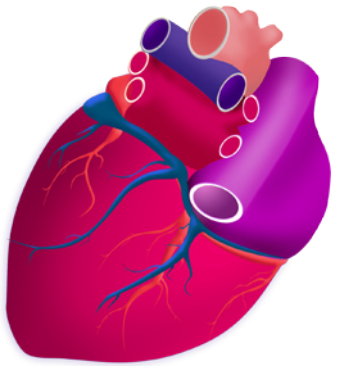
Perfused Heart Assessment: Langendorff and Working Heart Training

Two Day Training Course for the Cardiovascular Scientist



ADInstruments is pleased to offer professional on-site installation and training for the In Vitro Langendorff/Working Heart System. Leverage the combined knowledge and experience of ADInstruments' Product Engineer and Surgical Research Consultant to maximize your equipment investment and curtail typical experimental roadblocks. You and your staff will reap the benefits of access to someone possessing a strong background in Biomedical Engineering with extensive experience providing training and technical support to cardiovascular research scientists. You will also receive hands-on surgical training from an established scientist with over 10 years of research expertise performing isolated heart perfusion studies in both academia and industry.

ADInstruments has designed a two-day training course which pairs the essential theory, surgery, equipment and software components necessary to implement successful Langendorff and Working Heart research studies from day one. This course can be held in your lab using your equipment at your convenience.

Services Provided:

- **Equipment Setup and Software Installation**
- **Glassware, Pump, and Water Bath Configuration**
- **Langendorff Principles and Surgical Demonstration**
- **Working Heart Principles and Surgical Demonstration**
- **Transducer Configuration and Measurement Parameters**
- **PowerLab Data Acquisition System and Chart Software Overview**
- **Blood Pressure and ECG Analysis Module Overview**
- **Certificate of Completion: Isolated Perfused Heart Training**

CAN'T AFFORD TO WASTE ANY TIME GETTING STARTED?

Avoid common pitfalls and take the right steps to streamline your physiological data acquisition and analysis. Investing in a detailed and structured training program encouraging hands-on learning will shorten the learning curve and fast track your studies.

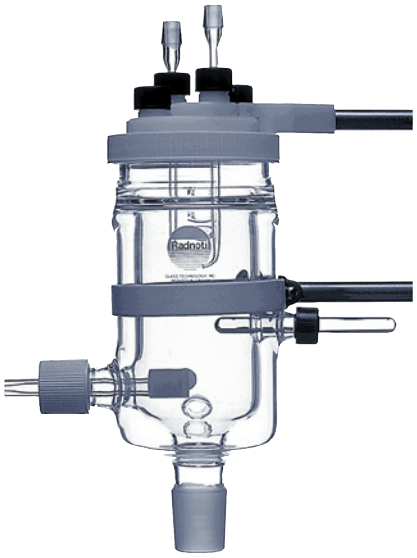
Training Overview:

Equipment Configuration and Software Installation

- **PowerLab System Setup:** Equipment Component Introduction and Overview, Amplifiers, Transducers, Calibrations, Powering up the System
- **Glassware:** Set Up, Glassware Components, Plumbing Basics (Priming the System, Constant Flow, Constant Pressure, Recirculating, Non-recirculating), Peristaltic Pump and Thermo Bath Circulator, Transducer and Electrode Placement
- **Software Installation and Licensing:** Chart, Chart Extensions, Chart Modules (Blood Pressure and ECG)

Glassware Priming and Plumbing Overview

- **Thermo bath operation**
- **Peristaltic pump operation**
- **Glassware priming**
- **Retrograde perfusion circuit (Langendorff): constant pressure, constant flow, recirculating and non-recirculating**
- **Working heart perfusion circuit**
- **Glassware maintenance and post experimental cleanup**
- **Troubleshooting techniques**



Langendorff Principles and Surgical Demonstration*

- **Basic cardiac principles**
- **Live surgical demonstration and hands on assistance**
- **Removal of the heart**
- **Heart anatomy (landmarking)**
- **Aortic cannulation**
- **Retrograde perfusion circuit (Langendorff method)**
- **Perfusion flow rates**
- **Constant flow vs. constant pressure**

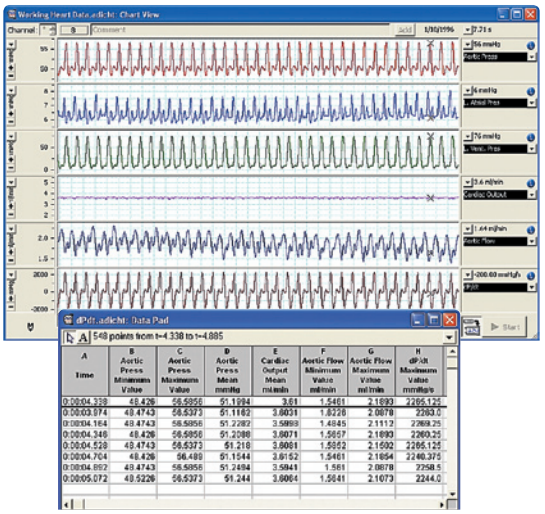
Isolated Heart Techniques Training Series

Working Heart Principles and Surgical Demonstration*

- **Basic cardiac principles**
- **Heart anatomy (landmarking)**
- **Live surgical demonstration and hands on assistance**
- **Left atria cannulation**
- **Working heart perfusion circuit**
- **Perfusion flow rates**
- **Pre-load pressure**
- **After-load pressure**
- **Starling curve demo**

Transducer Configuration and Measurement Parameters

- **Transducer placement**
- **Left Atria Pressure (Pre-load)**
- **Aortic Pressure (After-load)**
- **Systolic and Diastolic Pressure from the aortic line**
- **Ventricular Pressure**
- **Left Ventricular dP/dt**
- **Cardiac Electrical Activity**
- **Heart Rate**
- **Perfusate Temperature**
- **Cardiac pacing**



PowerLab Data Acquisition System and Chart Software Analysis

- **Getting Started:** Basics of Data Acquisition (Sampling Rate, Filtering, Digitization, Range, Noise, Display)
- **Introduction to Chart:** Opening Chart Files, Closing a File or Exiting Chart, The Toolbar, Recording (Display while Recording, Blocks and Settings, Recording or Monitoring, Adding Comments, Recording Durations, Data Buffering)
- **Setting up Chart:** Sampling Rates, Channel Controls and Settings, The Input Amplifier, Units Conversion, Preset Comments
- **Data Display:** The Chart View (Changing Channel Size, The Split Bar, Amplitude Axis), Display Settings,

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Channel Settings, The Zoom View, Organizing Chart Windows

- **Working with Files:** Selecting Data using Set Selection, Deleting Data, Transferring Data (Copying and Pasting to other Applications), Saving Options, Appending Files, Printing
- **Data Analysis:** Finding Data, Comments and Events, The Data Pad (Adding Data to the Data Pad: Real Time Automations, Saving as Text or Excel, Spreadsheet Functions), The XY View (Online and Offline Operation, Printing and Copying), The Spectrum Window, The Notebook Window, Channel Calculations (Arithmetic, Digital Filters, Derivative, Integral, Smoothing, Cyclic Measurements (Heart Rate, Mean BP, Diastolic, Systolic)
- **Customizing and Automating:** Preferences, Macros, Chart Extensions, Chart Modules, Software Updates, Help Menus

Blood Pressure Analysis Module

- **Basics:** Installation, Licensing, Background
- **Setting Up:** Blood Pressure (BP) Settings (Online and Offline Analysis, Blood Pressure Settings Dialog), Cycle Detection
- **Analyzing Data:** Cycle Markers, BP Classifier View, BP Analysis View (Parameters), BP Table View (Standard Columns, Optional Columns, Exporting Results), BP Channel Calculations, Copying BP Views, Printing BP Views.
- **Blood Pressure Parameters:** Max Pressure, Min Pressure, Mean Pressure, Max-Min Pressure, Heart Rate, Max dP/dt, Min dP/dt, EDP, Systolic Duration, Diastolic Duration, Cycle Duration, Tau, Pressure Time Index, Contractility Index, IRP Average dP/dt

ECG Analysis Module

- **Basics:** Installation, Licensing, Background, Sampling Rates, Ranges, Filters
- **Using the Module:** The Analysis Process (Detection, Classification, Averaging, Manual Edits, Reselecting Analyzed Data, Block Boundaries), Analysis Results (ECG Table View, Analysis Plots, ECG Channel Calculations), Copying and Printing ECG Windows, Online Mode (Chart View, ECG Beat Classifier View, ECG Averaging View, ECG Table View, Channel Calculations)
- **ECG Parameters:** RR Interval, Heart Rate, PR Interval, P Duration, QRS Interval, QT Interval, QTc, JT Interval, P Amplitude, Q Amplitude, R Amplitude, S Amplitude, S Amplitude, ST Height, T Amplitude

Isolated Heart Techniques Training Series

***Disclaimer:** ADInstruments' surgical consulting staff will only perform surgeries on 300 gram rats or larger and will not administer anesthesia. Anesthetic and scientific experimental protocols will neither be provided nor recommended by ADInstruments. Proof of an approved animal use protocol must be submitted to ADInstruments by either fax at (719) 576-3971 or email prior to scheduling a training date. ADInstruments will not perform surgeries without proof of an approved animal use protocol. All departmental and administrative regulations requiring approval for animal handling by ADInstruments' staff at your facility must be submitted to ADInstruments 30 days prior to training. Please contact your ADInstruments representative for a list of consumables and surgical equipment required for training.*

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