

1. Record Nr.	UNINA9910813276803321
Titolo	Manual of research techniques in cardiovascular medicine / / edited by Hossein, Ardehali, Roberto Bolli, Douglas W. Losordo
Pubbl/distr/stampa	Chichester, West Sussex ; ; Hoboken : , : Wiley, , 2014
ISBN	9781118495131 1118495136 9781118495148 1118495144 9781118495162 1118495160
Edizione	[1st ed.]
Descrizione fisica	1 online resource (xx, 451 pages) : illustrations
Altri autori (Persone)	ArdehaliHossein BolliRoberto LosordoDouglas W
Disciplina	617.4 617.4/1059 617.41059
Soggetti	Angioplasty Coronary heart disease - Treatment Tachycardia - Treatment Transluminal angioplasty
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover -- Dedication -- Title page -- Copyright page -- Contents -- List of Contributors -- Preface -- About the Companion Website -- Part 1: Electrophysiology -- 1: Measurement of calcium transient ex vivo -- Introduction -- Preparation and fluorescent indicator loading -- Optical setup -- Calibration -- Analysis and interpretation -- Set-by-step procedure -- References -- 2: Confocal imaging of intracellular calcium cycling in isolated cardiac myocytes -- Introduction -- Materials and methods -- Chamber, electrical stimulation, and superfusate delivery apparatus -- Confocal microscope system -- Cell loading of fluorescent Ca ²⁺ indicators -- Experimental approach --

Data analyses -- Weaknesses and strengths of the method and alternative approaches -- Conclusions -- References -- 3: Generating a large animal model of persistent atrial fibrillation -- Introduction -- Insights from tachypacing-induced AF models -- Protocol -- Generating a tachypacing-induced AF model -- Pacing protocols -- Ventricular rate during AF: to ablate or not to ablate -- Strengths and weaknesses of the model -- Complications and alternative approaches to study AF -- Potential complications -- Alternative AF models -- Conclusion -- Acknowledgement -- References -- 4: Confocal imaging of intracellular calcium cycling in the intact heart -- Introduction -- Measurement of intracellular Ca^{2+} transients -- Principles and features of confocal microscopy -- Procedure -- Materials and equipment -- Experimental setup -- Limitations, potential pitfalls and alternative approaches -- Additional application: use of confocal imaging to determine efficacy of stem cell integration into host myocardium -- References -- 5: Recording and measurement of action potentials -- Introduction -- Protocol -- Theory of AP recording -- Procedure -- Recording amplifier. Choices to make before an experiment -- AP recording procedure -- Frequent problems -- AP analysis -- Alternative approaches and extensions -- Weaknesses and strengths -- Conclusion -- References -- 6: Patch-clamp recordings from isolated cardiac myocytes -- Introduction -- Theory of patch-clamp recording -- Cell-attached configuration -- Whole-cell recording configuration -- Inside-out excised patch configuration -- Outside-out excised patch configuration -- Instrumentation for patch-clamp recordings -- Experimental aspects of patch-clamp recordings -- Gigaseal formation -- Whole-cell recordings -- Whole-cell voltage-clamp protocols, data acquisition, and analysis -- Conclusions and future directions -- References -- 7: Optical mapping of the heart -- Introduction -- Protocols -- Experimental set-up -- Tissue preparations (Figure 7.2) -- Staining and image acquisition -- Data processing and analysis -- Representative results -- Alternative approaches -- Weaknesses and strengths of method -- Conclusions -- References -- Part 2: Isolation and Maintenance of Primary Stem Cells -- 8: Isolation of colony-forming endothelial progenitor cells -- Introduction -- Materials -- Laboratory reagents -- Laboratory equipment -- Methods -- MNC isolation from fresh PB or UCB -- EPC-CFA of bulk cell populations in PB, GmPB, BM, or UCB -- Optional-1: EPC-CFA of single CD34+ or CD133+ cells in PB, GmPB, BM, or UCB -- Optional-2: HELIC assay of single CD34+ or CD133+ cells as cell fate assay of HSC -- Application -- Acknowledgements -- Competing interests statement -- References -- 9: Cardiac resident stem cells -- Introduction -- Protocol -- Preparation of basic solutions and culture medium -- Enzymatic digestion of the mouse heart -- Separation of small cells -- Sorting c-kit-positive cells using FACS -- Alternative approaches -- Weaknesses and strength of the method. Conclusion -- Acknowledgements -- References -- 10: Cardiospheres -- Introduction -- Protocols -- Preparation for explant creation -- Explant creation -- Preparation for cardiosphere formation -- Cardiosphere formation -- Alternative approaches -- Weaknesses and strengths of the method -- Conclusions -- References -- 11: Mesenchymal stem cells -- Introduction -- Protocols -- Isolation of human MSCs from BM aspirates -- Conclusions -- Acknowledgements -- References -- 12: Generation and differentiation of human iPS cells -- Introduction -- Protocol I: Generation of hiPSC from fibroblasts -- Production of the VSV-G Lentivirus (6 days) -- Reprogramming of human fibroblasts (14 days) -- Plasmids and media -- Titration of the

virus -- Protocol II: differentiation hiPSCs to myocytes -- Future perspectives -- References -- 13: Isolation of neonatal and adult rat cardiomyocytes -- Introduction -- Protocols -- Isolation of neonatal rat ventricular cardiomyocytes -- Isolation of adult rat cardiomyocytes -- Alternative approaches -- Weaknesses and strengths of the method -- Conclusions -- References -- 14: Isolation and culture of vascular smooth muscle cells -- Introduction -- Protocol -- Reagents -- Equipment -- Reagent setup -- Preparation and equipment setup -- Procedure -- Alternative approaches -- Explant method -- Strengths and weaknesses of method -- Conclusion -- References -- 15: Isolation and culture of cardiac endothelial cells -- Introduction -- Protocol for isolation of mouse cardiac endothelial cells -- Materials and preparations -- Procedures -- Important notes -- Alternative approaches -- A novel protocol of endothelial cell isolation -- Conclusions -- Acknowledgements -- References -- 16: Isolation and culture of cardiac fibroblasts -- Introduction -- Cardiac fibroblasts isolation protocol -- Materials and preparations. Procedures for isolation of mouse cardiac fibroblasts -- Cell propagation and maintenance -- Alternative approaches -- Isolation of cardiac ventricular fibroblasts from rats -- Conclusions -- References -- 17: Murine bone marrow transplantation model -- Introduction -- Materials -- Procedure -- Animal husbandry -- Alternative approaches -- Weaknesses and strengths of the method -- References -- 18: In vitro differentiation and expansion of vascular endothelial cells derived from mouse embryonic stem cells -- Introduction -- Materials -- Tissue culture -- Methods -- ES-cell culture (see Notes 1 and 2) -- Differentiation of ES-cells to Flk-1+ progenitors -- Purification of Flk-1+ cells -- Expansion/differentiation of Flk-1+ cells -- Notes -- Acknowledgements -- References -- Part 3: Manipulation of the Heart and Vessels in Vivo and ex Vivo -- 19: Coronary ligation -- Introduction -- Protocol -- Alternative approaches -- Weaknesses and strengths of the method -- Conclusions -- Acknowledgments -- References -- 20: Transverse aortic constriction: a model to study heart failure in small animals -- Introduction -- Material -- Procedure -- Preparation of the operative field -- Anesthesia, intubation, and ventilation -- Aortic banding (constriction of transverse aorta) -- Postoperative care -- Notes -- Limitations -- Confirmation of constriction -- Expected outcomes -- Alternative approaches -- Weaknesses and strengths of the method -- Conclusions -- References -- 21: Pharmacological models of hypertrophy and failure -- Overview -- Protocols -- Alternative approaches -- Strengths and weaknesses of the method -- Conclusions -- References -- 22: Hindlimb ischemia -- Introduction -- Protocol -- Induction of anesthesia -- Hair removal prior to surgery -- Surgery preparation -- Femoral artery ligation -- Laser Doppler -- Alternative methods. Common considerations -- Acknowledgements -- References -- 23: The Langendorff preparation -- Introduction -- Protocol -- Cannulation of the aorta -- Perfusion solution constituents, thermoregulation, and mode of delivery -- Recording of left ventricular pressure, ECG, and coronary flow -- Alternative approaches -- Weaknesses and strengths of the method -- Conclusions -- References -- 24: Myocarditis and other immunological models of cardiac disease -- Introduction -- Protocol -- Induction of EAM -- Notes -- Alternative approaches -- Strength and weaknesses of the method -- Conclusions -- Acknowledgement -- References -- 25: Models of pacing-induced heart failure -- Introduction -- Rapid pacing models - protocols -- Functional and hemodynamic expectations -- Neurohormonal aspects and expectations -- Cellular and biochemical considerations to chronic

rapid pacing -- Matrix remodeling and chronic rapid pacing -- Electrophysiology and arrhythmogenesis in chronic rapid pacing -- Chronic rapid pacing-induced heart failure: the issue of reversibility -- Chronic pacing model for therapeutic research and development: technical considerations and limitations -- Summary -- Acknowledgements -- References -- 26: Porcine myocardial ischemia models -- Introduction -- Methods -- Anesthetized pig model with an angioplasty balloon-induced occlusion -- Conscious pig model with an extravascular balloon-induced occlusion -- Conclusion -- Acknowledgements -- References -- 27: Angiogenesis assays -- Introduction -- In vivo Matrigel plug assay -- Preparation of reagents and animals -- Reagents for quantification of angiogenesis -- Equipment -- Matrigel mixtures and injections -- Matrigel harvest and analysis -- Notes -- Mouse corneal micropocket angiogenesis assay -- Preparation of reagents and animals -- Equipment -- Preparation of controlled slow-release pellet. Surgical procedure.

Sommario/riassunto

While some research methods or techniques are applicable in several areas of medicine, research in cardiovascular diseases requires knowledge of an increasing array of procedures, techniques and measurements that are highly specialized and unique to this area of investigation. Edited by senior clinical investigators who are recognized leaders in cardiovascular medicine worldwide, this book provides readers with a comprehensive, practical "how-to-do-it" review of best-practice techniques for cardiovascular research.
