Challenge Whole Body Plethysmography TCP_CHL_003

Purpose

The purpose of this procedure is to record the respiratory function of mice after sensitization with an inert allergen (ovalbumin; OVA) in response to challenge with a non-allergen airway agonist (Methacholine; MCh) using unrestrained whole-body plethysmography and assess the ability of the immune system to mount an acquired Type I allergic hypersensitivity immune response (allergic airway disease).

Experimental Design

- **Minimum number of animals :** 6M + 6F
- **Age at test:** Week 11
- **Sex:** We would expect the results of this test to show sexual dimorphism

Equipment

1. Scale/balance
2. Flow chambers
3. Plethysmographs
4. Nebulizers
5. Computer connected to flow chamber
6. Challenge reagents
7. Personal safety equipment (masks, gloves, etc.)

Procedure

Sensitization:

- Day 0: administrate OVA (20 µg) + Alum (2mg) ip
- Day 7: administrate OVA (20 µg) + Alum (2mg) ip
- Day 14: administrate aerosol 2.5% OVA (40min/day)
- Day 15/16: administrate aerosol 2.5% OVA (40min/day)
- Day 17/18: administrate aerosol 2.5% OVA (40min/day)
- Day 20: administrate aerosol 2.5% OVA (40min/day)

On the day of the Whole Body Plethysmography procedure:

1. Transfer the cohort to be tested to the test room.
2. Weigh each mouse in the cohort and record weight.

3. Turn on amplifier, nebulizer and computer, and calibrate the equipment.
4. Place each mouse in the cohort in an individual plethysmograph chamber and acclimatize for 30 minutes.
5. Methacholine (MCh) challenge:
    - Measure and record baseline data for 5 minutes
    - Nebulize with PBS for 2 minutes
    - Measure and record response to PBS for 5 minutes
    - Nebulize with 12.5mg/ml MCh for 2 minutes
    - Measure and record response to 12.5mg/ml for 5 minutes
    - Nebulize with 25mg/ml MCh for 2 minutes
    - Measure and record response to 25mg/ml for 5 minutes
    - Nebulize with 50mg/ml MCh for 2 minutes
    - Measure and record response to 50mg/ml MCh for 5 minutes
6. Remove each mouse from its chamber and place back in the home cage.
7. Sacrifice the mouse and collect samples:
    - Whole blood by cardiac punture to prepare for serum analysis of IgE and IgG
    - Bronchoalveolar lavage (BAL) fluid into 1.5ml eppendorf tube for analysis of inflammatory cells and cytokines
    - Whole lung tissue immersion fixation in 10% NBF for histopathology

Parameters and Metadata

Body weight TCP_CHL_043_001 | v1.0

simpleParameter

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

Unit Measured: g

Description: body_weight

Respiratory Frequency (f) TCP_CHL_044_001 | v1.0

seriesParameter

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

Unit Measured: bpm (breaths per minute)

Description: respiratory_frequency_f

Increments: baseline, PBS, 12.5 Mch, 25 Mch, 50 Mch,

Tidal Volume (TV) TCP_CHL_045_001 | v1.0

seriesParameter

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

Unit Measured: ml

Description: tidal_volume_tv

Increments: baseline, PBS, 12.5 Mch, 25 Mch, 50 Mch,

Peak Expiratory Flow (PEF) TCP_CHL_046_001 | v1.0

seriesParameter

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

Unit Measured: ml/s

Description: peak_expiratory_flow_pef

Increments: baseline, PBS, 12.5 Mch, 25 Mch, 50 Mch,

Peak Inspiratory Flow (PIF) TCP_CHL_047_001 | v1.0

seriesParameter

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

Unit Measured: ml/s

Description: peak_inspiratory_flow_pif

Increments: baseline, PBS, 12.5 Mch, 25 Mch, 50 Mch,

Inspiratory Time (Ti) TCP_CHL_048_001 | v1.0

seriesParameter

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

Unit Measured: seconds

Description: inspiratory_time_ti

Increments: baseline, PBS, 12.5 Mch, 25 Mch, 50 Mch,

Expiratory Time (Te) TCP_CHL_049_001 | v1.0

seriesParameter

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

Unit Measured: seconds

Description: expiratory_time_te

Increments: baseline, PBS, 12.5 Mch, 25 Mch, 50 Mch,

Enhanced Pause (Penh) TCP_CHL_050_001 | v1.0

seriesParameter

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

Unit Measured: ratio

Description: enhanced_pause_penh

Increments: baseline, PBS, 12.5 Mch, 25 Mch, 50 Mch,

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baseline Frequency of breathing TCP_CHL_051_001 | v1.0

simpleParameter

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

Unit Measured: bpm (breaths per minute)

Description: baseline_frequency_of_breathing

Derivation: incrementValue('TCP_CHL_044_001','baseline')

PBS Frequency of breathing TCP_CHL_052_001 | v1.0

simpleParameter

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

Unit Measured: bpm (breaths per minute)

Description: pbs_frequency_of_breathing

Derivation: incrementValue('TCP_CHL_044_001','PBS')

12.5 Mch Frequency of breathing TCP_CHL_053_001 | v1.0

simpleParameter

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

Unit Measured: bpm (breaths per minute)

Description: 12_5_mch_frequency_of_breathing

Derivation: incrementValue('TCP_CHL_044_001','12.5 Mch')

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25 Mch Frequency of breathing TCP_CHL_054_001 | v1.0

simpleParameter

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

Unit Measured: bpm (breaths per minute)

Description: 25_mch_frequency_of_breathing

Derivation: incrementValue('TCP_CHL_044_001','25 Mch')

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50 Mch Frequency of breathing TCP_CHL_055_001 | v1.0

simpleParameter

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

Unit Measured: bpm (breaths per minute)

Description: 50_mch_frequency_of_breathing

Derivation: incrementValue('TCP_CHL_044_001','50 Mch')

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baseline Tidal volume TCP_CHL_056_001 | v1.0

simpleParameter

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

Unit Measured: ml

Description: baseline_tidal_volume

Derivation: incrementValue('TCP_CHL_045_001','baseline')

PBS Tidal volume TCP_CHL_057_001 | v1.0

simpleParameter

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

Unit Measured: ml

Description: pbs_tidal_volume

Derivation: incrementValue('TCP_CHL_045_001','PBS')

12.5 Mch Tidal volume TCP_CHL_058_001 | v1.0

simpleParameter

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

Unit Measured: ml

Description: 12_5_mch_tidal_volume

Derivation: incrementValue('TCP_CHL_045_001','12.5 Mch')

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25 Mch Tidal volume TCP_CHL_059_001 | v1.0

simpleParameter

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

Unit Measured: ml

Description: 25_mch_tidal_volume

Derivation: incrementValue('TCP_CHL_045_001','25 Mch')

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50 Mch Tidal volume TCP_CHL_060_001 | v1.0

simpleParameter

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

Unit Measured: ml

Description: 50_mch_tidal_volume

Derivation: incrementValue('TCP_CHL_045_001','50 Mch')

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baseline Peak Expiratory Flow TCP_CHL_061_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: baseline_peak_expiratory_flow

Derivation: incrementValue('TCP_CHL_046_001','baseline')

PBS Peak Expiratory Flow TCP_CHL_062_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: pbs_peak_expiratory_flow

Derivation: incrementValue('TCP_CHL_046_001','PBS')

12.5 PEF TCP_CHL_063_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: 12_5_pef

Derivation: incrementValue('TCP_CHL_046_001','12.5 Mch')

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25 Mch Peak Expiratory Flow TCP_CHL_064_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: 25_mch_peak_expiratory_flow

Derivation: incrementValue('TCP_CHL_046_001','25 Mch')

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50 Mch Peak Expiratory Flow TCP_CHL_065_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: 50_mch_peak_expiratory_flow

Derivation: incrementValue('TCP_CHL_046_001','50 Mch')

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baseline Peak Inspiratory Flow TCP_CHL_066_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: baseline_peak_inspiratory_flow

Derivation: incrementValue('TCP_CHL_047_001','baseline')

PBS Peak Inspiratory Flow TCP_CHL_067_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: pbs_peak_inspiratory_flow

Derivation: incrementValue('TCP_CHL_047_001','PBS')

12.5 Mch Peak Inspiratory Flow TCP_CHL_068_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: 12_5_mch_peak_inspiratory_flow

Derivation: incrementValue('TCP_CHL_047_001','12.5 Mch')

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25 Mch Peak Inspiratory Flow TCP_CHL_069_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: 25_mch_peak_inspiratory_flow

Derivation: incrementValue('TCP_CHL_047_001','25 Mch')

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50 Mch Peak Inspiratory Flow TCP_CHL_070_001 | v1.1

simpleParameter

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

Unit Measured: ml/s

Description: 50_mch_peak_inspiratory_flow

Derivation: incrementValue('TCP_CHL_047_001','50 Mch')

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baseline Inspiratory time TCP_CHL_071_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: baseline_inspiratory_time

Derivation: incrementValue('TCP_CHL_048_001','baseline')

PBS Inspiratory time TCP_CHL_072_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: pbs_inspiratory_time

Derivation: incrementValue('TCP_CHL_048_001','PBS')

12.5 Mch Inspiratory time TCP_CHL_073_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: 12_5_mch_inspiratory_time

Derivation: incrementValue('TCP_CHL_048_001','12.5 Mch')

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25 Mch Inspiratory time TCP_CHL_074_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: 25_mch_inspiratory_time

Derivation: incrementValue('TCP_CHL_048_001','25 Mch')

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50 Mch Inspiratory time TCP_CHL_075_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: 50_mch_inspiratory_time

Derivation: incrementValue('TCP_CHL_048_001','50 Mch')

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baseline Expiratory time TCP_CHL_076_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: baseline_expiratory_time

Derivation: incrementValue('TCP_CHL_049_001','baseline')

PBS Expiratory time TCP_CHL_077_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: pbs_expiratory_time

Derivation: incrementValue('TCP_CHL_049_001','PBS')

12.5 Mch Expiratory time TCP_CHL_078_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: 12_5_mch_expiratory_time

Derivation: incrementValue('TCP_CHL_049_001','12.5 Mch')

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25 Mch Expiratory time TCP_CHL_079_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: 25_mch_expiratory_time

Derivation: incrementValue('TCP_CHL_049_001','25 Mch')

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50 Mch Expiratory time TCP_CHL_080_001 | v1.1

simpleParameter

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

Unit Measured: seconds

Description: 50_mch_expiratory_time

Derivation: incrementValue('TCP_CHL_049_001','50 Mch')

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baseline Enhanced pause TCP_CHL_081_001 | v1.1

simpleParameter

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

Unit Measured: ratio

Description: baseline_enhanced_pause

Derivation: incrementValue('TCP_CHL_050_001','baseline')

PBS Enhanced pause TCP_CHL_082_001 | v1.1

simpleParameter

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

Unit Measured: ratio

Description: pbs_enhanced_pause

Derivation: incrementValue('TCP_CHL_050_001','PBS')

12.5 Mch Enhanced pause TCP_CHL_083_001 | v1.1

simpleParameter

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

Unit Measured: ratio

Description: 12_5_mch_enhanced_pause

Derivation: incrementValue('TCP_CHL_050_001','12.5 Mch')

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25 Mch Enhanced pause TCP_CHL_084_001 | v1.1

simpleParameter

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

Unit Measured: ratio

Description: 25_mch_enhanced_pause

Derivation: incrementValue('TCP_CHL_050_001','25 Mch')

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50 Mch Enhanced pause TCP_CHL_085_001 | v1.1

simpleParameter

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

Unit Measured: ratio

Description: 50_mch_enhanced_pause

Derivation: incrementValue('TCP_CHL_050_001','50 Mch')

Equipment ID TCP_CHL_086_001 | v1.1

procedureMetadata

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

Description: equipment_id

Experimenter ID TCP_CHL_087_001 | v1.0

procedureMetadata

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

Description: experimenter_id

Equipment manufacturer TCP_CHL_088_001 | v1.0

procedureMetadata

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

Description: equipment_manufacturer

Options: Buxco, DSI,

Equipment model TCP_CHL_089_001 | v1.0

procedureMetadata

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

Description: equipment_model

Options: Aerosol Delivery System AUT 5110, Plethysmograph PLY3211, FP WBP Unite,

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Software for analysis TCP_CHL_090_001 | v1.0

procedureMetadata

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

Description: software_for_analysis

Options: BioSystem XA for Windows v2.9.4, FinePointe Software Research Suite v2.3.1.9,

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Analysis Algorithm TCP_CHL_091_001 | v1.0

procedureMetadata

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

Description: analysis_algorithm

Options: Epstein,

Date equipment last calibrated TCP_CHL_092_001 | v1.0

procedureMetadata

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

Description: date_equipment_last_calibrated

Type of restraint TCP_CHL_093_001 | v1.0

procedureMetadata

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

Description: type_of_restraint

Options: Unrestrained,
