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Brugada Phenocopy:
Update 2014
Phenocopy: Definition

“an environmental condition that imitates (copies) one produced by a gene”
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!!!*)
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
Updates to the classification were needed…
Brugada Phenocopy in the context of pulmonary embolism

Anselm, Baranchuk. Int J Cardiol 2013

Let’s avoid confusion…
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
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)
Brugada phenocopy: A new electrocardiogram phenomenon

Daniel D Anselm, Jennifer M Evans, Adrian Baranchuk

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)
Brugada phenocopy: A new electrocardiogram phenomenon

Daniel D Anselm, Jennifer M Evans, Adrian Baranchuk

Type-2 BrP

A. True BrS ECG (saddleback)
B. Electrocution
C. Pectus excavatum
D. ECG w/high pass filter
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
Proof of Concept: Clinical reproducibility

Brugada Phenocopy Clinical Reproducibility Demonstrated by Recurrent Hypokalemia
This case shows 2 possible dangerous signs: 1. fQRS, 2. aVR sign
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

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 ventriculocardio outflow tract (RVOT) manipulation has occurred within the last 96 h |
| 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) |

![Fleca Test](image.png)
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)
Rhabdomyoma as a Brugada Syndrome Presenting ECG

Timothy Nguyen

Cardiol Young 2011
Brugada Phenocopy emerging as a new concept
Re: Hyperkalemia Mimicking a Pattern of Brugada Syndrome.

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

Daniel D. Anselm¹, Natalia Rodriguez Genaro², Adrian Baranchuk¹

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

Confirmed Brugada phenocopy in the setting of hypopituitarism
Other authors using the term Brugada Phenocopy

- **Brugada phenocopy emerging as a new concept. Response.**
  Recasens L, Meroño O, Bazan V, Ribas N.

- **"About Brugada phenocopy": Brugada phenocopy with a flecainide overdose: a pharmacological dose effect?**
  Chubb H, Cooklin M, Rosenthal E.

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

1. International 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 disappear…)
Future directions

Experimental model

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