R-R Interval Testing for Vagal Nerve Tone

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Financial Disclosures

- None

Heart Rate Variability (HRV)

- Measure of how the length of R-R changes between ventricular contractions
- R-R changes with inspiration and expiration
- Low HRV = time between each R’ is constant
- High HRV = time between each R’ is variable
- Reflection of Autonomic Nervous System control

Ways of measuring HRV


Using HRV to Assess Autonomic Neuropathy

- Relationship between cardiac neuropathy and other autonomic neuropathies (e.g., gastroparesis, postural hypertension, etc.)

Dr. Richard Bernstein

Images: www.diabetes-book.com
"A Simple Office Protocol"

E/I ratio

- **E** = sum of maximum R-R intervals (in mm) on EKG in each of six 5 second forced expirations
- **I** = sum of the minimum R-R intervals (in mm) on EKG in each of the prior six 5 second inspirations
- **E/I ≤ 1.1** = "Indicate of total or near-total absence of parasympathetic control of heart rate"
- **E/I ≥ 1.24** = "likely absence of both cardiac autonomic neuropathy or sensory neuropathy"

Protocol
1. Attach limb leads only while patient is seated
2. Set rhythm tracing on EKG to Lead II
3. Instruct patient on process of deep inspiration followed by forced expiration
   - “in” at time 0, “out” at 5s, “in” at 10 sec, “out” at 15, etc. for 60 seconds
4. Begin rhythm tracing with instructions re: breathing above
   - “in” inspiration vs. expiration on rhythm strip
5. Measure shortest R-R interval in each Inspiration segment and measure longest R-R interval in each Expiration segment
6. Use equation on previous slide to calculate E/I ratio


Gastroparesis & HRV
- From “Diabetes Solution”
- HRV ≤ 28% = mild gastroparesis
- HRV ≤ 20% = moderate gastroparesis
- HRV ≤ 15% = severe gastroparesis


Free software for calculating HRV
- http://www.physionet.org
- http://kubios.uef.fi/nccm.idm.oclc.org
Helpful resources


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