Electrocardiogram (ECG) IMPC_ECG_003

Purpose

To provide a high throughput method to obtain Electrocardiograms in a conscious mouse or an anesthetized mouse.

Experimental Design

- Minimum number of animals : 5M + 5F
- Age at test: Week 12
- Sex: We would expect the results of this test to show sexual dimorphism

Procedure

Conscious Procedure with ECGenie

- 1. The lead plates are to be snapped into place onto the top of the pre-amplifier tower. The covering is removed to reveal three gel coated pads surrounded by a sticking plate. The plate will need to be covered with the extra cover in the package.
- 2. Turn on the combined amplifier and the pre-amplifier tower.
- 3. Double click the icon ECG acquisition on the acquisition computer.
- 4. Open the ECG set up file (for default settings).
- 5. Place mouse on pad, lowering the Red Acrylic Cubby to surround the mouse on 3 sides discouraging escape.
- 6. Press Start.
- 7. After the desired acquisition time, (5-10 minutes) stop the reading. There will be one long reading.
- 8. Save the data.
- 9. For additional readings create a new session using the same settings as before.
- 10. When saving sections with good readings, highlight the selected area and then save.

Anesthetized Procedure

- 1. Place mouse in the induction chamber. Anesthetize with 2.5-4% isoflurane in oxygen.
- 2. Transfer mouse to a warmed platform and maintain with a nose cone at 2-2.5% isoflurane.
- 3. Fasten the mouse to the heated platform set to 37.5-39° Add electrode cream if using the foot surface electrodes on the platform surface. *Alternatively insert needle electrodes subcutaneously into the limbs using Lead Configuration I: Left Arm Right Arm (LA-RA) and/or Lead Configuration II: Left Leg Right Arm (LL-RA).*
- 4. Monitor the body temperature with a rectal probe if possible.

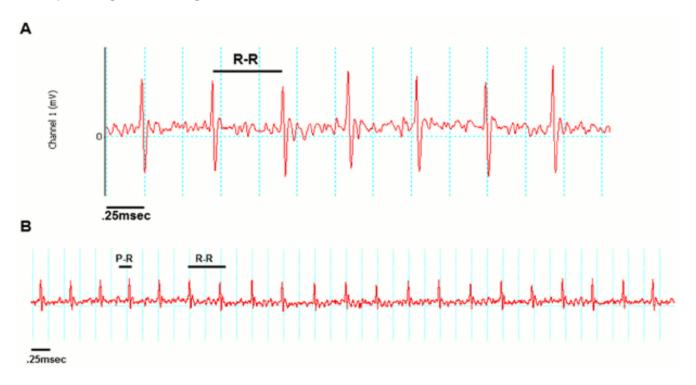
- 5. Open the recording software with appropriate settings and record an ECG for about 2 minutes.
- 6. Save the recording and allow mouse to recover.

Notes

Data Analysis - Conscious Procedure with ECGenie

- 1. Open Emouse Analyses icon
- 2. Select ECG signals
- 3. Choose folder (all readings in folder will show)
- 4. Click PNN X (for mice: N-N> than <u>6</u> ms)
- 5. Choose file(s) by highlighting
- 6. Go
- 7. Bottom file is the corrected file
- 8. Red dots should be on peak of R waves, if image appears inverted click invert
- 9. Click Add, or minus if R waves are not marked with red dots or if too many are marked
 - L click to zoom in
 - R click to zoom out
- 11. "What if?" button to remove unwanted sections
 - L click image (zooms in)
 - L click left boundary
 - L click right boundary
- 13. Options- click more if want to exclude more sections
- 14. Undo available
- 15. Go
- 16. Here can input animal data if desired
- 17. Save- For the first mouse in in group, hit save, a new results folder will be created within the folder with the mouse data. Then can click quick save or next.
- 18. For the rest of the mice in the series, can hit quick save at this point- saves in last selected file will group all files together in same excel sheet.
- 19. Open Emouse Analyses icon
- 20. Select ECG signals
- 21. Choose folder (all readings in folder will show)
- 22. Click PNN X (for mice: N-N> than 6 ms)
- 23. Choose file(s) by highlighting
- 24. Go
- 25. Bottom file is the corrected file
- 26. Red dots should be on peak of R waves, if image appears inverted click invert
- 27. Click Add, or minus if R waves are not marked with red dots or if too many are marked
 - L click to zoom in
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- 29. "What if?" button to remove unwanted sections
 - L click image (zooms in)
 - L click left boundary
 - L click right boundary
- 31. Options- click more if want to exclude more sections
- 32. Undo available
- 33. Go
- 34. Here can input animal data if desired

- 35. Save- For the first mouse in in group, hit save, a new results folder will be created within the folder with the mouse data. Then can click quick save or next
- 36. For the rest of the mice in the series, can hit quick save at this point- saves in last selected file will group all files together in same excel sheet



Examples of good readings

Data QC

Analysis room should be dim and quiet. Keep the door closed preferably while analysis is taking place.

Figure A. Taking a reading

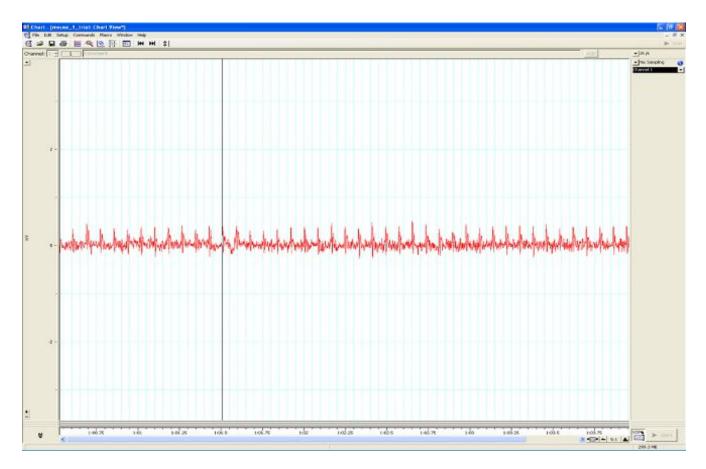


Figure B. Saving a section of the reading

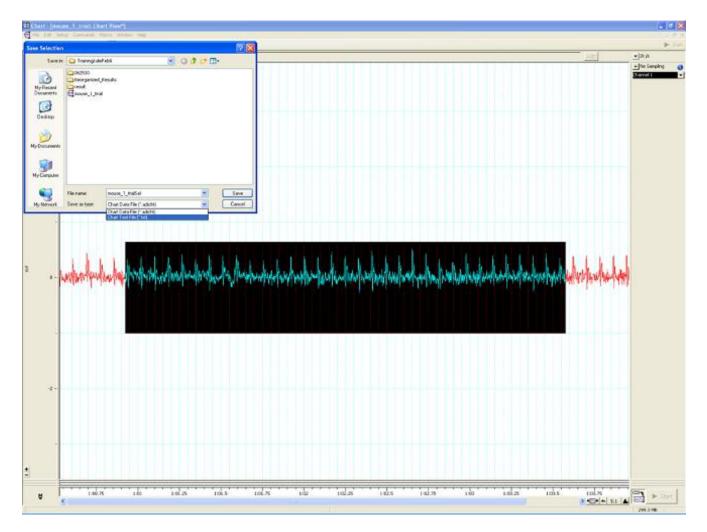
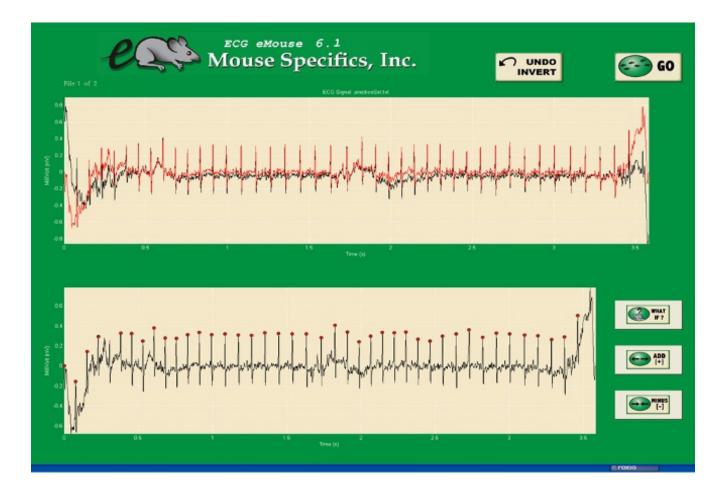


Figure C. Analysis phase, with the options to remove sections on the "What if?" button below.



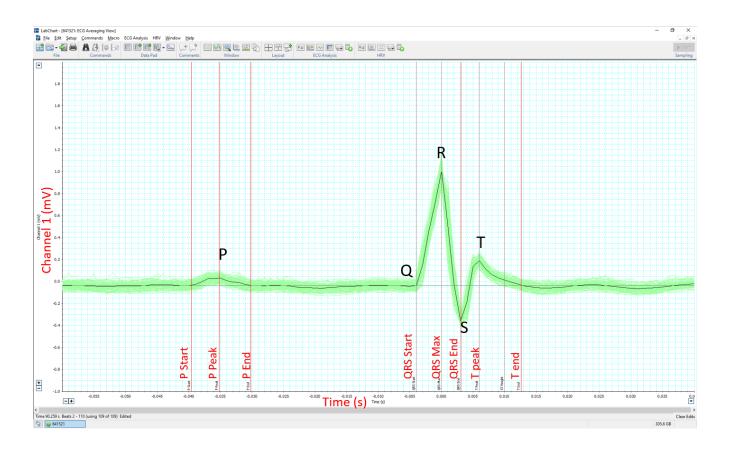
Data Analysis - Anesthetized Procedure

- 1. Review the tracing and note any abnormal findings. Take images for upload where required.
- 2. Analyse all or a selection of the tracing (approximately 100 beats minimum).
- 3. If using LabChart software (ADInstruments), select Mouse preset and QTc = Bazett.
- 4. The software can automatically mark the P, QRS and T waves of each beat (Beats to average = 1) and calculate the interval and amplitude data. The average of all beats will be determined for each parameter.
- 5. Alternatively, an averaged tracing can be generated first (Block Averaging). Markers for the P, QRS and T waves are placed by the software but can be adjusted according to the centre criteria. Interval and amplitude data is then generated by the software.

Example of the LabChart8 ECG setting

Example of LabChart ECG Averaging View

LabChart ECG Averaging View



Parameters and Metadata

Number of signals IMPC_ECG_001_001 | v1.2

simpleParameter

Req. Analysis: falseReq. Upload: trueIs Annotated: false

HR IMPC_ECG_002_001 | v1.1

simpleParameter

Req. Analysis: false

Req. Upload: true

Is Annotated: true

Unit Measured: bpm

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CV IMPC_ECG_003_001 simpleParameter	v1.0	
Req. Analysis: false	Req. Upload: false	Is Annotated: true
Unit Measured: %		
RR IMPC_ECG_004_001 simpleParameter	v1.2	
Req. Analysis: false	Req. Upload: true	Is Annotated: true
Unit Measured: ms		
PQ IMPC_ECG_005_001 simpleParameter	v1.0	
Req. Analysis: false	Req. Upload: false	Is Annotated: true
Unit Measured: ms		

PR IMPC_ECG_006_001 | v1.1

simpleParameter

Req. Analysis: false	Req. Upload: false	Is Annotated: true
Unit Measured: ms		
QRS IMPC_ECG_007_00 simpleParameter	1 v1.2	
Req. Analysis: false	Req. Upload: true	Is Annotated: true
Unit Measured: ms		
ST IMPC_ECG_008_001 simpleParameter	v1.0	
Req. Analysis: false	Req. Upload: false	Is Annotated: true
Unit Measured: ms		

HRV IMPC_ECG_010_001 | v1.0

simpleParameter

Req. Analysis: false	Req. Upload: false	Is Annotated: true
Unit Measured: bpm		
Mean SR amplitude	e IMPC_ECG_012_001 v1. ⁻	1
Req. Analysis: false	Req. Upload: false	Is Annotated: false
Unit Measured: mV		
Mean R amplitude simpleParameter	IMPC_ECG_013_001 v1.1	
Req. Analysis: false	Req. Upload: false	Is Annotated: false
Unit Measured: mV		
rMSSD IMPC_ECG_014_ simpleParameter	_001 v1.0	
Req. Analysis: false	Req. Upload: false	Is Annotated: true
Unit Measured: ms		

pNN5(6>ms) IMPC_ECG_015_001 | v1.2

simpleParameter

Req. Analysis: false	Req. Upload: false	Is Annotated: false
Unit Measured: %		
Equipment ID IMPC_ procedureMetadata	ECG_016_001 v1.0	
Req. Analysis: false	Req. Upload: true	Is Annotated: false

Equipment Manufacturer IMPC_ECG_017_001 | v1.0

procedureMetadata

Req. Analysis: trueReq. Upload: trueIs A	nnotated: false
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Options: Mouse Specifics, Inc., AD Instruments, World Precision Instruments, Indus Instruments,

Equipment Model IMPC_ECG_018_001 | v1.0

procedureMetadata

Req. Analysis: true

Req. Upload: true

Is Annotated: false

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Options: ECGenie, ML870/p, ML826/FE132, Iso-DAM8A, ECGenie + gel pads, ML866, Mouse MonitorS, PowerLab: 4/35, ML826MS1,

Anesthetic IMPC_ECG_019_001 | v1.0

procedureMetadata

Req. Analysis: true	Req. Upload: true	Is Annotated: false

Options: Isoflurane, No anesthesia, Avertin, Tribromoethanol, Isoflurane: 1.5-2.5(%), Isoflurane: 1.5-3(%), Isoflurane: 2(%), Isoflurane: 2-2.5(%), Isoflurane: 1.5-2(%), Tribromoethanol: 250(mg/kg), Isoflurane: 1.5-3(%) with active scavenging,

Experimenter ID IMPC_ECG_020_001 | v1.0

procedureMetadata

Req. Analysis: false	Req. Upload: true	Is Annotated: false

Noise level IMPC_ECG_021_001 | v1.0

procedureMetadata

Req. Analysis: false Req. Upload: false Is Annotated: fa
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Light level IMPC_ECG_022_001 | v1.0 procedureMetadata Req. Analysis: false Req. Upload: false Is Annotated: false _____ Date equipment last calibrated IMPC_ECG_023_001 | v1.1 procedureMetadata Req. Analysis: false Req. Upload: false Is Annotated: false _____ **QTC** IMPC ECG 009 002 | v2.0 simpleParameter Req. Analysis: false Req. Upload: false Is Annotated: false Unit Measured: ms Derivation: div('IMPC ECG 028 001',sqrt(div('IMPC ECG 004 001',100)))

Analysis Software IMPC_ECG_024_001 | v1.0

procedureMetadata

Options: eMouse, Matlab, PowerLab, LabChart,

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Waveform Image IMPC_ECG_025_001 | v1.0

seriesMediaParameter

Req. Analysis: false	Req. Upload: false	Is Annotated: false
Increments: Minimum 1		

Waveform Image Comment IMPC_ECG_026_001 | v1.0

simpleParameter

Req. Analysis: false	Req. Upload: false	Is Annotated: false
Description:		
Free text comment on the	waveform image. Use parame	eterAssociation of the image
parameter to link to this te	xt.	

Lead Configuration IMPC_ECG_027_001 | v1.0

procedureMetadata

Req. Analysis: false Req. Uplo	ad: false Is Annotated: false
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Options: Lead I: LA-RA, Lead II: LL-RA,

QT IMPC_ECG_028_001 | v1.0

simpleParameter

Req. Analysis: false	Req. Upload: true	Is Annotated: true
Unit Measured: ms		
QT Dispersion IMPC	_ECG_029_001 v1.0	
Req. Analysis: false	Req. Upload: false	Is Annotated: true
Unit Measured: ms		

Data acquisition sampling rate IMPC_ECG_030_001 | v1.0

procedureMetadata

Req. Analysis: false	Req. Upload: false	Is Annotated: false
Unit Measured: kHz		
Options: 1, 2, 4, 10,		

Abnormal ECG detected IMPC_ECG_031_001 | v1.0

simpleParameter

Req. Analysis: false	Req. Upload: false	Is Annotated: true
Options: Yes, No,		