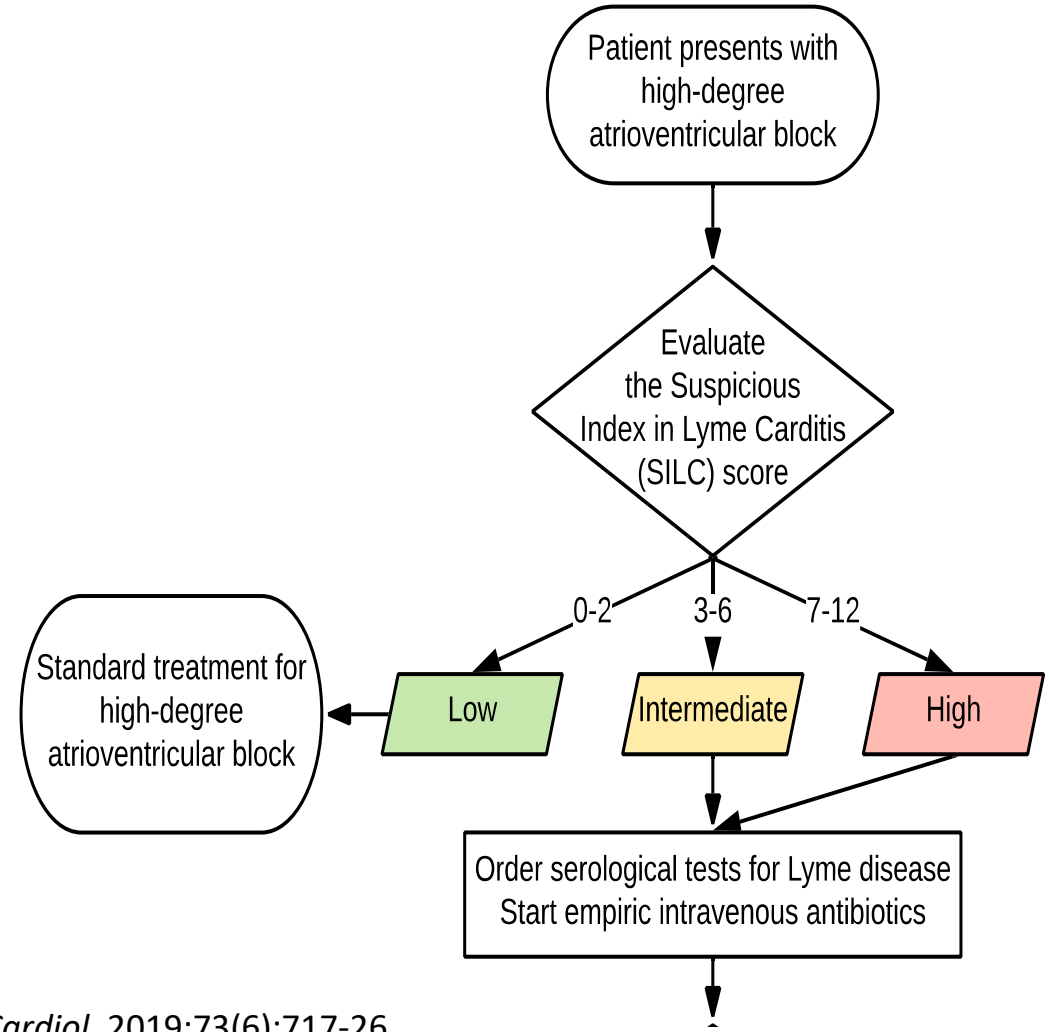

Variable	Value
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Age < 50 years	1
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J Am Coll Cardiol. 2019;73(6):717-26.

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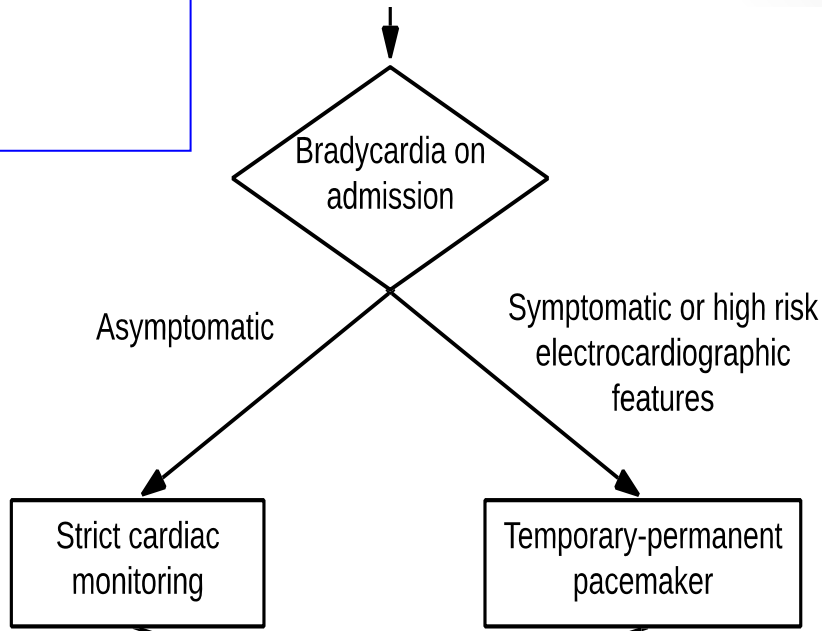

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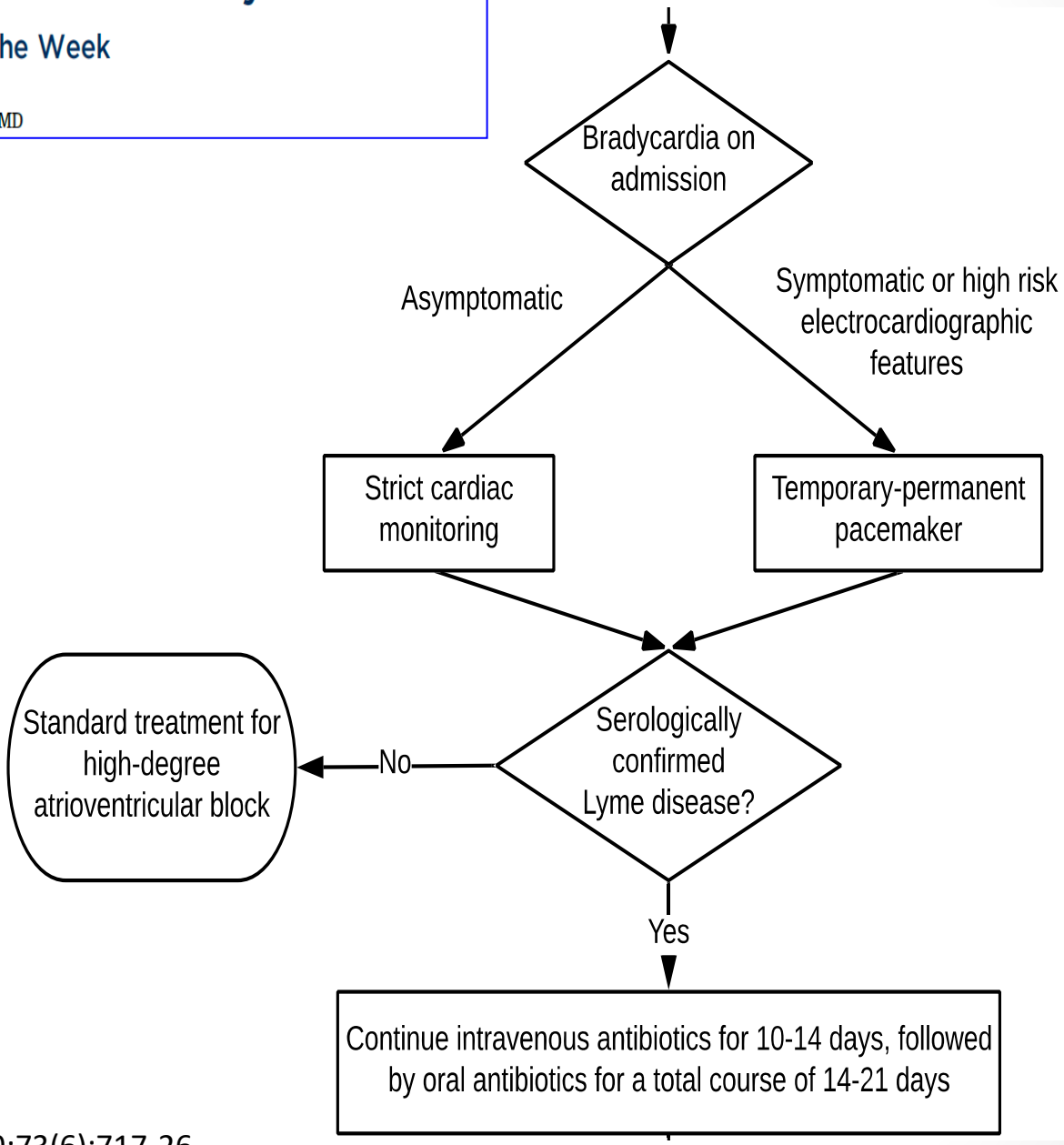

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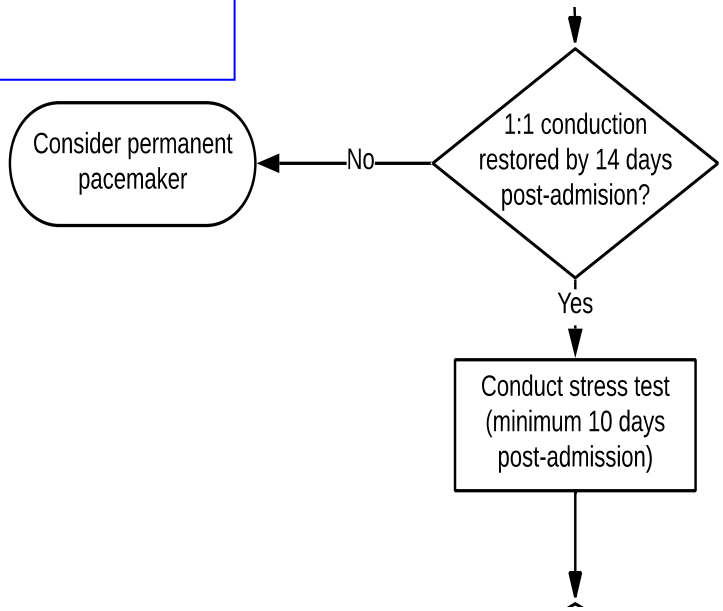

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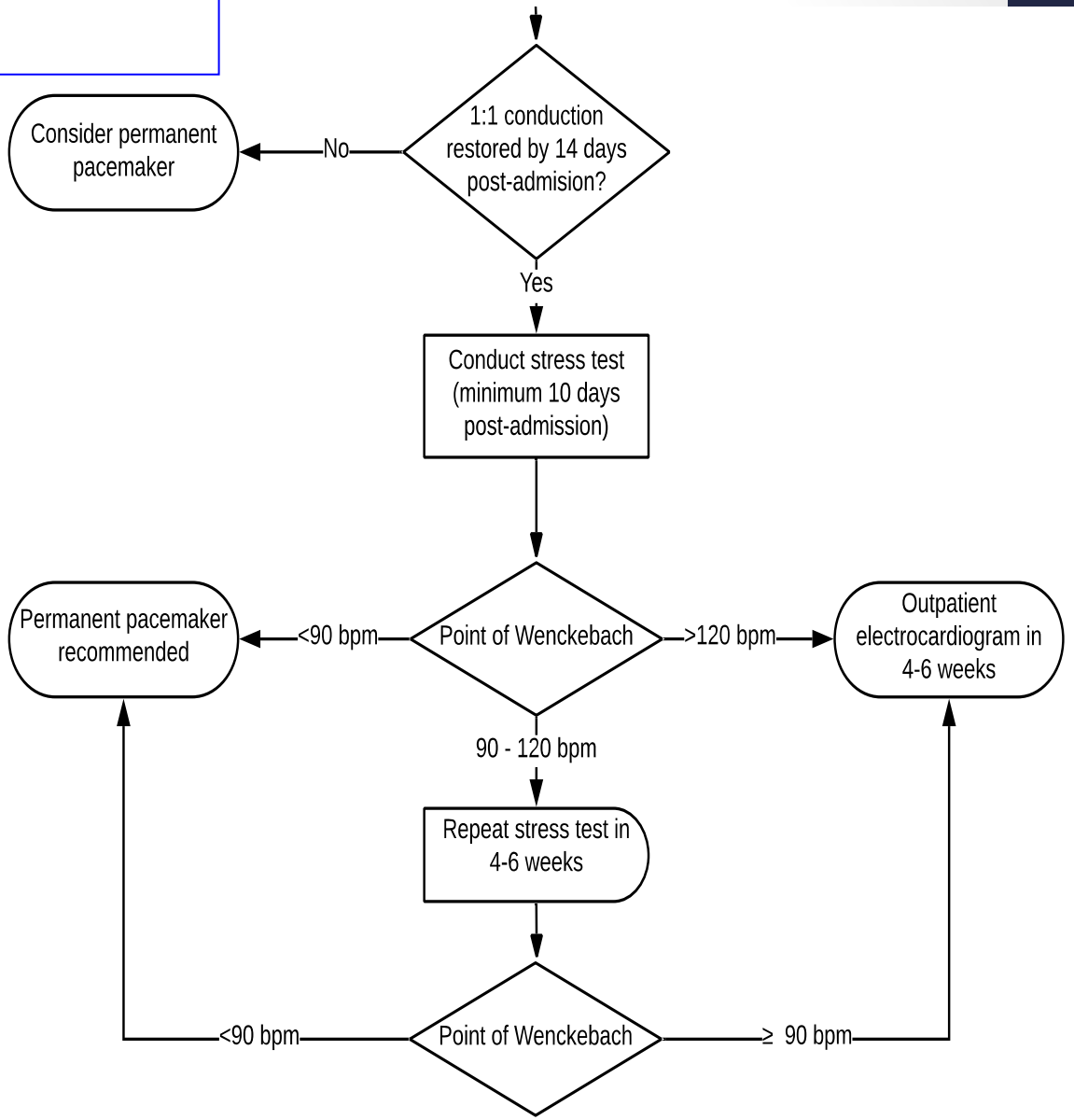

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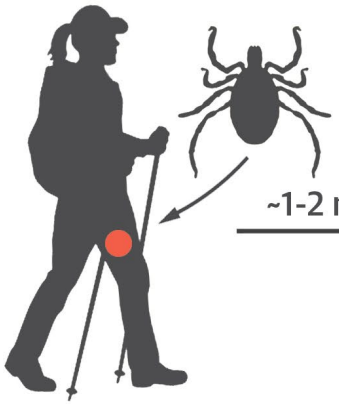
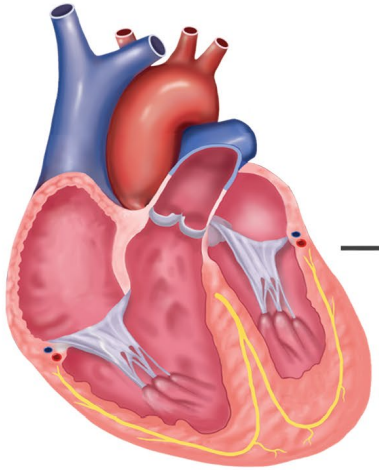


~1-2 months

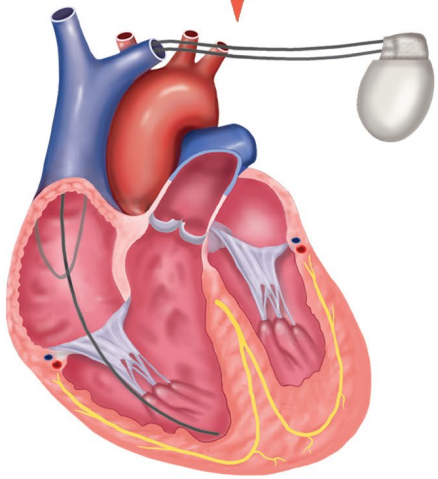
Lyme disease is a tick-borne bacterial infection



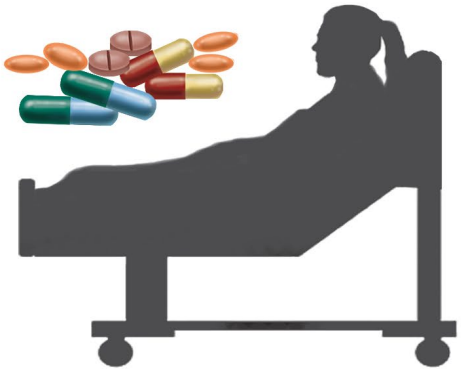
High-degree atrioventricular block occures in 80-90% of Lyme carditis

Patients often seek medical attention multiple times before the correct diagnosis is made

X



Since the high-degree atrioventricular block in Lyme carditis usually resolves with antibiotic therapy, permanent pacemaker implantation is not necessary

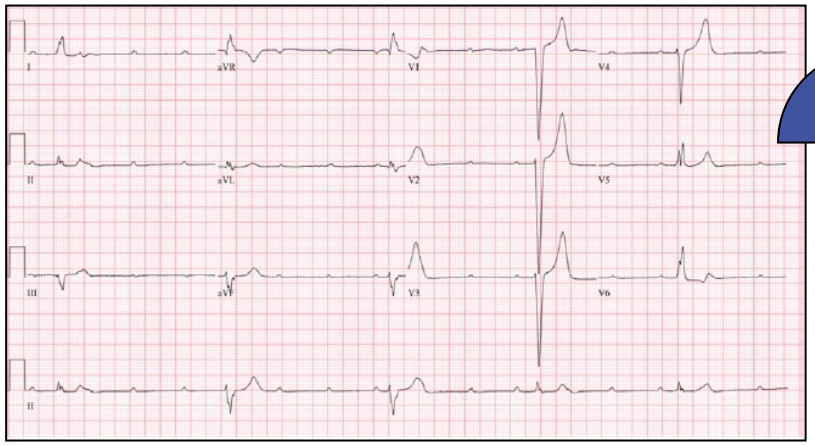


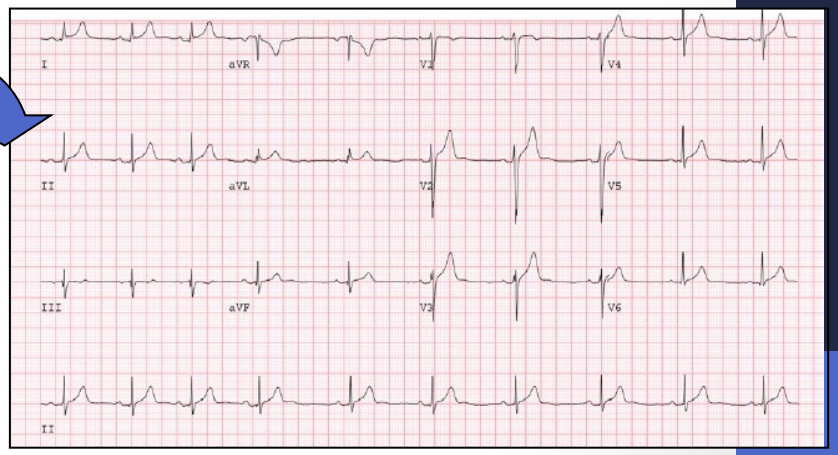
Changes in our approach as we learn more…

ANEC 2018

Treating Lyme carditis high-degree AV block using a temporary–permanent pacemaker

Chang Wang | Sanoj Chacko | Hoshiar Abdollah | Adrian Baranchuk

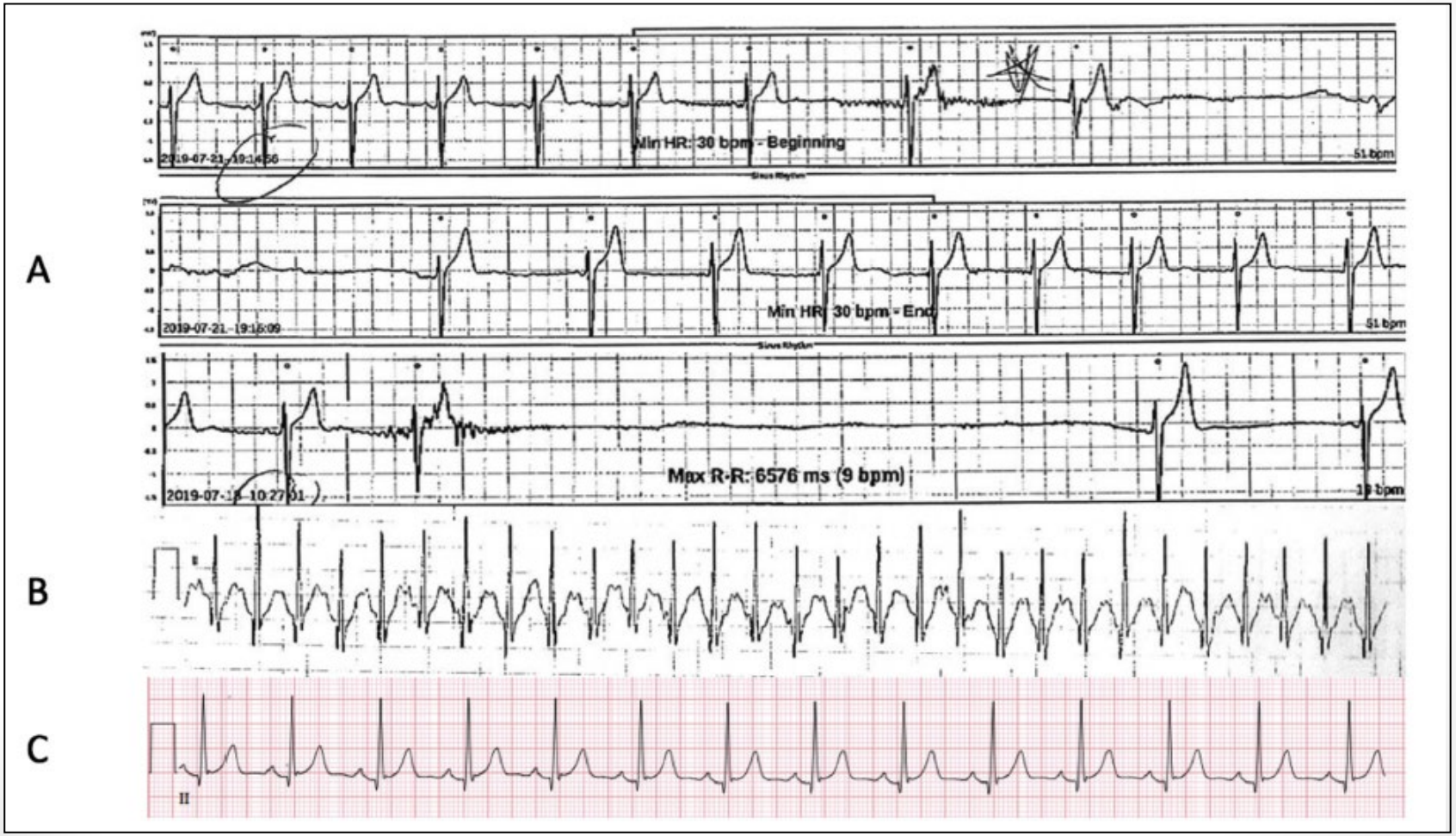




Lyme carditis presenting as sick sinus syndrome☆

Naomi Gazendam, Cynthia Yeung, BSc, Adrian Baranchuk, MD*

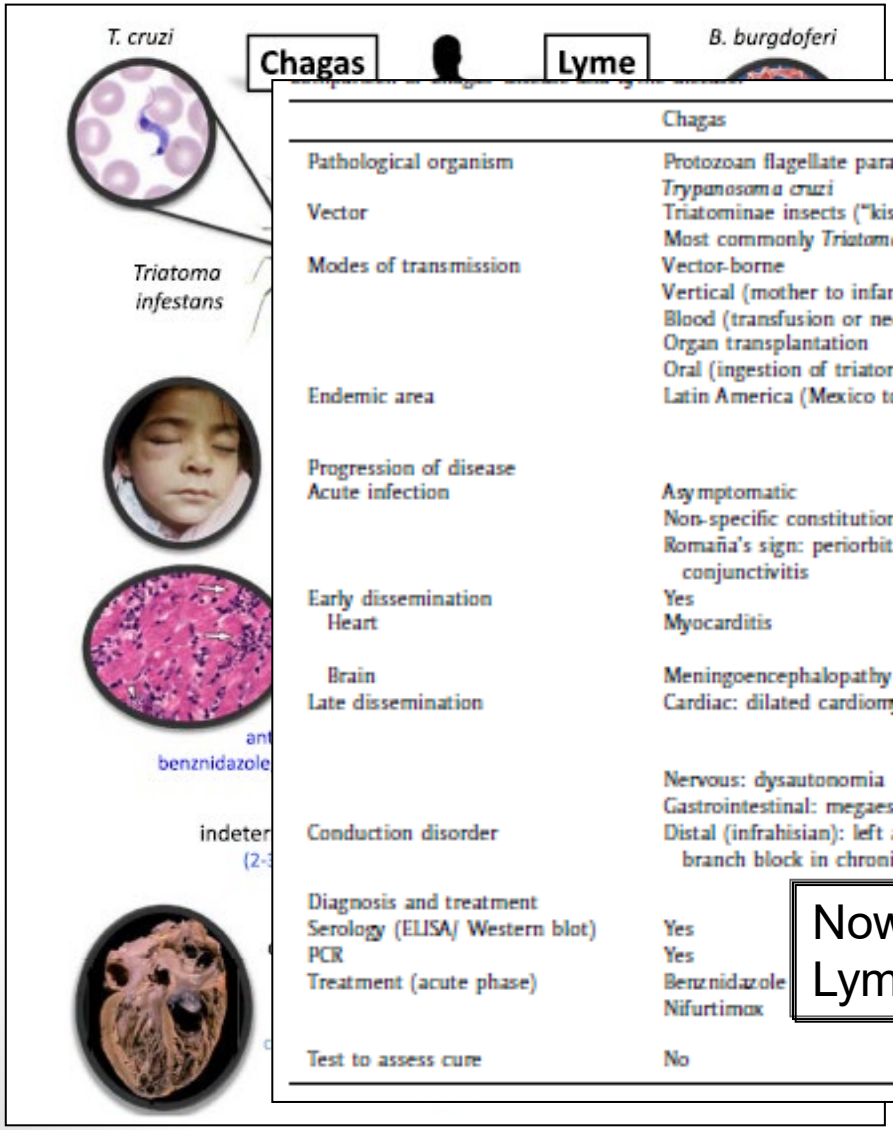
J Electrocardiol 2020



Chagas' cardiomyopathy and Lyme carditis: Lessons learned from two infectious diseases affecting the heart ☆,☆☆

Cynthia Yeung [a], Ivan Mendoza [b], Luis Eduardo Echeverria [c], Adrian Baranchuk [a,*]

Trends Cardiovasc Med 2020



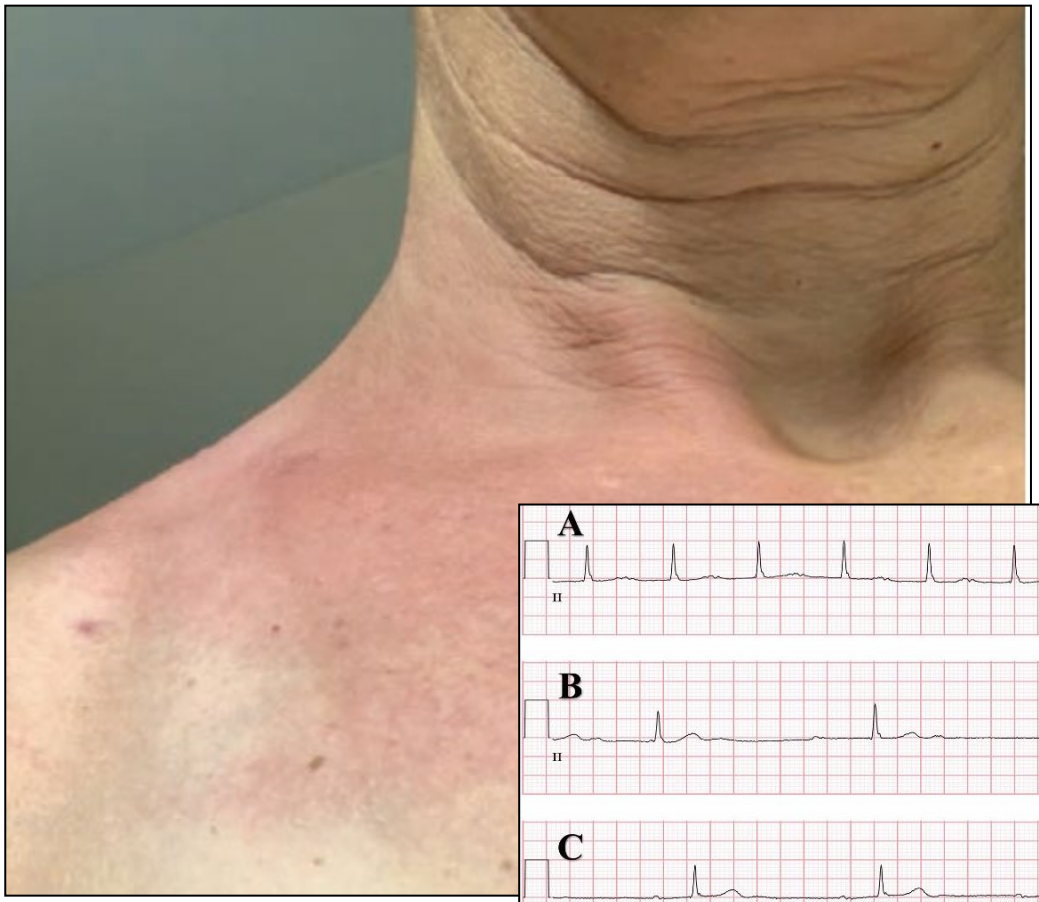
	Chagas	lyme
Pathological organism	Protozoan flagellate parasite *Trypanosoma cruzi*	Spirochete flagellate bacteria Usually *Borrelia burgdoferi*
Vector	Triatominae insects ("kissing bug") Most commonly *Triatoma infestans*	Hard-bodied tick ("blacklegged tick" or "deer tick") Most commonly *Ixodes scapularis*
Modes of transmission	Vector-borne Vertical (mother to infant) Blood (transfusion or needle-stick injury) Organ transplantation Oral (ingestion of triatomine-contaminated foods)	Vector-borne Limited evidence for autochthonous modes of transmission
Endemic area	Latin America (Mexico to Argentina)	Some regions of Canada, United States, Mexico, central Europe, and Asia
Progression of disease		
Acute infection	Asymptomatic Non-specific constitutional symptoms Romaña's sign: periorbital swelling, palpebral edema and conjunctivitis	Asymptomatic Non-specific constitutional symptoms Erythema migrans: pathognomonic "bulls eye" rash
Early dissemination Heart	Yes Myocarditis	Yes Atrioventricular block Less frequently myocarditis
Brain	Meningoencephalopathy	Meningitis, facial nerve palsy, neuropathy
Late dissemination	Cardiac: dilated cardiomyopathy	Cardiac: unknown
		Musculoskeletal: arthritis
		Nervous: encephalopathy, neuropathy
	Nervous: dysautonomia	
	Gastrointestinal: megaesophagus, megacolon	
Conduction disorder	Distal (infrahisian): left anterior fascicular block, right bundle branch block in chronic phase	High-degree AVB (suprahisian) in early phase
Diagnosis and treatment		
Serology (ELISA/ Western blot)	Yes	Yes
PCR	Yes	Yes
Treatment (acute phase)	Benznidazole Nifurtimox	Ceftriaxone Doxycycline Amoxicillin
Test to assess cure	No	No

Now:
Lyme & COVID-19?

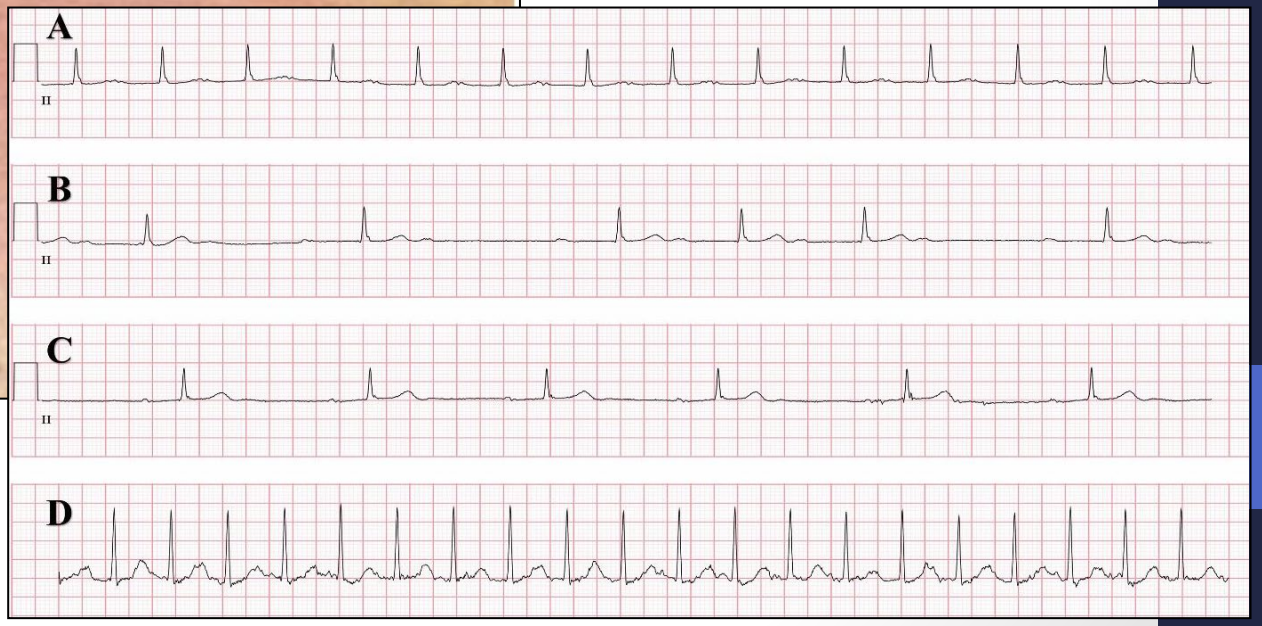
Lyme carditis presenting with an atypical rash

Dennys Franco-Avecilla MD, Cynthia Yeung BSc, Adrian Baranchuk MD

CMAJ 2020



(55 y/o woman,
SILC = 8 (high!)



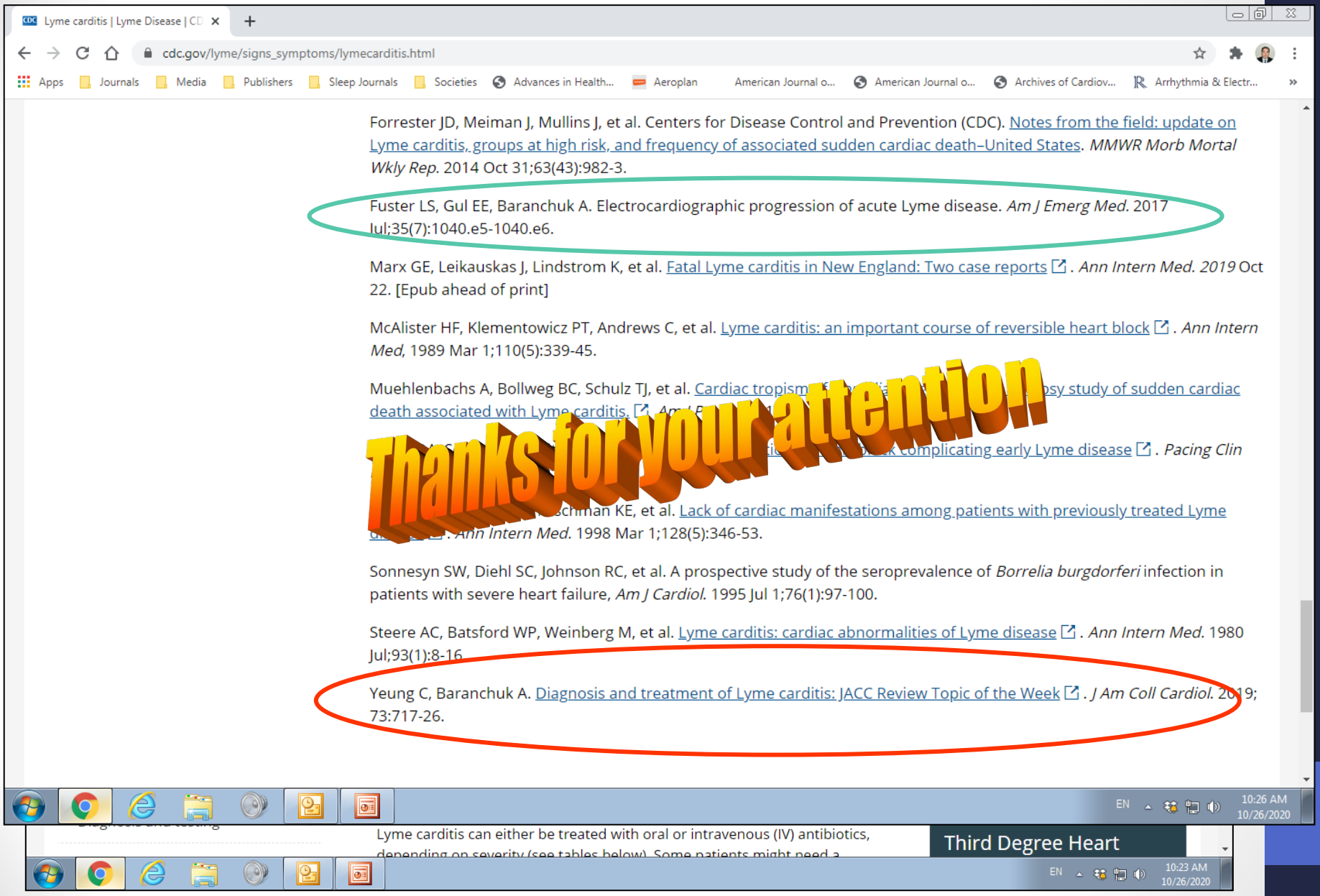
Long-term Outcomes in Treated Lyme Carditis

(more than 12 months FU)

- A prospective observational study of patients with serologically-confirmed LC from our center treated with a Protocol designed at our institution.
- Patients with clinical follow-up and electrocardiogram ≥12 months

Demographics	
Age (years)	27 (14-35)
Male (%)	100
Initial admission for Lyme carditis	
Suspicious Index in Lyme Carditis score	7 (5-12)
Temporary pacing wire (%)	20
Abnormal echocardiogram during admission (%)	40
Time to resolution of conduction abnormalities (days)	4.5 (2-10)
Follow-up	
Asymptomatic (%)	100
Sinus rhythm (%)	100
Heart rate (bpm)	48.5 (47-103)
PR interval (ms)	164 (150-188)
QRS interval (ms)	92 (82-102)

Mean follow up time 17 months (range 14-44 months)


Lyme carditis | Lyme Disease | CD
cdc.gov/lyme/signs_symptoms/lymecarditis.html
Apps
Journals
Media
Publishers
Sleep Journals
Societies
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Thanks for your attention
EN
10:26 AM
10/26/2020
Lyme carditis can either be treated with oral or intravenous (IV) antibiotics,
Third Degree Heart
EN
10:23 AM
10/26/2020