

# Exhibit 4



12. Accordingly, based on well-recognized and accepted standards of medicine, Drs. Alexander and Fowler should have noted that myocardial bridging and an anomalous right coronary artery were present but did not cause Anton's death.
13. In my opinion, Anton's death was caused by asphyxiation.
14. All the opinions stated herein are to a reasonable degree of medical and scientific certainty.

*I hereby swear and affirm under the penalty of perjury that the foregoing statements are true and accurate base upon my personal knowledge.*

A handwritten signature in black ink, appearing to read "Jon Resar", with a large, stylized flourish at the end.

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Dr. Jon Resar

3/31/2021

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Date

# Exhibit A



**03/28/2021**

NAME: Jon Rodney Resar, MD

CURRENT APPOINTMENTS:

Professor of Medicine  
Division of Cardiology  
Department of Medicine  
Johns Hopkins University

Director  
Interventional Cardiology Training Program  
Johns Hopkins University

Director  
Adult Cardiac Catheterization Laboratory  
Johns Hopkins Hospital

Director  
Interventional Cardiology and Structural Heart Program  
Adult Cardiac Catheterization Laboratory  
Johns Hopkins Hospital

Medical Director, Structural Heart Disease Program  
Johns Hopkins Hospital

OFFICE ADDRESS:

Zayed 7125N  
Division of Cardiology  
Johns Hopkins Hospital  
1800 Orleans Street  
Baltimore, Maryland 21287  
Tele: (410) 614-1132  
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[jresar@jhmi.edu](mailto:jresar@jhmi.edu)

HOME ADDRESS:

P.O. Box 162  
1705 By Woods Lane  
Stevenson, Maryland 21153  
(410) 484-3701

DATE OF BIRTH: August 14, 1960

PLACE OF BIRTH: Ashland, Wisconsin

CITIZENSHIP:	United States
MEDICAL LICENSE:	Maryland Certificate # D38228

EDUCATION:

1982	B.S. University of Wisconsin-Milwaukee Milwaukee, Wisconsin
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1985	M.D. Medical College of Wisconsin Milwaukee, Wisconsin
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POSTGRADUATE TRAINING:

1985-1986	Intern, Department of Internal Medicine Johns Hopkins University, Baltimore, MD
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1986-1988	Resident, Department of Internal Medicine Johns Hopkins University, Baltimore, MD
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1988-1991	Fellow, Cardiovascular Medicine Johns Hopkins University, Baltimore, MD
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1991-1992	Fellow, Interventional Cardiology Johns Hopkins University, Baltimore, MD
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APPOINTMENTS:

1981-1983	Research Assistant Medical College of Wisconsin
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1982-1983	Neuroanatomy Teaching Assistant Medical College of Wisconsin
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1992-1998	Assistant Professor Division of Cardiology Department of Medicine Johns Hopkins University
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1992-Present	Attending, Interventional Cardiology Johns Hopkins Hospital
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1995-1999	Associate Director Interventional Cardiology
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1995-1997	Johns Hopkins Hospital Medical Director Cardiac Catheterization Laboratory Towson Heart Center
1997-2012	Medical Director Halsted 5 In-Patient Unit Johns Hopkins Hospital
1998-2016	Associate Professor Division of Cardiology Department of Medicine Johns Hopkins University
1998-Present	Director Adult Cardiac Catheterization Laboratory Johns Hopkins Hospital
1999-Present	Director Interventional Cardiology Johns Hopkins Hospital
2007-2009	Director Cardiac Catheterization Laboratory Greater Baltimore Medical Center
2008-2013	Medical School Council Johns Hopkins University School of Medicine
2011-Present	Medical Director, Structural Heart Disease Program Johns Hopkins Hospital
2017-Present	Professor of Medicine Division of Cardiology Department of Medicine Johns Hopkins University

CERTIFICATIONS:

1986	License to Practice Medicine, Maryland
1986	Diplomate, National Board of Medical Examiners
1988	Diplomate, American Board of Internal Medicine
1991 (Recert. 2000 and 2011)	Diplomate, Board of Cardiovascular Disease
1999 (Recert. 2009 and 2019)	Diplomate, Board of Interventional Cardiology

AWARDS & HONORS:

Alpha Omega Alpha Honor Medical Society  
Engstrom Award In Internal Medicine  
Quick Award In Biochemistry  
William H. Millman Award  
Frankow Award  
Castle Connely's America's Top Doctors  
Madison Who's Who

SOCIETY MEMBERSHIPS:

AOA Honor Society  
Fellow, American College of Cardiology  
Circulation Council, American Heart Association  
Fellow, Society Cardiac Angiography and Intervention

GRANT SUPPORT:

National Research Service Award  
(1F32HL08184-01) Individual Postdoctoral  
Fellowship NIH-PHS 7/1/90-6/30/91

Co-Investigator: R01AG023624  
Mechanisms of Age-related Diastolic  
Dysfunction in Humans, PI: Shapiro,  
Edward P.

Multiple industry sponsored research trials

RESEARCH ACTIVITY:

Principal Investigator  
Inoue Mitral Valvuloplasty Study  
IMPACT II Study  
BARAT Study  
MK-383 Study  
Stent Anticoagulation Study  
ATLAST Study  
PACIFIC Study  
Esprit Study  
Target Study  
Microvena Trap Device Study  
DELIVER Study  
PPAR Study  
CardioMag Study  
ev3 SPIDER Study  
Tenacity  
Spirit-III  
Stradivarius  
Spirit-IV  
Protect-II  
Xience V Registry



Xience V Small Vessel Study  
Agility Trial  
Medtronic CoreValve Pivotal Studies  
Excel Study  
Absorb Study  
Coapt Study  
St. Jude Portico TAVR Study  
Reprise III Study  
Medtronic Evolut R Low Risk Study  
Medtronic Apollo Study  
Sinomed Pioneer III Study  
Relieve Study

Co-Investigator

CAVEAT Study  
Stent Restenosis Study (STRESS)  
Calypso Study  
Gianturco-Roubin II Stent Study  
ACS Stent Study  
Instent Study  
Schwarz Pharma F-9004 Study  
NIR Stent Study  
Wallstent Study  
Berlex Gene Therapy Protocol  
Novoste Beta-Cath Trial  
Be Stent Trial  
Cook Logic Stent Trial  
Complete Trial

SCIENTIFIC ADVISORY BOARD:

Osiris Therapeutics  
Corindus  
Cardiospec  
Boston Scientific Corporation

PATENT:

JHU/APL File No. 2820-SPL entitled "Implantable  
Pressure-Actuated Drug Delivery Systems and Methods  
of Manufacture and Use

PROFESSIONAL SERVICES:

Abstract Review

American Heart Association  
American College of Cardiology  
Transcatheter Cardiovascular Therapeutics  
Cardiovascular Research Technologies

National Steering Committee	MACE Trial CoreValve Evolut R TAVR Trial Medtronic Evolut R Low Risk TAVR Trial
Journal Peer Review	Catheterization and Cardiovascular Intervention Chest American Heart Journal International Journal of Cardiovascular Interventions Lasers in Medicine Annals of Biomedical Engineering Journal of the American College of Cardiology American Journal of Cardiology Atherosclerosis International Journal of Cardiology Circulation Circulation: Cardiovascular Interventions British Medical Journal
National Symposiums	Moderator Multiple Scientific Sessions American College of Cardiology 2001-Present American Heart Association 1995-Present Transcatheter Cardiovascular Therapeutics 2005-Present  Presenter How to Avoid Hemodynamic Errors in the Cath Lab American Heart Association November 10, 2004  Presenter How to Manage Complications in the Cath Lab American Heart Association November 14, 2005  Presenter Extracorporeal Shockwave Myocardial Revascularization Transcatheter Cardiovascular Therapeutics 2006  Presenter Complications of Interventional Therapies My Worst Complications: ASD, PFO, VSD Misadventures Discussant, Structural Heart Disease Theater Transcatheter Cardiovascular Therapeutics 2007

Presenter  
Atrial Septal Defect Closure Course 2011

Presenter  
High Risk Percutaneous Intervention  
American Heart Association  
November 14, 2011

Presenter  
Transcatheter Aortic Valve Replacement Heart Team  
Society of Thoracic Surgery  
January 28, 2013

Speaker  
Paravalvular Regurgitation Following TAVR  
American Heart Association  
November 17, 2014

Speaker  
PFO Occluder – Cardiology Perspective  
Elderly Patients in the Catheterization Laboratory  
TAVR Complications and Management  
CRT17  
February 18-21, 2017

Speaker  
Low Flow, Low Gradient Aortic Valve Stenosis  
Minnesota Valve Symposium  
April 20, 2017

#### International Symposiums

Coronary Artery Disease  
Sao Paulo, Brazil  
August, 1997

Cardiology Symposium  
Beijing, P.R. China  
June, 1998

Cardiovascular Diseases  
Bologna, Italy  
September, 2000

Cardiology Grand Rounds  
Dubai, UAE  
February, 2005

Data and Safety Monitoring Boards

REVEAL Study  
MIST-II Study  
gRELIEFa Study

Cardiology Update  
Istanbul, Turkey  
June, 2005

Cardiology Symposium  
Panama City, Panama  
October, 2008

Kamakura Live Demonstration Course  
Yokohama, Japan  
2009, 2010, 2011, 2012

Crossroads Institute Interventional Fellows Course  
Tokyo, Japan  
2009, 2010, 2011, 2012  
Drug Eluting Stent Symposium  
Amman, Jordan  
January, 2010

Cardiology Imaging Symposium  
Beirut, Lebanon  
June, 2012

Cardiovascular Topics  
Dhahran, Saudi Arabia  
February, 2015

Jordanian Society of Cardiology  
Amman, Jordan  
April, 2015

Visiting Professor  
National Taiwan University Hospital  
Taipei, Taiwan  
March, 2018

TAVI Symposium: Challenges & Triumphs Part 1  
Amman, Jordan  
January, 2021

TAVI Symposium: Challenges & Triumphs Part 2  
Amman, Jordan  
March, 2021

#### CME Presentations

Advances in Cardiac Diagnosis & Treatment  
1993 Update on Interventional Cardiology

1994 Mitral Valvuloplasty  
1996 Intracoronary Stenting  
1998 Myocardial Laser Revascularization  
2000 PCI in Patients with Prior CABG  
2001 PCI in Patients with Diabetes  
2002 Multi-Vessel CAD: CABG or PCI  
2004 What's New in Cardiac Intervention  
2004 Evaluation of Pulmonary Hypertension  
2005 Drug Eluting Stents  
2006 Adult Congenital Heart Disease  
2007 New Frontiers in Catheter Intervention  
2008 New Interventional Procedures  
2009 Percutaneous Valve Therapy  
2010 Coronary Artery Disease in Diabetics  
2011 Transcatheter Aortic Valve Implantation  
2012 Transcatheter Aortic Valve Replacement  
2013 Update on the TAVR Revolution  
2014 Aggressive PCI  
2015 Elderly Patients in the Cath Lab  
2016 Structural Heart Disease Management

Johns Hopkins Medicine

1996 Intracoronary Stenting  
1997 Intracoronary Radiation Therapy  
2003 PFO and Cardiogenic Stroke  
2004 Anticoagulation and Antiplatelet Therapy  
2005 Diabetes and Cardiovascular Disease  
2012 Transcatheter Aortic Valve Replacement  
2015 Transcatheter Aortic Valve Replacement  
2016 Meet The Professor Rounds  
2018 Transcatheter Mitral Therapy  
2018 Meet The Professor Rounds  
2019 Meet The Professor Rounds

Johns Hopkins Medical Grand Rounds

2010 Percutaneous Atrial Septal Defect Closure  
2014 Transcatheter Aortic Valve Replacement

Johns Hopkins Community Physicians

2012 Transcatheter Aortic Valve Replacement

Suburban Hospital Cardiovascular Symposium

2013 Transcatheter Aortic Valve Replacement  
2013 Transcatheter Mitral Valve Therapy

Cardiovascular Medicine Grand Rounds

University of Wisconsin-Madison  
September 27, 2007

Stent Symposium/NACCME  
Newest Perspectives on DES  
Reston, Virginia  
March 5, 2008

Greater Baltimore Medical Center Grand Rounds  
2011 PFO Closure  
2012 Transcatheter Aortic Valve Implantation

Harbor Hospital Grand Rounds  
2012 Transcatheter Aortic Valve Implantation

Transradial Catheterization Symposium  
University of Maryland  
May 19, 2012

Mercy Hospital Medical Grand Rounds  
2021 Transcatheter Aortic Valve Implantation

Proctoring

Percutaneous myocardial revascularization  
Mayo Clinic, February 1998  
Jewish Hospital, March 1998  
New Delhi, India, April 1998  
Mumbai, India, April 1998  
Beijing, P.R. China, June 1998  
Montreal Heart Institute, September 1999

Microvena Vascular Filtration System  
Lancaster General Hospital, April 2001

Medtronic CoreValve  
Roanoke Hospital, 2014  
University Hospital Case Reserve, 2014  
University of Maryland, 2014  
New York Presbyterian Medical Center, 2014  
George Washington Medical Center, 2014  
Jewish Hospital/University of Louisville, 2014  
Palm Beach Gardens Medical Center, 2015  
Emory University Hospital, 2015  
Danbury Hospital, 2015  
Community Heart and Vascular Institute, 2015  
Abington Hospital, 2015  
Rex Hospital, 2015  
Ft. Lauderdale Hospital, 2015

## PUBLISHED ARTICLES

1. Resar JR, Livingston JZ, Halperin HR, Sipkema P, Krams R, Yin FCP: Effect of Wall Stretch on Coronary Hemodynamics in the Canine Interventricular Septum. American Journal of Physiology 259 (2): H1869-H1880, 1990.
2. Resar JR, Halperin HR, Yin FCP: Myocardial Stiffness and Coronary Perfusion --- Implications for Biomechanics. RL Spilker and MH Friedman, eds. 263-266, 1991 Biomechanics Symposium. ASME, New York.
3. Resar JR, Livingston JZ, Yin FCP: In-Plane Myocardial Wall Stress is Not the Primary Determinant of Coronary Systolic Flow Impediment. Circulation Research 70:583-592, 1992.
4. Resar JR, Trerotola SO, Osterman FA, Aversano TR, Brinker JA: Ultrasound Guided Ablation of Pseudoaneurysm Following Coronary Artery Stent Placement: A Preliminary Report. Catheterization and Cardiovascular Diagnosis 26:215-218, 1992.
5. Resar JR, Brinker JA: Early Coronary Artery Stent Restenosis: Utility of Percutaneous Coronary Angioscopy. Catheterization and Cardiovascular Diagnosis 27:276-279, 1992
6. Wolff MR, Resar JR, Stuart RS, Brinker JA: Coronary Artery Rupture and Pseudoaneurysm Formation Resulting From Percutaneous Coronary Angioscopy. Catheterization and Cardiovascular Diagnosis 28:47-50, 1993.
7. Resar JR, Prewitt KC, Wolff MR, Blumenthal RS, Raqueno JV, Brinker JA: Percutaneous Transluminal Coronary Angioplasty Through 6 French Diagnostic Catheters: A Feasibility Study. American Heart Journal 125:1591-1596, 1993.
8. Resar JR, Judd RM, Halperin HR, Chacko VP, Weiss RG, Yin FCP: Direct Evidence That Coronary Perfusion Affects Diastolic Myocardial Mechanical Properties. Cardiovascular Research 27:403-410, 1993.
9. Resar JR, Wolff ME, Hruban RH, Brinker JA: Endoluminal Sealing of Vascular Wall Disruptions With Radiofrequency Heated Balloon Angioplasty. Catheterization and Cardiovascular Diagnosis 29:161-167, 1993.
10. CAVEAT Study Group: A Comparison of Directional Atherectomy with Coronary Angioplasty in Patients with Coronary Artery Disease. New England Journal of Medicine 329: 221-227, 1993.
11. Blumenthal RS, Wolff ME, Resar JR, Coombs VJ, Brinker JA: Pre-procedural Anticoagulation Does Not Reduce Angioplasty Heparin Requirements. American Heart Journal 125:1221-1225, 1993.



12. Wolff MR, Prewitt KC, Brinker JA, Resar JR: Coronary Angioplasty Using an Autoperfusion Balloon Catheter Through a 6 French Guiding Catheter. Catheterization and Cardiovascular Diagnosis 29:247-250, 1993.
13. Resar JR, Wolff MR, Blumenthal RS, Coombs V, Brinker JA: Brachial Approach for Intracoronary Stent Implantation: A Feasibility Study. American Heart Journal 126:300-304, 1993.
14. Prewitt KC, Resar JR, Brinker JA: Fragmentation and Embolization of a Plastic-Coated Guidewire. Catheterization and Cardiovascular Diagnosis 30:27-29. 1993.
15. Oktay HS, Resar JR, Humphrey JD: Mechanics of Conventional and Thermal Balloon Angioplasty. Langrana NA, Friedman MH, and Grood ES, eds. pp 305-306, 1993 Bioengineering Conference. ASME, New York.
16. Judd RM, Resar JR, Yin FCP: Dynamic Measurements of Diastolic Intramyocardial Vascular Volume. American Journal of Physiology 265:H1038-H1047, 1993.
17. Livingston JZ, Resar JR, Yin FCP: The Effect of Tetanic Myocardial Contraction on Coronary Pressure-flow Relationships. American Journal of Physiology 265:H1215-H1226, 1993.
18. Halperin HR, Tsitlik JE, Rayburn BK, Resar JR, Livingston JZ, Yin FCP: Estimation of Myocardial Mechanical Properties With Dynamic Transverse Stiffness. Advances in Experimental Medicine & Biology 346: 103-112, 1993.
19. Reis SE, Gloth ST, Blumenthal RS, Resar JR, Zacur HA, Gerstenblith G, Brinker JA: Ethinyl Estradiol Acutely Attenuates Abnormal Coronary Vasomotor Responses to Acetylcholine in Postmenopausal Women. Circulation 85:52-60, 1994.
20. Resar JR, Prewitt KC, Wolff MR, Brinker JA: Coronary Angioplasty Through a New 6 French Guiding Catheter. Catheterization and Cardiovascular Diagnosis 32:268-273, 1994.
21. Resar JR, Brinker JA: Peripheral Arterial Access: The Large and Small of it. Catheterization and Cardiovascular Diagnosis 33:212-213, 1994.
22. Kang T, Resar JR, Humphrey JD: Heat-Induced Changes in the Mechanical Behavior of Passive Coronary Arteries. Journal of Biomechanical Engineering 117:86-93, 1995.

23. Kamp TJ, Goldschmidt-Clermont PJ, Brinker JA, Resar JR; Myocardial Infarction, Aortic Dissection, And Thrombolytic Therapy: A case report and review of the literature. American Heart Journal 128: 1234-1237, 1994.
24. Blumenthal RS, Savader SJ, Resar JR, Brinker JA, Reis Se: Use of Intravascular Ultrasonography to Assess the Hemodynamic Significance of the Coronary-Subclavian Steal Syndrome. American Heart Journal 129:622-625, 1995.
25. Reis SE, Resar JR, Blumenthal RS, Gloth ST, Gerstenblith G, Brinker JA: Effects of Aging on the Modulation of Coronary Flow by Endothelium-Independent Vasodilators in Postmenopausal Woman. Cardiology in the Elderly 3:43-51, 1995.
26. Hope EJ, Haigney MC, Calkins H, Resar JR: Left Main Coronary Thrombosis After Radiofrequency Ablation. American Heart Journal 129:1217-1219, 1995.
27. Dalal JN, Brinker JA, Resar JR: Coronary Artery Spasm in the Transplanted Human Heart. Angiology 47:291-294, 1996.
28. Blumenthal RS, Carter AJ, Resar JR, Coombs V, Gloth ST, Dalal J, Brinker JA: A Comparison of Bedside and Hospital Laboratory Coagulation Studies During and After Coronary Intervention. Catheterization and Cardiovascular Diagnosis 34:9-17, 1995.
29. Carter AJ, Hicks K, Heldman AW, Resar JR, Laird JR, Coombs VJ, Brinker JA, Blumenthal RS: Clinical Evaluation of a Microsample Coagulation Analyzer, and Comparison With Existing Techniques. Catheterization and Cardiovascular Diagnosis 39:97-102. 1996.
30. Blumenthal RS, Brinker JA, Resar JR, Gloth ST, Zacur HA, Coombs VJ, Gerstenblith G, Reis SE: Long-Term Estrogen Therapy Abolishes Acute Estrogen-Induced Coronary Flow Augmentation in Postmenopausal Women. American Heart Journal 133:323-328, 1997
31. Blumenthal RS, Heldman AW, Brinker JA, Resar JR, Coombs VJ, Gloth ST, Gerstenblith G, Reis SE: Acute Effects of Conjugated Estrogens on Coronary Blood Flow Response to Acetylcholine in Men. American Journal of Cardiology 80:1021-1024, 1997.
32. The IMPACT-II Investigators: Randomized Placebo-Controlled Trial of Effect of Eptifibatide on Complications of Percutaneous Coronary Intervention: IMPACT-II. Lancet 349:1422-1428, 1997.

33. The RESTORE Investigators: Effects of Platelet Glycoprotein IIb/IIIa Blockade With Tirofiban on Adverse Cardiac Events in Patients With Unstable Angina or Acute Myocardial Infarction Undergoing Coronary Angioplasty. Circulation 96:1445-1453, 1997.
34. The IMPACT-II Investigators: Modifiable Risk Factors for Vascular Access Site Complications in the IMPACT-II Trial of Angioplasty With Versus Without Eptifibatide. Journal American College of Cardiology 31:1518-1524, 1998.
35. Resar JR, Brinker JA: Bridge Work. Catheterization and Cardiovascular Diagnosis 41:421-422, 1998.
36. Burkhoff D, Wesley MN, Resar JR, Lansing AM: Factors Correlating with Risk of Mortality Following Transmyocardial Revascularization. Journal American College of Cardiology 34:55-61, 1999.
37. Burkhoff D, Schmidt S, Schulman SP, Myers J, Resar J, Becker LC, Weiss J, Jones JW: A Prospective, Randomized Trial of Transmyocardial Laser Revascularization versus Continued Medical Therapy for the Treatment of Refractory Angina Pectoris: The ATLANTIC Study. Lancet 354:885-890, 1999.
38. Oesterle SN, Sanborn TA, Ali N, Resar J, Ramee SR, Heuser R, Dean L, Knopf W, Schofield P, Schaer GL, Reeder G, Masden R, Yeung AC, Burkhoff D: The PACIFIC Study: A Prospective Randomized Trial of Percutaneous Transmyocardial Laser Revascularization for Severe Angina. Lancet 356: 1705-1710, 2000.
39. Segal JB, Kasper EK, Rohde C, Bray PF, Baldwin WM, Resar JR, Hruban RH, Kickler TS: Coagulation Markers Predicting Cardiac Transplant Rejection. Transplantation 72:233-237, 2001.
40. Hennebry TA, Segal JB, Kickler TS, Kasper EK, Resar JR: Decreased Levels of D-dimer Predict Progressive Accelerated Graft Arteriosclerosis. American Journal of Cardiology, 89:884-887, 2002.
41. Hofmann LA, Razavi M, Arepally A, Reginelli JP, Resar JR, Geschwind JF, Corl F: GPIIb-IIIa Receptor Inhibitors: What the Interventional Radiologist Needs to Know. CardioVascular and Interventional Radiology, 24:361-367, 2001.
42. The TARGET Investigators: Outcomes at 6 months for the direct comparison of tirofiban and abcizimab during percutaneous coronary revascularization with stent placement: the TARGET study. Lancet, 360: 335-360, 2002.
43. Roguin A, Resar JR: Genetics and Susceptibility of Coronary Collateral Formulation. Circulation 108: 149, 2003.

44. Fernando D, Resar JR: Magnetocardiography in Cardiac Transplantation: A Case Study. International Journal of Bioelectromagnetism 5:109-113, 2003.
45. Gellman J, Hare JM, Lowenstein CJ, Gerstenblith G, Coombs V, Langenberg P, Brinker JA, Resar JR: L-Arginine Ameliorates the Abnormal Sympathetic Response of the Dysfunctional Human Coronary Microvasculature. Angiology 55:1-8, 2004.
46. Shechter G, Ozturk C, Resar JR, McVeigh ER: Respiratory Motion of the Heart from Free Breathing Coronary Angiograms. IEEE Transactions on Medical Imaging 23:1046-1056, 2004.
47. Shechter G, Resar JR, McVeigh ER: Rest Period Duration of the Coronary Arteries: Implications for Magnetic Resonance Coronary Angiography. Medical Physics 32: 255-262, 2005.
48. Shechter G, Shechter B, Resar JR, Beyar R: Prospective Motion Correction of X-Ray Images for Coronary Interventions. IEEE Transactions on Medical Imaging 24:441-450, 2005.
49. Steinberg BA, Roguin A, Watkins SP, Hill P, Fernando D, Resar JR: Magneto-Cardio-Gram Recordings in a Non-Shielded Environment-Reproducibility and Ischemia Detection. Annals of Noninvasive Electrocardiology 10(2):152-160, 2005.
50. Resar JR, Roguin A, Voner J, Nasir K, Hennebry TA, Miller JM, Ingersol BS, Kasch LM, Semenza GL: Hypoxia-Inducible Factor 1 $\alpha$  Polymorphism and Coronary Collaterals in Patients with Ischemic Heart Disease. Chest 128:787-791, 2005.
51. Roguin A, Steinberg BA, Watkins SP, Resar JR: Safety of Bivalirudin During Percutaneous Coronary Interventions in Patients With Abnormal Renal Function. International Journal of Cardiovascular Interventions 7(2):88-92, 2005.
52. Dixon SR, Mann JT, Lauer MA, Casale PN, Dippel EJ, Strumpf RK, Feldman RL, Shear W, Resar JR, Zimmer SD, O'Neill WW for the TRAP Investigators: A Randomized, Controlled Trial of Saphenous Vein Graft Intervention With a Filter-Based Distal Embolic Protection Device: TRAP Trial. Journal of Interventional Cardiology 18 (4):233-241, 2005.
53. Roguin A, Resar JR: CT Angiography is Here – Are We Expected to See a Change of Angiography Referral Pattern? International Journal of Cardiovascular Interventions 7:152-151, 2005.

54. Isenbarger DW, Resar JR: Drug-eluting versus third-generation bare metal stents: The US strategy. International Journal of Cardiovascular Interventions 7: 171-175, 2005.
55. Shechter G, Resar JR, McVeigh ER: Displacement and Velocity of the Coronary Arteries: Cardiac and Respiratory Motion. IEEE Transactions on Medical Imaging 25:369-375, 2006.
56. Boyle AJ, Chan M, Dib, J, Resar J: Catheter-Induced Coronary Artery Dissection: Risk Factors, Prevention and Management. Journal of Invasive Cardiology 18:5000-503, 2006.
57. Dib J, Boyle AJ, Chan M, Resar JR: Coronary Air Embolism: A Case Report and Review of the Literature. Catheterization and Cardiovascular Interventions 68:897-900, 2006.
58. Boyle AJ, Chan MY, Dib J, Kapur NK, Kraft S, Vaillant R, Whiting JS, Resar JR: Assessment of a Novel Angiographic Image Stabilization System for Percutaneous Coronary Intervention. Journal of Interventional Cardiology 20:153-157, 2007.
59. Bhatt DL, Chew DP, Grines C, Mukherjee D, Leeser M, Gilchrist IC, Corbelli JC, Blankenship JC, Eres A, Steinhubl S, Tan WA, Resar JR, AlMahameed A, Abdel-Latif A, Tang HW, Brennan D, McErlean E, Hazen SL, Topol EJ: Peroxisome Proliferator-Activated Receptor  $\gamma$  Agonists for the Prevention of Adverse Events Following Percutaneous Coronary Revascularization---Results of the PPAR Study. American Heart Journal 154:137-143, 2007.
60. Kapur NK, Conte JV, Resar JR: Percutaneous Closure of Patent Foramen Ovale for Refractory Hypoxemia after HeartMate II Left Ventricular Assist Device Placement. Journal of Invasive Cardiology 19:E268-E270, 2007.
61. MacKnight BM, Stearns JD, Vricella LA, Resar JR: Migration of an Embolized Patent Foramen Ovale Closure Device to the Left Ventricular Outflow Tract. Anesthesia and Analgesia 105(5):1229-1230, 2007.
62. Resar JR: Can We Do Better? Strategies for Acute Coronary Syndrome With Percutaneous Coronary Intervention. Advanced Studies in Medicine 7(17):534-559, 2007.
63. Thompson, JB, Blaha M, Resar JR, Blumenthal RS, Desai MY: Strategies to Reverse Atherosclerosis: An Imaging Perspective. Current Treatment Options in Cardiovascular Medicine 10:283-293, 2008.

64. Boyle AJ, Schuleri KH, Lienard J, Vaillant R, Chan MY, Zimmet JM, Mazhari R, Centola M, Feigenbaum G, Dib J, Kapur NK, Hare JM, Resar JR: Quantitative Automated Assessment of Myocardial Perfusion at Cardiac Catheterization. American Journal of Cardiology 102:980-987, 2008.
65. Stradivarius Investigators: Effect of Rimonabant on Progression of Atherosclerosis in Patients With Abdominal Obesity and Coronary Artery Disease: The Stradivarius Randomized Controlled Trial. Journal of the American Medical Association 299(13):1547-1560, 2008.
66. Spirit III Investigators: Comparison of an Everolimus-Eluting Stent and a Paclitaxel-Eluting Stent in Patients With Coronary Artery Disease: A Randomized Trial. Journal of the American Medical Association 299(16):1903-1913, 2008.
67. Boudoulas KD, Elinoff J, Resar JR: Bronchopulmonary Fistula Closure with an Amplatzer Multi-Fenestrated Septal Occluder. Catheterization and Cardiovascular Interventions, Published On-Line Prior to Print, 2009.
68. Yannopoulos D, Zviman M, Kolandaivelu A, Ranjan R, Dori Y, Castro V, Resar JR, Wilson RF, Halperin HR. Intra-CPR Hypothermia with and Without Volume Loading in an Ischemic Model of Cardiac Arrest. Circulation 120:1426-143, 2009.
69. Dorfman T, Resar JR: Thrombotic Occlusion of a Large Septal Perforator Presenting as ST-Segment Elevation in V1-V2 and Treated with Aspiration Thrombectomy: A Brief Review of the Literature. Journal of Invasive Cardiology 23:E255-259, 2011.
70. Kakouros N, Rade JJ, Kourliouros A, Resar JR: Platelet Function in Patients with Diabetes Mellitus: From a Theoretical to a Practical Perspective. International Journal of Endocrinology 2011: Article ID 742719, 14 pages.
71. Gupta A, Schoenberg M, Streiff M, Resar J: Coronary Stent Management in Elective Genitourinary Surgery. British Journal of Urology 2012: 110(4): 480-484.
72. Zakaria S, Tedford RJ, Desai D, Resar JR: Acute Isolated Posterior Myocardial Infarction Electrocardiogram Findings in a Patient with Pulmonary Disease. Texas Heart Institute Journal 2012: 39(2): 292-293.
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Subsequent abstracts are not listed.

# Exhibit B

Name: **ANTON MILBERT L. BLACK**Case Number: **18-11079**POST MORTEM EXAMINATION REPORT  
OFFICE OF THE CHIEF MEDICAL EXAMINER  
STATE OF MARYLAND

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An autopsy was performed on the body of **ANTON MILBERT L. BLACK** at the Office of the Chief Medical Examiner for the State of Maryland on the 16<sup>th</sup> day of **September 2018**.

### **EXTERNAL EXAMINATION**

The body was that of a well-developed, well-nourished, adult black male. The body was received unclad. The body weighed 159 pounds, was 5'9" in length and appeared compatible with the reported age of 19 years. The body was cool. Rigor was fully fixed in the extremities and jaw. Fixed purple livor mortis was on the posterior surfaces of the body, except in areas exposed to pressure. The scalp hair was black, curly, and arranged in moderately long braids. Facial hair consisted of a black mustache and tuft of hair on the chin. The irides were brown. The corneae were slightly clouded. The conjunctivae were slightly congested with a few petechiae on the right lateral bulbar conjunctivae. Two hemorrhages, 1/8" and 1/16", were on the left lower lateral bulbar conjunctiva. Otherwise the sclerae were white. Bloody fluid was at the mouth and nares. The external auditory canals were free of foreign material and abnormal secretions. The nasal skeleton was palpably intact. The lips were normally formed. The anterior teeth were natural and in adequate condition. No oral petechiae were noted. No petechiae were on the facial skin. The neck organs were in the midline position and appeared normally formed. The chest was unremarkable. The abdomen was flat. Small scars were on the back and extremities. The upper and lower extremities were symmetrical and without absence of digits. The fingernails were short, clean, trimmed and intact. No tattoos were identified. The external genitalia were those of an adult circumcised male. The testicles were bilaterally descended within a dried scrotum. The posterior torso was without note. The anus was unremarkable.

### **EVIDENCE OF THERAPY**

Evidence of medical intervention included: an orotracheal tube; defibrillator pads on the chest; bilateral chest tubes; a decompression catheter in the right side of the top of the chest; a peripheral intravenous catheter in the right antecubital fossa; and a peripheral intravenous catheter in the posterior right hand. Multiple red-brown abrasions, up to 1-7/8", on the mid-chest were consistent with injuries due to resuscitative efforts.

### **EVIDENCE OF INJURY**

#### **I. BLUNT FORCE TRAUMA**

A 1/2 x 3/8" red abrasion was on the right side of the forehead. A 1/8" red abrasion was on the left side of the forehead. Multiple red abrasions, up to 1/4", were on the nose. A 1/2 x 3/16" red-purple abraded contusion was on the lateral left upper eyelid. A 1/16" red abrasion was just lateral of the left eye. A 1-1/2 x 5/8" red-tan abrasion was on the right side of the face. A 3/16" red abrasion was just below the left naris of the nose. Multiple red abrasions, up to 1/4", were just below the left corner of the mouth. Two red abrasions, each 1/4", were on the right lateral inner upper lip. Multiple red abrasions, up to 1/2", were on the left lateral inner upper lip. Multiple red abrasions, up to 3/16", were on the right lateral inner lower lip. A 1/8" red abrasion was on the left lateral lower lip. A 3/16" red abrasion was on the left medial inner lower lip. A 3/4 x 1/8" area of red-purple abraded contusion was on the left lateral



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inner lower lip. A 3/8 x 1/4" red-purple abraded contusion and a 1/8" purple contusion were on the right buccal mucosa.

Two brown abrasions, each 1/16", were on the helix of the left ear. Multiple red abrasions and purple contusions, up to 1/2", were on the inner aspect of the left ear. Multiple red abrasions and purple contusions, up to 1/8", were just behind the left ear and on the adjacent posterolateral neck. A 3/8 x 1/4" red-purple abraded contusion was on the left anterior base of the neck. A 1/8" red abrasion was on the left posterior neck.

Multiple linear brown crusted abrasions, up to 7/8", were on the right upper back. Multiple linear brown crusted abrasions, up to 1/2", and purple contusions, up to 1/8", were on the left upper back. Cut-downs were performed along the posterior neck, back and extremities. A 2-1/2 x 2" area of subcutaneous hemorrhage was on the mid upper back; no underlying muscle hemorrhage, contusion or other injury was noted, and no fractures were noted. A 1-1/2 x 1" area of subcutaneous hemorrhage was on the mid upper lumbar area; no underlying muscle hemorrhage, contusion or other injury was noted.

A few purple contusions, up to 3/16", were on the anterior right shoulder. Multiple purple contusions, up to 1", were on the medial right arm. Multiple linear red abrasions, up to 3/8", were on the posteromedial right forearm. A 1/16" brown abrasion was on the posterolateral right wrist.

Two red abrasions, 1-1/2 x 1/2" and 1 x 1/8", were on the top of the left shoulder. Multiple linear red abrasions, up to 3/8", were on the posteromedial distal left forearm. A 5/16 x 3/16" red-purple abraded contusion was on the posteromedial left wrist. Three red abrasions, each 1/16", were on the posterior left hand. A 1/8" brown abrasion was on the posterior left hand. A 1/8" purple contusion with adjacent 1/8" red abrasion was on the posterior left middle finger. A 1/8" red abrasion was on the posterior left index finger. Cut-downs of the wrists revealed no hemorrhage, contusions, or other abnormalities within the soft tissues and muscles of the wrists.

A 2-1/2 x 3/4" red abrasion was on the anterolateral right thigh. A 3/4 x 1/4" red abrasion was in the anterior right knee. A 3/8 x 1/4" red abrasion was on the medial right ankle. Two brown crusted abrasions, 1/8" and 1/4", were on the top of the right foot. Multiple brown crusted abrasions, up to 3/16", were on the top of the left foot. Cut-downs of the ankles revealed no hemorrhage, contusions, or other abnormalities within the soft tissues and muscles of the ankles.

## **II. TASER**

A TASER dart without attached wire was in the left buttock; a 1-1/4" segment of the dart extended out from the skin of the buttock. When removed from the buttock, the dart consisted of a 1" long base with attached 1/2" barbed end. The taser wound in the left buttock consisted of a 1/16" puncture mark with two linear red abrasions, each 1/2", arranged in a semicircular pattern along the medial edge. A 1/8" x 1/8" purple contusion was just lateral to the puncture mark. A 1 x 1/4" pressure mark extended superomedially from the puncture wound. The hemorrhagic wound track of the dart extended 1/2" through the subcutaneous tissue and was associated by a 1-7/8 x

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3/4" area of fascial hemorrhage on the underlying muscle of the buttock. Sectioning of the muscle revealed hemorrhage on the surface of the muscle, but not extending into the substance of the muscle.

### INTERNAL EXAMINATION

#### BODY CAVITIES:

The body was opened by the usual thoraco-abdominal incision and the chest plate was removed. No adhesions or abnormal collections of fluid were in any of the body cavities. All body organs were in the normal anatomic position.

#### HEAD: (CENTRAL NERVOUS SYSTEM)

The scalp was reflected. The calvarium of the skull was removed. The dura mater and falx cerebri were intact. There was no epidural or subdural hemorrhage. Further description of the brain, dura and spinal cord will be given within the "**Neuropathology Report**". The brain weighed 1400 grams.

#### NECK:

A layered anterior neck dissection revealed no hemorrhage, contusion or other abnormalities within the strap muscles, soft tissues and large vessels of the anterior neck. The hyoid bone and larynx were intact. A posterior neck dissection revealed no hemorrhage, contusion or other abnormalities within the soft tissues or muscles of the posterior neck; the bony elements of the posterior neck were intact.

#### CARDIOVASCULAR SYSTEM:

Further description of the heart will be given within the "**Cardiovascular Pathology Report**". The aorta and its major branches arose normally, followed the usual course and were widely patent, free of significant atherosclerosis and other abnormality. The vena cava and its major tributaries returned to the heart in the usual distribution and were free of thrombi. The heart weighed 390 grams.

#### RESPIRATORY SYSTEM:

The upper airways were clear of debris and foreign material; the mucosal surfaces were smooth, yellow-tan and unremarkable. The pleural surfaces were smooth, glistening and unremarkable. The pulmonary parenchyma was red-purple and congested, exuding mild amounts of blood and frothy fluid; no focal lesions were noted. The pulmonary arteries were normally developed, patent and without thrombus or embolus. The right lung weighed 520 grams; the left 340 grams.

#### LIVER & BILIARY SYSTEM:

The hepatic capsule was smooth, glistening, intact, and covered a dark red-brown parenchyma with no focal lesions noted. The gallbladder contained 20 mL of green-brown, mucoid bile; the mucosa was velvety and unremarkable. The extrahepatic biliary tree was patent, without evidence of calculi. The liver weighed 1710 grams.

#### ALIMENTARY TRACT:

The tongue exhibited no evidence of recent injury. The esophagus was lined by a gray-white, smooth mucosa. The gastric mucosa was arranged in the usual rugal folds and the lumen contained 200 mL of dark brown liquid.



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The gastric mucosa was diffusely congested, but no ulcers or perforations were noted. The small and large bowels were unremarkable. The pancreas had a normal pink-tan lobulated appearance and the ducts were clear. The appendix was unremarkable.

#### **GENITOURINARY SYSTEM:**

The renal capsules were smooth and thin, semi-transparent and stripped with ease from the underlying smooth, red-brown cortical surfaces. The cortices were sharply delineated from the medullary pyramids, which were red-purple and unremarkable. The calyces, pelves and ureters were unremarkable. The urinary bladder contained 20 mL of yellow urine; the mucosa was gray-tan and smooth. The prostate gland was without note. The right kidney weighed 150 grams; the left 150 grams.

#### **RETICULOENDOTHELIAL SYSTEM:**

The spleen had a smooth, intact capsule covering a red-purple, soft parenchyma; the lymphoid follicles were unremarkable. The regional lymph nodes appeared normal. The spleen weighed 120 grams.

#### **ENDOCRINE SYSTEM:**

The thyroid and adrenal glands were unremarkable.

#### **MUSCULOSKELETAL SYSTEM:**

Muscle development was normal. No bone or joint abnormalities were noted. The neck was stable on internal palpation. No fractures were noted within the ribs or spine. Cut-downs were performed along the back, and no hemorrhage, contusions or other abnormalities were noted, except as previously described; no fractures were noted. Cut-downs were performed along the upper and lower extremities; no hemorrhage, contusions or other abnormalities were noted. No hemorrhage, contusions or other abnormalities were noted within the wrists or ankles.

### **MICROSCOPIC EXAMINATION**

**Lungs:** Sections of the lungs showed congestion, edema and intra-alveolar hemorrhage. Scattered clumps of bacteria without an associated inflammatory response likely represent post-mortem overgrowth. Mild, mostly chronic inflammation was around some airways, and increased mucus was noted within some airways; asthmatic type changes were not prominent.

**Airways:** Sections of the trachea and mainstem showed focal submucosal congestion and hemorrhage.

**Liver:** A section of the liver showed no significant histopathology.

**Kidney:** A section of a kidney showed autolysis and congestion.

**Pancreas:** A section of the pancreas showed focal autolysis and no significant histopathology.

**Stomach:** Sections of the stomach showed congestion and focal chronic inflammation.

**Spleen:** A section of the spleen showed no significant histopathology.

**Adrenal Gland:** A section of an adrenal gland showed no significant histopathology.

**Skin:** A section of the skin from the left buttock at the site of the TASER dart showed focal submucosal hemorrhage.

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**DO NOT DUPLICATE****PATHOLOGIC DIAGNOSES**


- I. Anomalous Right Coronary Artery Arising from Single Common Ostium above Left Coronary Sinus of Valsalva
- II. Myocardial Tunneling, Mid Left Anterior Descending Coronary Artery, 18 mm long and up to 7 mm deep
- III. Abrasions and Contusions of the Head, Back and Extremities
- IV. Taser Probe within Left Buttock
- V. Petechiae and Hemorrhages of the Eyes
- VI. Pulmonary Congestion, Edema and Hemorrhage
- VII. Chronic Gastritis
- VIII. History of Bipolar Disorder

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OPINION:

This 19-year-old black male, **ANTON MILBERT L. BLACK**, died of **SUDDEN CARDIAC DEATH** due to **ANOMALOUS RIGHT CORONARY ARTERY AND MYOCARDIAL TUNNELING OF THE LEFT ANTERIOR DESCENDING CORONARY ARTERY**. A significant contributing condition was bipolar disorder. Per report, on 9/15/18 at ~ 7:10 pm law enforcement received a phone call that a man was physically restraining a child. Upon arrival at ~ 7:13 pm, an officer arrived at the scene and saw the decedent restraining a child. The officer asked the decedent to release the child which he did. The decedent then ran away. He was pursued and ~ 2 minutes later he entered an auto and locked the doors. An officer used a baton to break the driver's side window. The officer reportedly fired a TASER through the broken window, but the TASER was described as having no effect. The decedent exited the auto and became involved in a physical altercation with officers. The decedent was placed prone on a handicap ramp leading to a residence. Three officers and a civilian were involved in restraining the decedent. A video of the incident shows an officer lying across the decedent's back at one point. One officer stated that he assisted in restraining the decedent by placing his knees on the decedent's shoulder, with his right knee on the left shoulder blade area at one point. Handcuffs were applied. Approximately 3 minutes after the physical altercation started, the decedent told his mother that he loves her. Approximately 4 minutes later officers applied leg restraints; the decedent was noted by officers to not be actively struggling after the application of the leg restraints. Approximately 1 minute after the legs were restrained, the decedent was noted to be unresponsive, but breathing and with a pulse. Officers rolled him on his side and then placed him in a sitting position. Approximately 2 minutes later his mother noted that "he is turning dark". Officers then removed the hand cuffs, placed him on his back, and started CPR (~ 11 minutes after the physical altercation started). Emergency medical services responded to the scene and continued CPR (including use of a LUCAS device). He was transported to a hospital, but died despite resuscitative efforts. There was no evidence (based on a review of officer interviews and a video of the incident) that the decedent was physically struck by officers, or had force applied to his neck. Reportedly, he may have recently smoked "spice". Per his medical record, he had recently been involuntarily hospitalized and diagnosed with bipolar disorder. No other medical history was reported. Based on a review of the investigation and autopsy findings, it is likely that the stress of his struggle contributed to his death. However, no evidence was found that restraint by law enforcement directly caused or significantly contributed to the decedent's death; in particular, no evidence was found that restraint led to the decedent being asphyxiated. The manner of death is best certified as **accident**.

  
Russell Alexander, M.D.  
Assistant Medical Examiner

  
David R. Fowler, M.D.  
Chief Medical Examiner

Date signed: 11/23/19  
RA/mwj/cs

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OFFICE OF THE CHIEF MEDICAL EXAMINER  
STATE OF MARYLAND

DATE

11/23/19

NEUROPATHOLOGY REPORT

**Name:** Anton Milbert L. Black **Case #:** 18-11079  
**Sex:** Male **Age:** 19  
**Race:** African American **Medical Examiner:** Dr. Alexander  
**Date of Death:** September 15, 2018

**MACROSCOPIC EXAMINATION** of October 10, 2018

**Brain Weight:** 1600 grams (fixed)

**Dura:** Free of hemorrhage. Superior sagittal sinus is patent.

**Brain:** The cerebral hemispheres are symmetrical, the gyral pattern is normal, and the leptomeninges are translucent. At the base of the brain, blood vessels are free of atherosclerosis or malformation. Cranial nerves are normal. The brainstem and cerebellum are externally within normal limits. External examination of the brain reveals no recent or remote trauma.

On coronal sections, the cerebral hemispheres are symmetrical. The cortical gyri are normally developed. The cortex is of normal thickness and well-demarcated from subjacent white matter. The volume and myelination of the white matter are normal. The corpus callosum and anterior commissure are of normal caliber. Basal ganglia, thalamus and hypothalamus are normal. The ventricular system is of normal shape and size. Hippocampal formations and entorhinal cortices are normal. In the midbrain, the aqueduct is patent and the substantia nigra is normally pigmented for age. Pons has no abnormality of the tegmentum or basis. Medulla is normal. The cerebellum shows normal folia, white matter, and deep nuclei.

**Spinal Cord:** The entire spinal cord, measuring 23.0 cm in length, is available for examination. The dura is free of hemorrhage. External examination of the cord and horizontal sections are unremarkable.

**Summary:** 1. Normal brain.  
 2. Normal spinal cord.

**Comment:** This specimen shows no sign of remote or recent trauma. Microscopic sections are pending.

24 October 2018  
**Date signed**

**Official Document**  
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**From File**

*Juan C. Troncoso*  
**Juan C. Troncoso, M.D.**  
**Neuropathologist**

cs

*11/10/19*

**NEUROPATHOLOGY REPORT**

**Name:** Anton Milbert L. Black

**Case #:** 18-11079

**Date of Death:** September 15, 2018

**Medical Examiner:** Dr. Alexander

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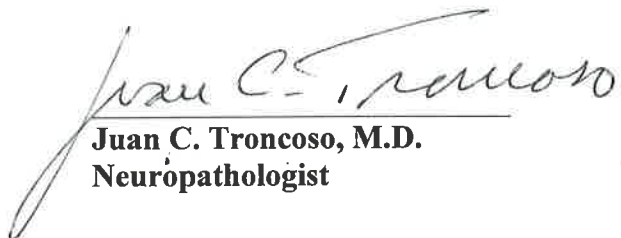
**MICROSCOPIC EXAMINATION of November 8, 2018**

Microscopic sections of the superior frontal cortex, basal ganglia, hippocampal formation, medulla, cerebellum and spinal cord show no abnormality.

In the cerebellum there is postmortem autolysis.

11/15/2018  
Date signed

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Juan C. Troncoso, M.D.  
Neuropathologist

CS

 11/10/29





CVPath Institute, Inc.

REPLY TO  
ATTENTION OF

Russell Alexander, M.D.  
Office of the Chief Medical Examiner  
900 West Baltimore Street  
Baltimore, MD 21223

PATIENT IDENTIFICATION

CAP 5105  
BLACK, Anton Milbert L.  
18-11079 RV/ns/rjk  
November 1, 2018

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FINAL DIAGNOSIS

**DIAGNOSIS: 18-11079 Autopsy, heart:**

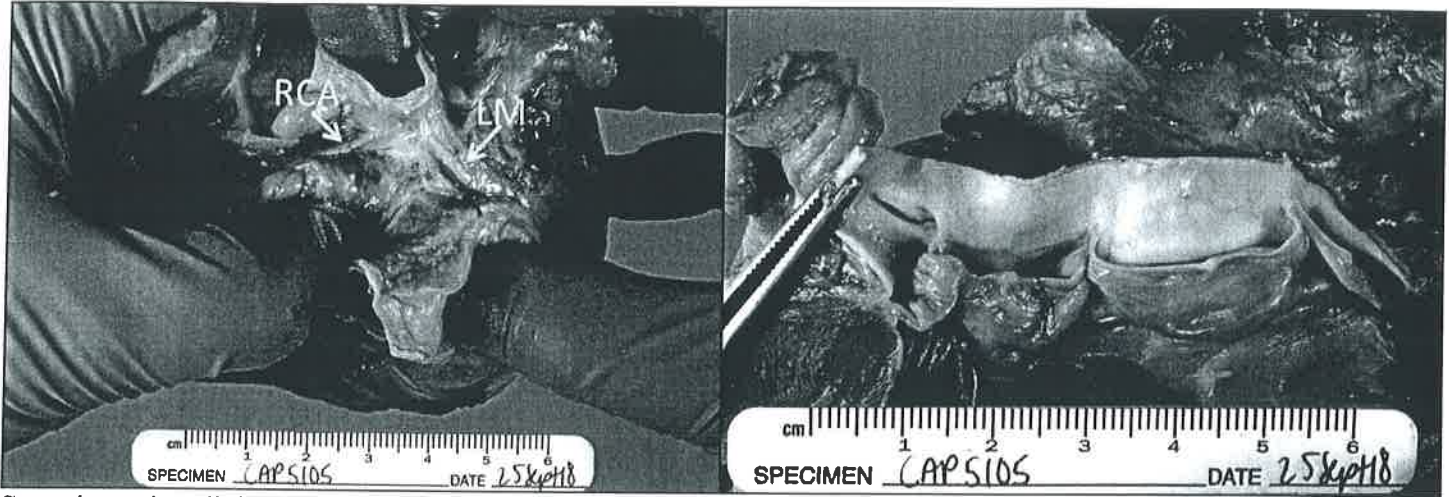
- 1. Anomalous right coronary artery arising from single common ostium above left coronary sinus of Valsalva**
- 2. Myocardial tunnel, mid LAD, 18 mm long and up to 7 mm deep**

History: 19 year old black male, 5'9", 159 lbs., was reportedly involved in possible child abduction; police were called, chased the subject on foot, then tazed and handcuffed him; placed in seated position leaning against a wall and went into cardiac arrest.

Heart: Received formalin fixed, 380 grams; normal epicardial fat with rare epicardial hemorrhage (2-5mm) overlying the anterior left ventricle at mid to apex level; closed foramen ovale; normal cardiac chamber dimensions: left ventricular cavity diameter 37 mm, left ventricular free wall thickness 12 mm, ventricular septum thickness 12 mm, right ventricle thickness 3 mm; left atrial endocardial fibrosis; fenestration of the right coronary cusp (RCC); myxomatous thickening of all three aortic valve leaflets with mild LCC/RCC and RCC/NCC commissural fusion; no gross myocardial fibrosis or necrosis; histologic sections show unremarkable myocardium without inflammation, necrosis or cardiomyopathic features

Coronary arteries: Anomalous take-off of the right coronary artery from a slit-like common left coronary ostium; right dominance; 18 mm span of mid left anterior descending (MLAD) tunneling into the left ventricular myocardium up to 7 mm deep; no gross atherosclerosis; a section of the tunneled mid LAD shows histologically normal artery

Conduction system: The sinoatrial node and sinus nodal artery are unremarkable. The compact atrioventricular (AV) node, penetrating bundle and left bundle branch are intact without inflammation, increased fat or proteoglycan. There is no dysplasia of the AV nodal artery. There are no discernible accessory conduction pathways.



Superior epicardial view of right coronary artery (RCA) and left main coronary artery (LM) arising from a common ostium; opened aortic root shows single ostium at level of sinotubular junction above left coronary sinus of Valsalva

**DO NOT DUPLICATE**

*Renu Virmani*  
Renu Virmani, M.D.  
President, CVPath Institute

Blocks made: 6 (5 heart, 1 coronary artery)  
Slides made: 7 (6 H&E, 1 Movat)  
Case received: September 21, 2018  
Case completed: November 1, 2018

*12/12/18*