Myocardial Infarct in the CD Rat

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Abstract
Coronary artery disease is the leading cause of death worldwide. The primary cause of coronary heart disease is atherosclerosis, a subsequent heart failure is ischemia, and treatment of the artery by atheromatous arteries causes damage to the heart muscle. A number of animal models that utilize ligation of the coronary artery have been described, including large species such as the swine and canine models, as well as rodent models. Charles River Surgical Services performed the following study to document the expected size of ischemic lesion and the infarction percentage.

Materials and Methods
Animals
Females of male Cd rats (Crl:CD(SD)) weighing 175-200g, were utilized. The animals were transferred to the surgical barrier, housed in filter top polycarbonate cages, and acclimated for 1-2 days prior to surgery. Post-surgery, the animals were group housed, six per cage, in the filter top polycarbonate cages for 24-hours before undergoing euthanasia for heart and tissue collection. The animals were briefly placed in a Chip Bed during the entire procedure, suppurating ketamine (43 mg/kg IP) and xylazine (8.7 mg/kg SQ) was administered, and the catheters were intubated and positive pressure ventilation was provided by a ventilator (Harvard model 790). A 3 cm transverse incision was made between the fourth and fifth intercostal spaces. The incision was performed with a scalpel, as a guide, and the chest wall was shaved and the skin prepared using applying alternative applications of povidone iodine solution and a 7.5% aqueous solution of betadine. A preoperative dose of buprenorphine (0.02 mg/kg SC) was administered and the animals were transferred to a HEPA filtered laminar flow hood, placed on a heated surgical table, and bed LabDiet S79 red clay. This study was conducted under a Charles River IACUC approved protocol, and was performed within a AAALAC, International accredited facility. All animals were of the VAF®Plus health status.

Surgical Procedure
Animals were anesthetized with a cocktail of ketamine (43 mg/kg IP) and xylazine (8.7 mg/kg IP) as a sedative for light caging purpose. For the surgical ligation of the coronary artery, we followed the surgical protocol. The animals were intubated and positive pressure ventilation was provided by a ventilator (Harvard model 790). A 3 cm transverse incision was made between the fourth and fifth intercostal spaces. The incision was performed with a scalpel, as a guide, and the chest wall was shaved and the skin prepared using alternative applications of povidone iodine solution and a 7.5% aqueous solution of betadine. A preoperative dose of buprenorphine (0.02 mg/kg SC) was administered and the animals were transferred to a HEPA filtered laminar flow hood, placed on a heated surgical table, and bed LabDiet S79 red clay. This study was conducted under a Charles River IACUC approved protocol, and was performed within a AAALAC, International accredited facility. All animals were of the VAF®Plus health status.

Introduction
Coronary artery disease (ischemic heart disease) is the leading cause of death worldwide, accounting for 17.5 million deaths per year, due to heart attacks. Approximately 12.8% of the world’s population is affected by coronary artery disease, which is the leading cause of death worldwide, and accounts for 12.8% of annual deaths worldwide.

The results of this study indicate that ischemic lesion sizes are highly dependent on the training received by the research staff. This report provides summary information on the outcome of the study.

Results
The infarction lesion size varied from 3.12% to 30.34% of the total cardiac muscle (cross section). The majority of animals (70%) had lesion sizes between 20% and 30%. As indicated, 9.6% of animals had infarction sizes smaller than 10%, over 38% of the animals had lesion sizes between 20 and 30%, and over 31% of animals had infarction sizes within 25-30%.

Discussion
The induction of myocardial infarction by ligation of the coronary artery is a highly technical challenging method, especially when trying to document the expected size of ischemic lesion. Myocardial infarct size varies from study to study, depending on the method of evaluating the infarct size. Infarct size determination in animal models, primarily in large and small animals, is highly dependent on the training received by the research staff. This study was designed to document the consistent surgical outcome, and to provide a standard measurement to calibrate the surgical protocol. The results from this study indicate that 10.6% of animals had infarction sizes within 25%. As indicated, 9.6% of animals had infarction sizes smaller than 10%, over 38% of the animals had lesion sizes between 20 and 30%, and over 31% of animals had infarction sizes within 25-30%.

References