OMICS GROUP

OMICS Group International through its Open Access Initiative is committed to make genuine and reliable contributions to the scientific community. OMICS Group hosts over **400** leading-edge peer reviewed Open Access Journals and organizes over **300** International Conferences annually all over the world. OMICS Publishing Group journals have over **3 million** readers and the fame and success of the same can be attributed to the strong editorial board which contains over **30000** eminent personalities that ensure a rapid, quality and quick review process. OMICS Group signed an agreement with more than **1000** International Societies to make healthcare information Open Access.

OMICS Journals are welcoming Submissions

OMICS Group welcomes submissions that are original and technically so as to serve both the developing world and developed countries in the best possible way.

OMICS Journals are poised in excellence by publishing high quality research. OMICS Group follows an Editorial Manager® System peer review process and boasts of a strong and active editorial board.

Editors and reviewers are experts in their field and provide anonymous, unbiased and detailed reviews of all submissions.

The journal gives the options of multiple language translations for all the articles and all archived articles are available in HTML, XML, PDF and audio formats. Also, all the published articles are archived in repositories and indexing services like DOAJ, CAS, Google Scholar, Scientific Commons, Index Copernicus, EBSCO, HINARI and GALE.

For more details please visit our website:
http://omicsonline.org/Submitmanuscript.php

Journal of General Practice-Open Access

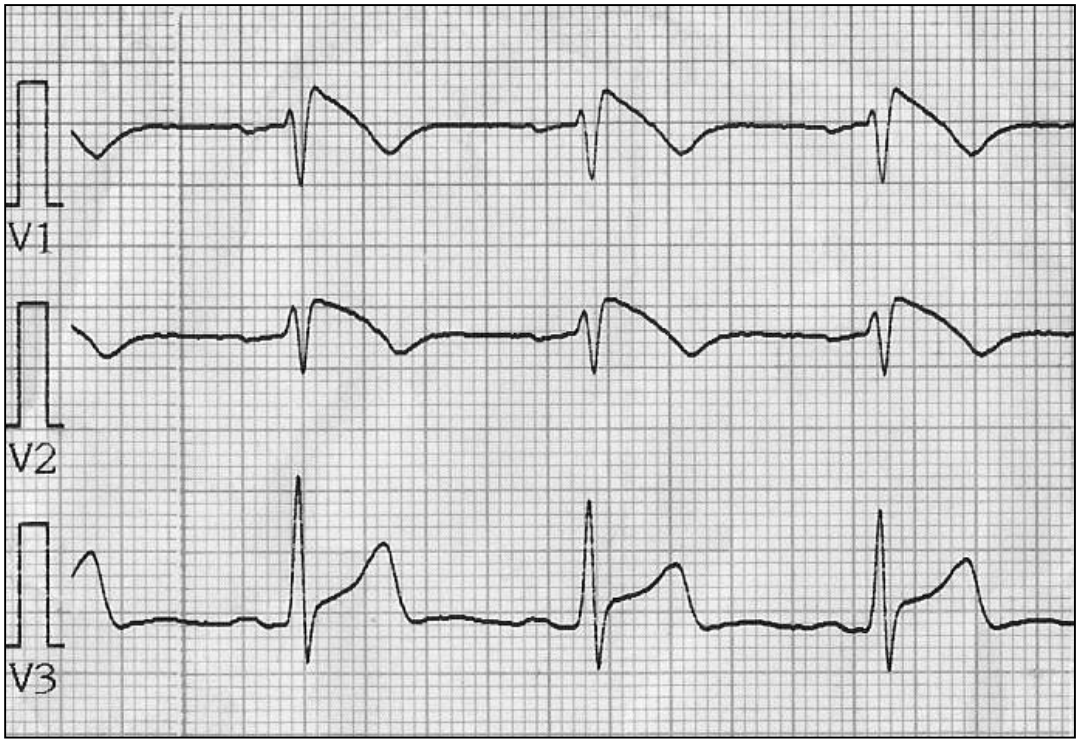
ISSN: 2329-9126

Dr. Adrian Baranchuk MD FACC FRCPC
Associate Professor of Medicine
Director EP Training Program
Queen's University
June 2014

Journal of General Practice-Open Access

ISSN: 2329-9126

Brugada Phenocopy: Update 2014

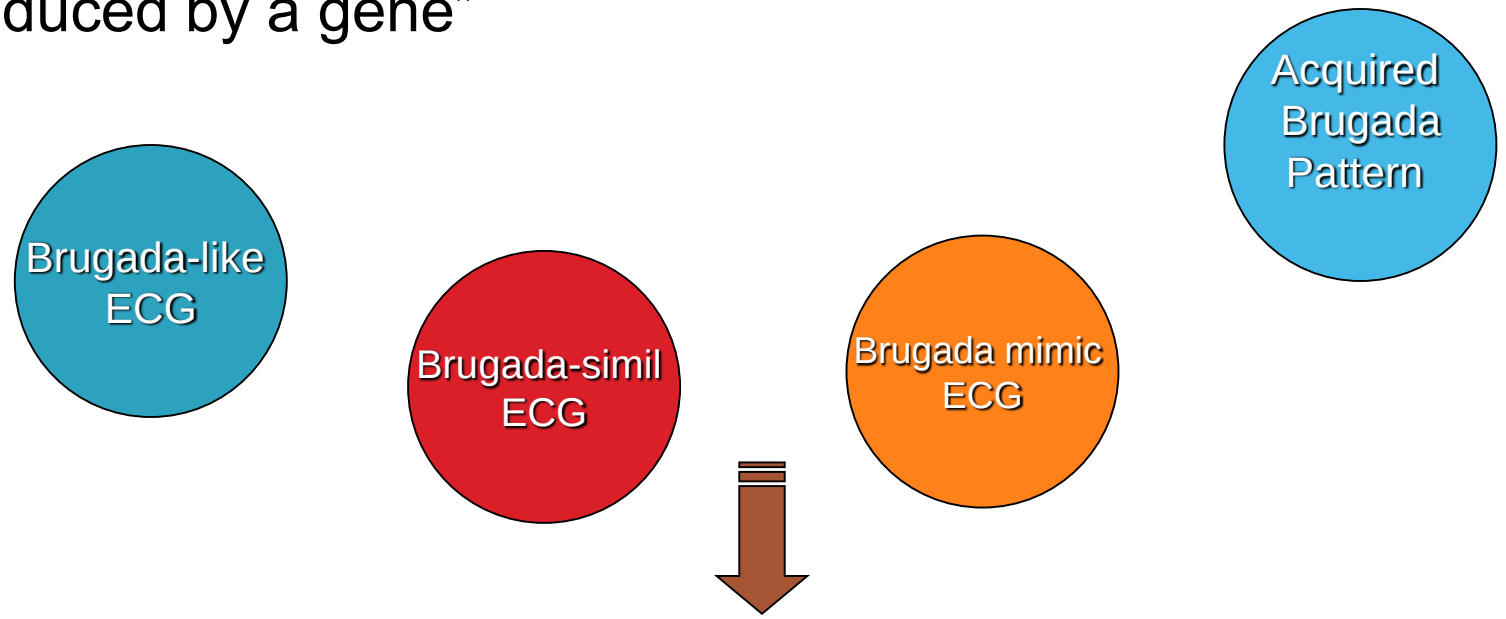


Journal of General Practice-Open Access

ISSN: 2329-9126

Phenocopy: Definition

"an environmental condition that imitates (copies) one produced by a gene"



BRUGADA PHENOCOPY

Journal of General Practice-Open Access

ISSN: 2329-9126

Brugada Phenocopy: New Terminology and Proposed Classification

Adrian Baranchuk, M.D., F.A.C.C., F.R.C.P.C.,* Timothy Nguyen, B.Sc.,* Min Hyung Ryu, B.Sc.,* Francisco Femenía, M.D.,† Wojciech Zareba, M.D., Ph.D.,‡ Arthur A.M. Wilde, M.D., Ph.D.,§ Wataru Shimizu, M.D., Ph.D.,¶ Pedro Brugada, M.D., Ph.D.,** and Andrés R. Pérez-Riera, M.D., Ph.D.‡‡

ANE 2012

1. Spontaneous Type-1 or type-2 ECG Brugada pattern
2. Underlying cause *justifying* the ECG abnormality
3. ECG normalization once the underlying cause is corrected
4. Lack of clinical features suggesting BrS (syncope/ aborted sudden death)
5. NEGATIVE Sodium channel blocker test (Fleca/Ajma/Procainamida)
6. Whenever possible NEGATIVE genetics (not mandatory!!!)
7. No surgical procedure involving the RVOT in the last 96 Hrs (new!!!)
8. Proper ECG filters (new!!!)

Journal of General Practice-Open Access

ISSN: 2329-9126

Why *negative genetics* is NOT a mandatory requisite?

a) Because only 25-30% of cases true Brugada Syndrome (BrS) depict positive genetics!!!

b) Therefore, NEGATIVE genetics do not rule out BrS

Journal of General Practice-Open Access

ISSN: 2329-9126

READERS' COMMENTS

Brugada Phenocopy: Redefinition and Updated Classification

Anselm, Baranchuk. Am J Cardiol 2012

Updated summary of Brugada phenocopies*

Category	Number of Patients (Number of Case Reports)	Age (years), Mean (Range)	Men/Women	ECG Type	Presence of Structural Heart Disease
Metabolic conditions	14 (14)	51.9 ± 17.8 (28–89)	13/1	13 type 1, 5 type 2, 4 variable	0 yes, 14 no
Mechanical Compression	6 (5)	45.7 ± 18.5 (19–66)	3/3	6 type 1, 0 type 2, 0 variable	3 yes, 3 no
Ischemia	4 (4)	60.0 ± 6.7 (55–68)	2/2	4 type 1, 1 type 2, 1 variable	1 yes, 3 no
Myocardial and pericardial disease	8 (6)	46.2 ± 13.9 (28–72)	5/3	5 type 1, 4 type 2, 2 variable	2 yes, 6 no
ECG modulation†	1 (1)	55 (55)	0/1	0 type 1, 1 type 2, 0 variable	0 yes, 1 no
Miscellaneous	2 (2)	22.5 ± 0.7 (22–23)	1/1	2 type 1, 1 type 2, 1 variable	1 yes, 1 no

* Adapted from Baranchuk et al.[2]

† Updated category of Brugada phenocopy on the basis of inappropriate ECG high-pass filtering.[1]

García-Niebla, Bayés de Luna Am J Cardiol 2012

Updates to the classification were needed…

Journal of General Practice-Open Access

ISSN: 2329-9126

Brugada Phenocopy in the context of pulmonary embolism

Anselm, Baranchuk. Int J Cardiol 2013

Category
i. Metabolic conditions
ii. Mechanical compression
iii. Ischemia & pulmonary embolism[a]
iv. Myocardial & pericardial disease
v. ECG modulation
vi. Miscellaneous

[a] Updated category of Brugada Phenocopy to include pulmonary embolism.

Let's avoid confusion…

Journal of General Practice-Open Access

ISSN: 2329-9126

Useful definitions to remember

Brugada Syndrome

Types 1 & 2 ECG pattern,

Symptoms,

Aborted SD,

Family history

Sodium channel blocker test is POSITIVE

Brugada ECG Pattern

Types 1 & 2 ECG pattern,

(defined as per 3er Consensus, JE 2012)

Brugada Phenocopy

Spontaneous

Types 1 & 2 ECG pattern

Underlying cause

ECG resolution upon

Resolution of underlying cause

Sodium channel blocker test is NEGATIVE

Journal of General Practice-Open Access

ISSN: 2329-9126

New morphological classification 2014

1. Type-1: ECG identical to true type-1 Brugada ECG pattern
2. Type-2: ECG identical to true type-2 Brugada ECG pattern

   Sub-types

   A: All conditions for BrP are met

   B: Not all aconditions for BrP are met

   C: Not all conditions are necessary (i.e. ECG modulation)

   ECG Modulation)

Journal of General Practice-Open Access

ISSN: 2329-9126

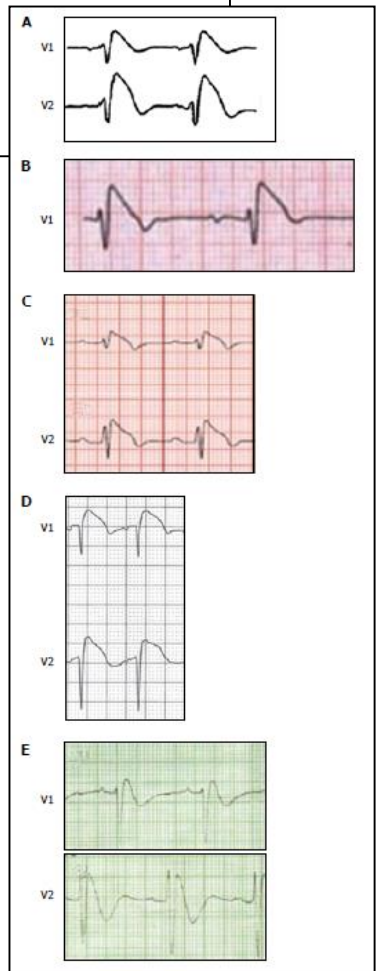
Brugada phenocopy: A new electrocardiogram phenomenon

Daniel D Anselm, Jennifer M Evans, Adrian Baranchuk

World J Cardiol 2014

Type-1 BrP

A. True BrS ECG (coved)
B. Acute inferior MI w/RV involvement
C. Hyperkalemia & acidosis
D. Acute pulmonary embolism
E. Hypokalemia (hypokalemic periodic paralysis)



Journal of General Practice-Open Access

ISSN: 2329-9126

Brugada phenocopy: A new electrocardiogram phenomenon

Daniel D Anselm, Jennifer M Evans, Adrian Baranchuk

World J Cardiol 2014

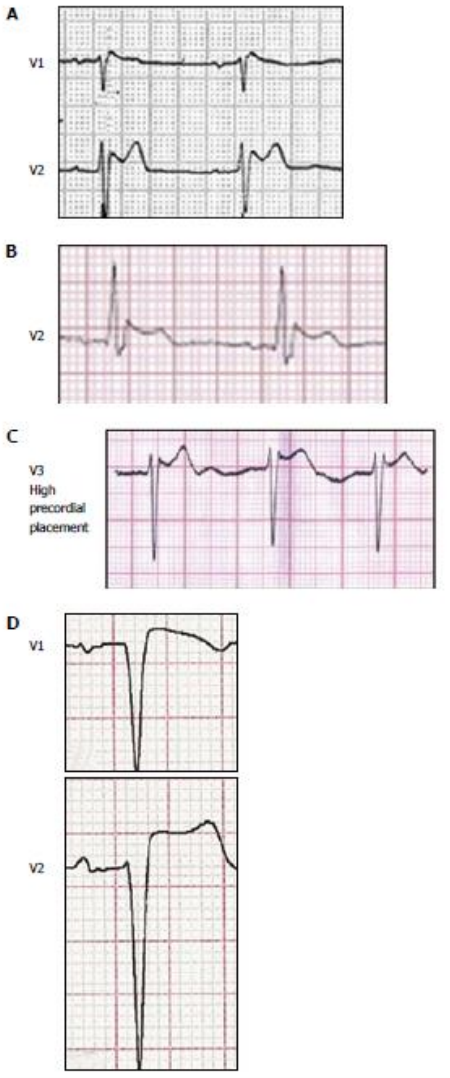
Type-2 BrP

A. True BrS ECG (saddleback)

B. Electrocution

C. Pectus excavatum

D. ECG w/high pass filter



Journal of General Practice-Open Access

ISSN: 2329-9126

Proof of Concept: Steps to validate a new ECG Phenomenon

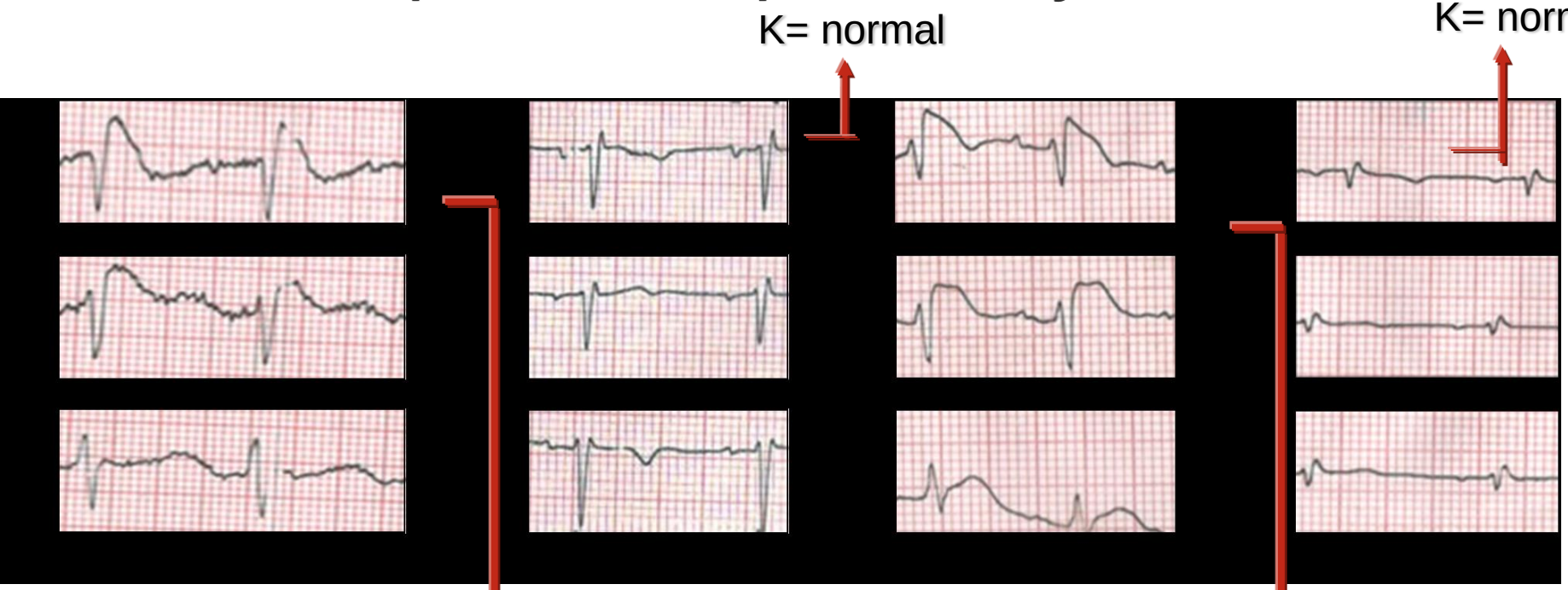
1. Visibility
2. Physiopathology speculation
3. Clinical Reproducibility
4. Experimental model

We are at this point

Journal of General Practice-Open Access

ISSN: 2329-9126

Proof of Concept: Clinical reproducibility



ANE 2014

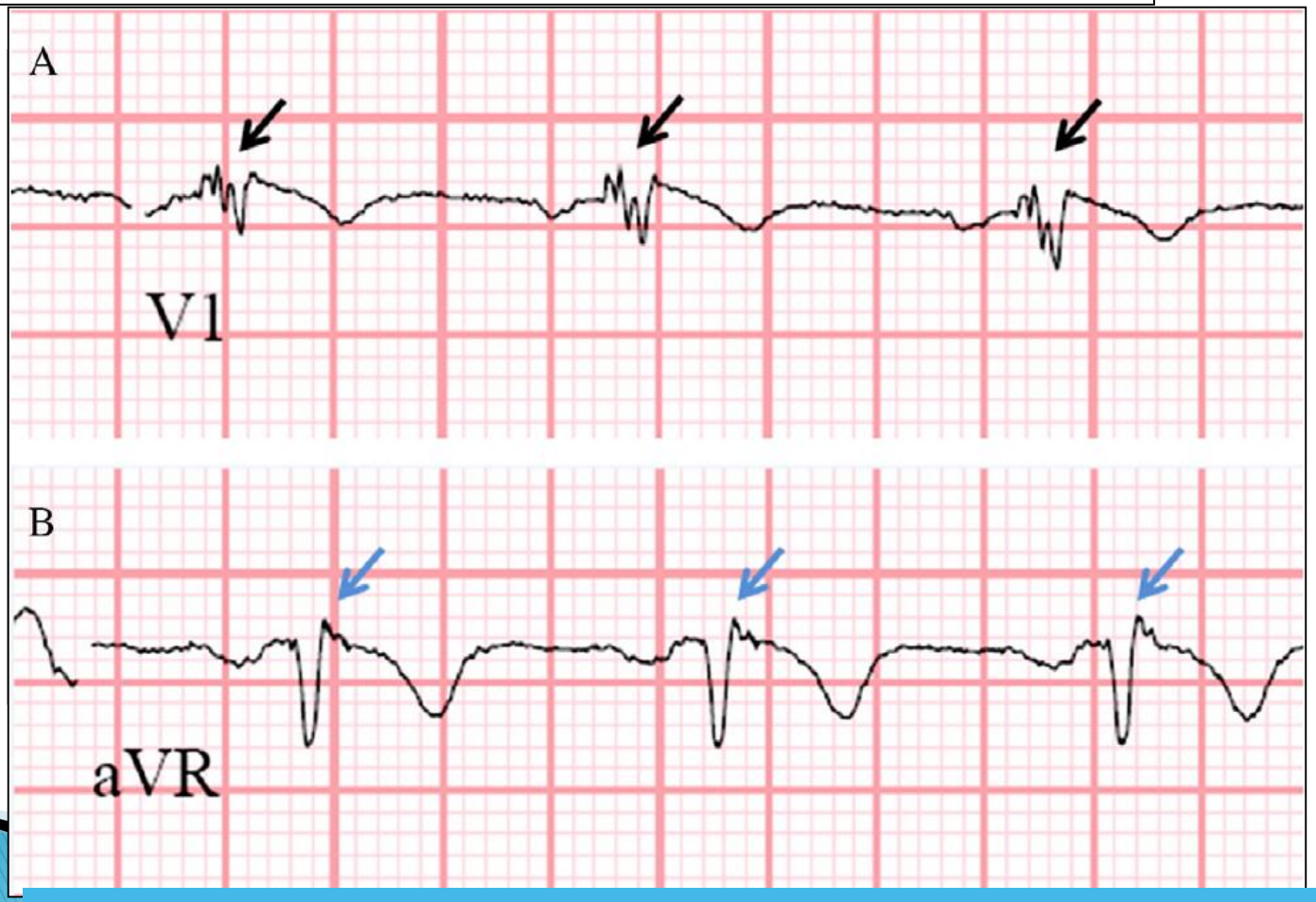
Brugada Phenocopy Clinical Reproducibility Demonstrated by Recurrent Hypokalemia

Journal of General Practice-Open Access

ISSN: 2329-9126

Electrocution-induced Brugada phenocopy

Jing Gennie Wang, William F. McIntyre, Waitak Kong, Adrian Baranchuk

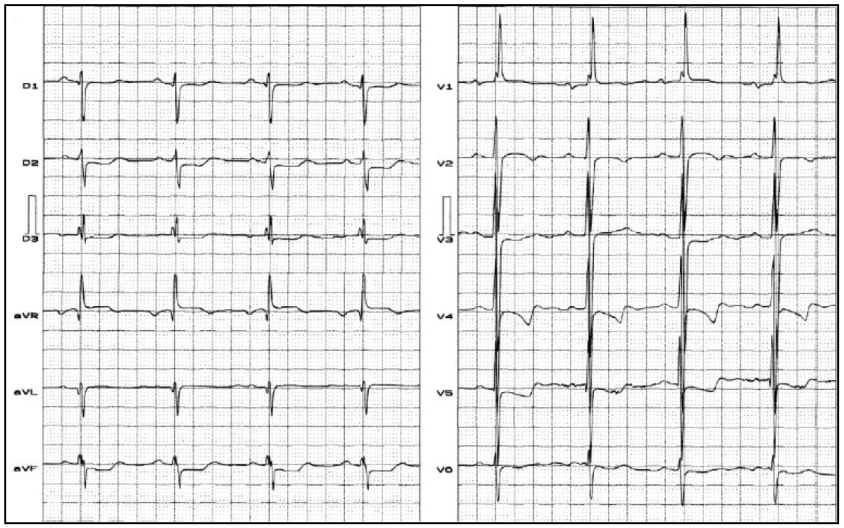


This case shows 2 possible dangerous signs: 1. fQRS, 2. aVR sign

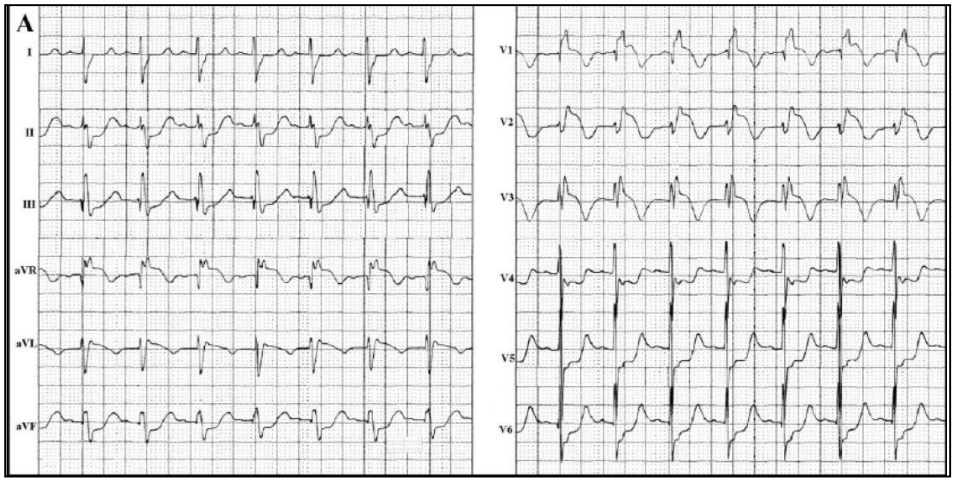
Brugada Phenocopy in a patient with surgically repaired Pentalogy of Fallot

Anselm, Baranchuk. RIA 2012

Pre-op ECG



Immediate Post-op ECG



3 months post-op

Immediate post-op ECG shows Brugada Phenocopy.
Three months later, ECG evolves with typical ECG changes associated with Fallot. From this case we learnt that surgical manipulation of the RVOT could produce a Brugada Phenocopy

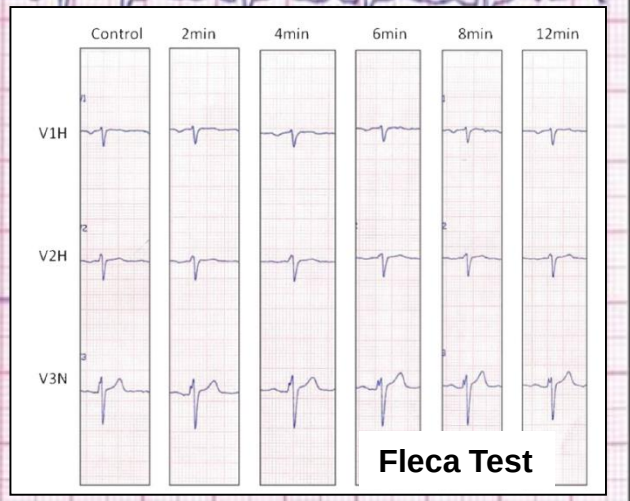
Brugada Phenocopy Induced by Acute Inferior ST-segment Elevation Myocardial Infarction with Right Ventricular Involvement

Anselm, Baranchuk. Inn Card Rhythm Manag 2013

ECG post-streptokinase

Table 1: Criteria for defining Brugada phenocopy*

i	The ECG pattern has a type 1 or type 2 Brugada morphology
ii	The patient has an underlying condition that is identifiable
iii	The ECG pattern resolves after resolution of the underlying condition
iv	There is a low clinical pretest probability of true Brugada syndrome determined by lack of symptoms, medical history, and family history
v	Negative provocative testing with sodium channel blockers such as ajmaline, flecainide, or procainamide
vi	Provocative testing not mandatory if surgical right ventriculoar outflow tract (RVOT)manipulation has occurred within the last 96 h[7]
vii	The results of genetic testing are negative (desirable but not mandatory because the SCN5A mutation is identified in only 20–30% of probands affected by true Brugada Syndrome)



Journal of General Practice-Open Access

ISSN: 2329-9126

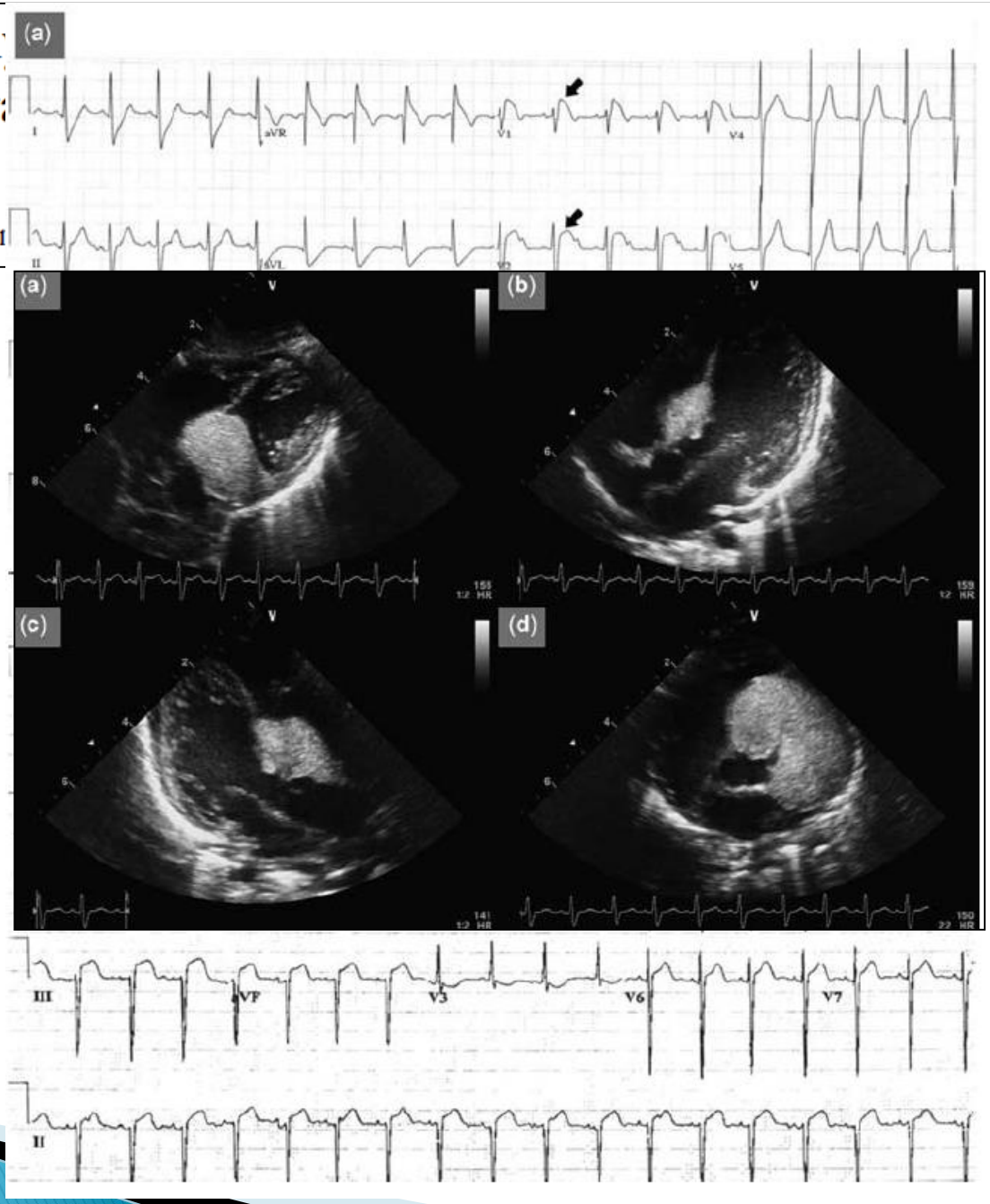
Clarification needed RE: Brugada Phenocopy & ischemia vs. Brugada Syndrome & ischemia

- Prior case is a Brugada Phenocopy, given a NEGATIVE FLECA test.
- WARNING!: Ischemia can "modulate" gradients between epicardium and endocardium unmasking or aggravating a true Brugada Syndrome (in such case, Fleca test would be POSITIVE).

  (see studies by Di Diego & Antzelevich)

Rhabdom… presenting as a Brug…

Timothy Nguyen…



Cardiol Young 2011

Fenocopia de Brugada: un nuevo concepto

Dres. Juan Cruz López-Diez[1], Adrian Baranchuk FACC FRCPC [2]

REVISTA ESPAÑOLA DE CARDIOLOGIA

Brugada Phenocopy emerging as a new concept
Re: Hyperkalemia Mimicking a Pattern of Brugada Syndrome.

Comentario editorial
Rev Urug Cardiol 2013; 28: 26-28

Categoría	*Número de*	*Edad (años)*	*Hombre/Mujer*	*Patrón*	*Presencia de*

Possible Brugada Phenocopy Induced by Hypokalemia in a Patient with Congenital Hypokalemic Periodic Paralysis

Daniel D. Anselm[1], Natalia Rodriguez Genaro[2], Adrian Baranchuk[1]

About Brugada Phenocopy: Brugada Phenocopy with a Flecainide Overdose: A Pharmacological Dose Effect?

Enfermedad miocárdica o pericárdica	8	46.2 ± 13.9	5/3	5 tipo 1, 4 tipo variable	2-6
Modulación electrocardiográfica				1, 1 tipo variable	0-1
Misceláneas				1, 1 tipo variable	1-1

Confirmed Brugada phenocopy in the setting of hypopituitarism

Journal of General Practice-Open Access

ISSN: 2329-9126

Other authors using the term Brugada Phenocopy

- **Brugada phenocopy** emerging as a new concept. Response.

Recasens L, Meroño O, Bazan V, Ribas N.

Rev Esp Cardiol (Engl Ed). 2013 Sep;66(9):756. doi: 10.1016/j.rec.2013.05.003. Epub 2013 Jul 10. No abstract available.

- "About **Brugada phenocopy**": **Brugada phenocopy** with a flecainide overdose: a pharmacological dose effect?

Chubb H, Cooklin M, Rosenthal E.

J Cardiovasc Electrophysiol. 2014 Mar;25(3):E1. doi: 10.1111/jce.12373. Epub 2014 Feb 20. No abstract available.

- **Brugada phenocopy** or **Brugada** ECG pattern in patients characterized by early repolarization pattern and additional arrhythmogenic right ventricular cardiomyopathy.

Peters S.

Int J Cardiol. 2014 Mar 1;172(1):278. doi: 10.1016/j.ijcard.2013.12.241. Epub 2014 Jan 10. No abstract available.

Journal of General Practice-Open Access

ISSN: 2329-9126

Future directions

1. Internatioanl registry via website ready to be launched (www.brugadaphenocopy.com)
2. Natural history paper (you maybe contacted…)
3. New electrocardiographic features to be applied to all Brugada Phenocopies (some of them may dissapear…)

Journal of General Practice-Open Access

ISSN: 2329-9126

Future directions

Experimental model

1. Hyperkalemic model
2. Hypokalemic model
3. RV stretch model

Journal of General Practice-Open Access

ISSN: 2329-9126

Conclusions & Questions

1. Brugada Phenocopies are Frequently observed
2. Proper recognition avoids decision making errors
3. Brugada ECG patterns unmasked by Sodium channel blockers are true Brugadas
4. We proved clinical reproducibility (Proof of Concept)
5. What's the natural history of this condition?
6. Is there a genetic predisposition?
7. Can we reproduce these patterns in the Lab?

Journal of General Practice

- Journal of Primary Health Care: Open Access
- Journal of Health Care : Current Reviews
- Journal of General Medicine: Open Access
- Journal of Family Medicine & Medical Science Research

Journal of General Practice
Related Conferences

- 3rd International Conference on Surgery and Anesthesia
- 3rd International Conference on Nursing & Emergency Medicine
- 2nd International Conference on Nursing & Healthcare

OMICS Group **Open Access Membership**

OMICS publishing Group Open Access Membership enables academic and research institutions, funders and corporations to actively encourage open access in scholarly communication and the dissemination of research published by their authors.

For more details and benefits, click on the link below:

http://omicsonline.org/membership.php