COUNTY OF EL PASO
OFFICE OF THE MEDICAL EXAMINER
AND FORENSIC LABORATORY

Autopsy Report
Case 2018-0585

JAKELIN AMEI ROSMERY CAAL MAQUIN

Cause of Death: Seq[illegible]f Streptococcal **Sepsis**
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AUTOPSY REPORT

CAAL MAQUIN, JAKELIN AMEI ROSMERY
2018-0585

POSTMORTEM EXAMINATION

An autopsy is performed on the body of Jakelin Amei Rosmery Caal Maquin at the El Paso County Office of the Medical Examiner, State of Texas, on the 10th day of December, 2018, commencing at 0935 hours. The body is received within a body bag with a label bearing the decedent's name. Items of clothing and personal effects are inventoried separately.

EXTERNAL EXAMINATION (EXCLUDING INJURIES)

The body is that of a female child who weighs 26.76 kg and is 117 cm in length (Body mass index=19.4 kg/m^2. The body is cold. Rigor mortis is partially fixed. Fixed purple livor mortis extends over the posterior surfaces of the body, except in areas exposed to pressure. The scalp hair is wavy, brown and measures 18 inches in length over the crown. The irides are brown. The pupils are round. The corneae are slightly clouded. The sclerae are white, and the conjunctivae are clear. No petechial hemorrhages are identified on the sclerae, bulbar conjunctivae, facial skin, or oral mucosa. The nose and ears are normally formed. The teeth are natural and in good condition. The neck is unremarkable. The thorax is well developed and symmetrical. The abdomen is flat. The anus is free of lesions. The spine is normally formed, and the surface of the back is free of lesions. The external genitalia are those of a normal female child. The upper and lower extremities are well developed and symmetrical, without absence of digits.

No identifying marks or scars are readily apparent. Evidence of medical intervention includes: an orotracheal tube, an orogastric tube, a Foley catheter, a pulse/oximeter encircling the 1st digit of the left foot; intravenous lines on the dorsum of the right hand, left ankle, left antecubital fossa and left inguinal area; puncture marks on the bilateral antecubital fossae (surrounded by purple ecchymosis), right ankle, right and left sides of the neck (surrounded by purple ecchymosis), bilateral inguinal areas (surrounded by purple ecchymosis) and the left subclavian area (surrounded by purple ecchymosis).

EVIDENCE OF INJURY

1. On the mucosal surface of the upper lip are small (less than 1/8 inch), discontinuous red abrasions over a 1½ inch area.

AUTOPSY REPORT

INTERNAL EXAMINATION

BODY CAVITIES:

The right and left pleural cavities show 160 and 180 mL of straw-colored fluid. The peritoneal cavity shows 210 mL of straw-colored fluid. No adhesions or any other abnormal collections of fluid are in any of the body cavities. All body organs are in normal and anatomic position. The serous surfaces are smooth and glistening. Diffuse subcutaneous soft tissue edema is present, predominantly on the torso (iatrogenic – fluid resuscitation). Extensive areas of subcutaneous soft tissue hemorrhage are present in the upper chest and bilateral clavicular areas, extending towards the mediastinum (iatrogenic – punctures and intravenous line accesses).

HEAD (CENTRAL NERVOUS SYSTEM):

The brain weighs 1318 grams. The dura mater and falx cerebri are intact and not adherent to the brain. The leptomeninges are thin and transparent. The brain is preserved in 20% formalin prior to further examination. See the Forensic Neuropathology Examination Report for complete examination of the brain.

NECK:

Extensive, confluent areas of subcutaneous soft tissue hemorrhage are present in neck, bilaterally (iatrogenic – punctures and intravenous line accesses). The hyoid bone and larynx are intact. The tongue is normal.

CARDIOVASCULAR SYSTEM:

The heart weighs 108 grams. The pericardial sac is free of significant fluid or adhesions. The pericardial surfaces are smooth and glistening. The coronary arteries arise normally and follow the distribution of a right dominant pattern with no associated abnormalities. The myocardium is dark red-brown, firm, and free of abnormalities. The atrial and ventricular septa are intact, and the septa and free walls are free of muscular bulges. The aorta and its major branches arise normally and follow the usual course, with widely patent orifices of the major aortic vascular branches. The vena cava and its major tributaries are patent and return to the heart in the usual distribution and are unremarkable.

RESPIRATORY SYSTEM:

The right and left lungs weigh 297 and 266 grams, respectively (after 24-hour formalin infusion). The upper and lower airways are unobstructed, and the mucosal surfaces are smooth and yellow-tan. The pleural surfaces are focally and mildly dusky with a cut surface showing patchy consolidations, predominantly at the lung bases, which exudes a moderate amounts of blood and frothy fluid. The pulmonary arteries are normally developed and without thromboemboli and atherosis.

LIVER AND BILIARY SYSTEM:

The liver weighs 645 grams. The hepatic capsule is smooth, glistening, and intact, and covers red-brown parenchyma. The gallbladder contains a small amount of green viscid bile without stones.

ALIMENTARY TRACT:

The esophagus is lined by gray-white, smooth mucosa. The gastric mucosa is arranged in the usual rugal folds, and the lumen contains 3 mL of brow, mucoid material without recognizable food fragments. The serosa of the small bowel is smooth and glistening. The small bowel contains several (2-3 dozen) nematodes (ascaris lumbricoides) of different sizes, ranging from 1-4 mm in diameter and 3-17 cm in length, observed more prominently on the duodenum and proximal jejunum, progressively diminishing in quantity up to near the ileocecal valve, where the last nematode is identified. No signs of bowel obstruction are noted, and there are no mucosal lesions of the small and large bowel. The colon contains scanty semi-formed stool. The appendix is present. The pancreas has a normal tan, lobulated appearance.

GENITOURINARY TRACT:

The right and left kidneys weigh 65 and 70 grams, respectively. The renal capsules are smooth, thin, semitransparent, and strip with ease from the underlying smooth, red-brown, and firm cortical surfaces. The cortices are of normal thickness and are well delineated from the medullary pyramids. The calyces, pelves, and ureters are non-dilated and free of stones. The urinary bladder contains 4mL of yellow urine; the mucosa is gray-tan and smooth. The uterus, cervix, fallopian tubes, ovaries, and vagina are infantile and unremarkable.

RESPIRATORY SYSTEM:

The right and left lungs weigh 297 and 266 grams, respectively (after 24-hour formalin infusion). The upper and lower airways are unobstructed, and the mucosal surfaces are smooth and yellow-tan. The pleural surfaces are focally and mildly dusky with a cut surface showing patchy consolidations, predominantly at the lung bases, which exudes a moderate amounts of blood and frothy fluid. The pulmonary arteries are normally developed and without thromboemboli and atherosis.

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RETICULOENDOTHELIAL SYSTEM:

The spleen weighs 55 grams and has a smooth intact capsule covering red-purple, diffluent parenchyma. The splenic white pulp is grossly prominent. The bone marrow of the rib is red-purple. The 21-gram thymus is tan-pink, lobulated, symmetrical, and without petechiae.

ENDOCRINE SYSTEM:

The pituitary gland is of normal size. The thyroid gland is of normal position, size, and texture. The adrenal glands show extensive parenchymal (cortical and medullary) hemorrhage.

MUSCULOSKELETAL SYSTEM:

The bony framework, supporting musculature, and soft tissues are not unusual. The cervical spinal column is stable on internal palpation.

MICROSCOPIC EXAMINATION

Cassette # 1: Thymus, pancreas, spleen.
Cassette # 2: Liver, kidney.
Cassette # 3: Adrenal glands.
Cassette # 4: Heart (right ventricle)
Cassette # 5: Heart (left ventricle)
Cassette # 6: Lung (Left upper lobe)
Cassette # 7: Lung (Left lower lobe)
Cassette # 8: Lung (Right upper lobe)
Cassette # 9: Lung (Right middle lobe)
Cassette # 10: Lung (Right lower lobe)

Report # 2019-0040 from Centers for Disease Control and Prevention (CDC).

Adrenal gland: There is marked medullary hemorrhage and necrosis (Waterhouse-Friderichsen syndrome) with hemorrhage extending into adjacent cortical sinusoids. No infectious agent or viral

inclusion is seen on H&E. On Gram stain, rare scattered gram-positive and gram-variable cocci in chains are seen. Multifocal staining of *Streptococcus* species is observed in the adrenal gland.
Lungs: Patchy areas of intraalveolar hemorrhage are observed containing scattered neutrophilic inflammatory infiltrates and fibrin. Bronchi and bronchioles, and few alveoli contain large loose aggregates of fibrin with variably moderate to marked numbers of neutrophils and fewer macrophages. The bronchial/bronchiolar epithelium are intact with central karyorrhexis of BALT (reactive). There is neutrophilic intravascular leukocytosis and mild septal edema. No viral inclusions or infectious agent are observed by H&E. On Gram stain, rare scattered gram-positive cocci in diploid formation and chains are seen predominantly within airway lumen. Extensive immunostaining of *Streptococcus* species is observed predominantly within the bronchial/bronchiolar lumen with some immunostaining within alveoli.

Spleen: The red pulp is moderately congested. Lymphoid follicles of white pulp exhibit central regions of karyorrhexis and apoptosis (reactive). No bacterial agents are observed on Gram stain. Scattered granular immunostaining of *Streptococcus* species is seen.

Liver: Small regions exhibit small and large droplet steatosis. Scattered individual hepatocyte necrosis are observed. No bacterial agents are observed on Gram stain. Immunostaining of *Streptococcus* species is observed within Kupffer cells.

Brain: There is mild to moderate meningeal edema with dilated/congested meningeal vessels. Some sections of brain exhibit more prominent intravascular leukocytosis composed of mixed inflammatory infiltrates with multifocal perivascular and neuropil edema. Rare perivascular inflammation is seen. No viral inclusions are observed. No bacterial agents are observed on Gram stain.

Kidney: There is multifocal acute proximal tubular necrosis and congestion. No bacterial agents are observed on Gram stain.

Heart, thymus, pancreas: Unremarkable.

MICROBIOLOGY

-*University Medical Center – El Paso.* Postmortem bacterial cultures of blood and lungs were without growth. Cultures of cerebrospinal fluid grew *micrococcus spp.* (consistent with specimen contamination). Rapid testing for viruses on a nasopharyngeal swab taken at autopsy was negative (influenza virus types A and B; Parainfluenza viruses 1, 2, and 3; respiratory syncytial virus, and adenovirus).

-*CDC – Infectious Disease Pathology Branch (IDPB) (#2019-0040).*

a) Gram stain POSITIVE for gram-positive cocci in chains in lungs and adrenal gland
b) Immunohistechemical evidence of *Streptococcus* spp (lung, adrenal gland, spleen, liver)
c) Molecular evidence of *Streptococcus* spp (lung, adrenal gland, liver)

-*CDC* (ID#N8KAOSR5). Real time polymerase chain reaction (RT-PCR) performed in blood sample obtained during hospital admission: NEGATIVE for *Streptococcus* (*S. agalactiae*, *S. pyogenes*, *S. pneumoniae*, and *S. salivarius*)

RADIOGRAPHS

Full body radiographs are taken. No evidence of acute of subacute osseous injury noted.

PATHOLOGIC DIAGNOSES / CLINICOPATHOLOGIC CORRELATIONS

I. Streptococcal sepsis
   A) Lung
      a. Hemorrhage and acute inflammation (pneumonia)
      b. *Streptococcus spp* identified via Gram stain, immunohistochemistry, and PCR (polymerase chain reaction) methods
      c. Bilateral pleural effusions (following active fluid resuscitation)
   B) Adrenal Glands
      a. hemorrhage and necrosis (Waterhouse-Friderichsen Syndrome)
      b. *Streptococcus spp* identified via Gram stain, immunohistochemistry, and PCR methods

C) Spleen
   a. Reactive changes
   b. *Streptococcus spp* identified via immunohistochemistry

D) Liver
   a. Focal steatosis
   b. Individual hepatocyte dropout
   c. *Streptococcus spp* identified via Gram stain, immunohistochemistry (in Kupffer cells) and PCR methods

E) Brain:
   a. Edema (See Forensic Neuropathology Consultation Report and Centers for Disease Control and Prevention [CDC] report 2019-0040).

F) Kidney
   a. Acute proximal tubular necrosis, multifocal

G) Disseminated Intravascular Coagulation (DIC) [Lab results from Hospitals of Providence Memorial Campus:12/07/18 - sample time: 11:55h]
   a. Thrombocytopenia (51,000/µL)
   b. Hypofibrinogenemia (<65 mg/dL)
   c. Prolonged prothrombin time (120 s)
   d. Prolonged partial thromboplastin time (160 s)
   e. Increased in fibrin degradation products (D-dimer: >5.0 mg/L)
   f. DIC score: 7 (International Society of Thrombosis and Haemostasis [ISTH])

H) Metabolic acidosis [Lab results from Hospitals of Providence Memorial Campus:12/07/18]
   a. Arterial lactic acid (28.4 mmol/L) – sample time: 19:50 h
   b. pH <6.709 – sample time: 17:00 h
   c. pCO2: 29.1 mmHg – sample time: 17:00 h
   d. Bicarbonate: 3.3 mmol/L – sample time: 18:20 h
   e. Anion Gap: 33.6 – sample time: 17:04 h

II. Ascariasis
   a. Intestinal (small bowel) *Ascaris lumbricoides* infestation

III. Blunt force injury of upper lip (mucosal surface): superficial, small abrasions

AUTOPSY REPORT

CAAL MAQUIN, JAKELIN AMEI ROSMERY
2018-0585

OPINION

This 7-year-old child, Jakelin Amei Rosmery Caal Maquin, died of sequelae of Streptococcal sepsis. According to reports, the decedent was transported from Lordsburg, NM to the Children's Hospital at Hospitals of Providence Memorial Campus in El Paso on 12/07/18 where her condition continued to deteriorate and was pronounced dead on 12/08/18, approximately 15 hours after her admission.

The clinical course and autopsy findings are those of a rapidly progressive infection, with prompt systemic bacterial spread and substantial clinical deterioration, with development of serious sequelae (*e.g.*, disseminated intravascular coagulation, metabolic acidosis, Waterhouse Friderichsen syndrome) resulting in multiple organ dysfunction and death. Subsequent ancillary testing revealed the presence of *Streptococcus* in major organs, including the lungs, adrenal gland, liver, and spleen. A specific species of *Streptococcus*, however, was not identified.

Postmortem analysis of the vitreous fluid exhibited changes consistent with renal dysfunction (urea nitrogen: 23 mg/dL; creatinine: 1.5 mg/dL) and postmortem changes (potassium: 19 mmol/L). It also showed an elevated glucose concentration (385 mg/dL). Forensic toxicology testing performed on a blood sample obtained during hospital admission revealed the presence of diazepam (85 ng/mL), nordiazepam (diazepam breakdown product [<20 ng/mL]), and lorazepam (17 ng/mL) which are sedatives often used in emergency room settings. The manner of death is natural

Final: 03/29/19

Forensic Neuropathology Consultation Report
Case 2018-0585

Jakelin Amei Rosmery Caal Maquin

DR. RASCON PERFORMED THE AUTOPSY ON 12/10/18
DR. DIAZ EXAMINED THE BRAIN ON 12/20/18
REPORT FINALIZED: 3/5/2019

GROSS EXAMINATION:
Brain weight: 1318 gm.

The specimen consists of the brain of a child.

The leptomeninges are thin, delicate and transparent. The cerebral gyri are slightly widened and sulci narrowed with unremarkable configuration. There is no sign of herniation. The external aspects of the brainstem and cerebellum are not remarkable. The arteries at the base of the brain follow a normal distribution and are free of atherosclerosis, aneurysmatic dilatations or sites of occlusion. All cranial nerve stumps identified are not remarkable.

Coronal sections of the cerebrum reveal no focal lesions in the cortex, white matter or deep nuclear structures. There is no shift of the midline structures. Sections of the midbrain and medulla oblongata and cerebellum show no focal abnormalities. The left ventral pons shows an 8 x 3 x 3 mm white discoloration. It extends from the upper pons to the middle/distal portion. Myelination is normal for age. The substantia nigra is pale. The ventricular system and cerebral aqueduct are patent, and normal in size and configuration. The ependymal lining is smooth and glistening.

PHOTOGRAPHS: YES

MICROSCOPIC EXAMINATION:
H & E stained sections keep it formalin until 12/26/2018:

11. Left superior frontal gyrus
12. Left basal ganglia
13. Right thalamus
14. Right hippocampus
15. Midbrain
16. Pons
17. Medulla
18. Cerebellum
19. Right frontal lobe
20. Left frontal lobe
21. Right parietal lobe
22. Left parietal lobe
23. Right temporal lobe
24. Left temporal lobe
25. Right occipital lobe
26. Left occipital lobe

Sections show a prominent (hypertrophied) tract on the left ventral pons. No atypical cells or malignancy are identified. This finding might represent a developmental abnormality or unilateral

hypertrophy of the corticospinal tract. Edema and rare inflammatory cells (mixed) seen on the leptomeninges of the cerebral convexities of the cerebrum. No infectious organism are identified. There is slight perivascular vacuolation of the neuropil.

FINDINGS:

I. **BRAIN EDEMA.**

JANICE DIAZ-CAVALLIERY, M.D.

Centers for Disease Control and Prevention

National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)

Division of High-Consequence Pathogens & Pathology (DHCPP)

Infectious Diseases Pathology Branch (IDPB)

Pathology Report

IDPB Number:	**2019-0040**	DOB: 12/3/2011
Receipt Date:	01/08/2019	Sex: F
Report Date:	03/15/2019	MRN: UMC EP XM0000211779 OME 001300571
Patient Name:	Caal Maquin, Jakelin A.	
Submitter/Outside #(s):	ME18-0585, ME 20180000585E, Corresponding case 18-8770	
Case Origin:	TX, USA	
Specimen(s) Received:	26 blocks and 1 CD with autopsy photos	
Submitted By:	Mario A Rascon, M.D. Chief Medical Examiner El Paso County Office of the Medical Examiner & Forensic Lab 4505 Alberta Ave El Paso, TX 79905-2727 USA (915) 351-0579, MRascon@epcounty.com; olchavez@epcounty.com	
Primary Path/Epi:	TH / SRS	

CSID and other internal CDC specimen numbers

CSID	CUID	BT#	Field#	BRRAT#	Other#'s	Specimen:
3001531492	N8KAF1GW					

Diagnosis:

Multiple tissues, autopsy.

Adrenal gland, lung, liver, spleen: sepsis

- Gram stain reveals rare gram-positive and gram-variable cocci in chains (lung, adrenal gland)
- Immunohistochemical and molecular evidence of Streptococcus species (see comments)
- Rare intraluminal immunostaining and molecular detection of Haemophilus influenzae (lung) (see comments)
- No molecular evidence of influenza viruses A/B, parainfluenza viruses types 1-4, or respiratory syncytial virus (lungs)
- No immunohistochemical or molecular evidence of Haemophilus influenzae (adrenal gland, spleen) (see comments)
- No immunostaining of group A streptococci (lung, adrenal)
- No immunohistochemical or molecular evidence of Neisseria meningitidis (lung, adrenal)
- No immunohistochemical evidence of dengue virus or Leptospira species (liver, kidney)

18-0585

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MAR 20 2019

Brain: meningeal edema and congestion; neuropil edema; intravascular leukocytosis

- No infectious agent observed on Gram stain
- No immunohistochemical evidence of Streptococcus species

See comments and footnotes, as applicable.

Comments:

Histomorphologic findings present a picture of sepsis in this patient with special stain, immunohistochemical, and molecular evidence of Streptococcus species involving multiple organs including the adrenal gland, lungs, liver, and spleen. In the lung,

sequence analysis of lytA and comC genes amplicons showed highest identities with Mitis group streptococci. In other tested tissue specimens, however, likely species could not be elucidated. Testing for multiple other infectious etiologic agents by IHC and/or molecular assays were negative (see Results section). Immunostaining of H. influenzae in the lungs was observed rarely and only within airways; this finding was therefore interpreted as incidental aspirated flora from the upper airway tract.

Correlation of any reported results with clinical, epidemiological, and other laboratory information is highly recommended.

Clinical History:

Provided history: 7-year old female from Guatemala who died on 12/8/18 in El Paso, TX. She experienced vomiting, difficulty breathing and seizure activity on 12/7/18 and was brought to the ED where she was febrile, had severe electrolyte abnormalities, metabolic acidosis, anemia, and thrombocytopenia and was started on ceftriaxone, levofloxacin, and azithromycin. Seizure activity continued and she developed respiratory failure, was admitted to the ICU and was intubated and ventilated. Head imaging demonstrated diffuse cerebral edema, and chest x-ray showed progressive diffuse pulmonary opacities. She experienced persistent hemodynamic instability, significant drops in hemoglobin and a coagulation panel consistent with DIC, and was transfused with pRBC, FFP and cryoprecipitate. Despite these interventions, she experienced cardiac arrest, could not be resuscitated and died on 12/8/18. Blood cultures collected prior to antibiotics were negative; postmortem lung swab and blood cultures, and NP swab rapid viral cultures were negative.

Microscopic Examination:

Multiple tissues, autopsy.
Adrenal gland: There is marked medullary hemorrhage and necrosis (Waterhouse-Friderichsen syndrome) with hemorrhage extending into adjacent cortical sinusoids. No infectious agent or viral inclusion is seen on H&E. On Gram stain, rare scattered gram-positive and gram-variable cocci in chains are seen. Multifocal staining of Streptococcus species is observed in the adrenal gland.

Lungs: Patchy areas of intraalveolar hemorrhage are observed containing scattered neutrophilic inflammatory infiltrates and fibrin. Bronchi and bronchioles, and few alveoli contain large loose aggregates of fibrin with variably moderate to marked numbers of neutrophils and fewer macrophages. The bronchial/bronchiolar epithelium are intact with central karyorrhexis of BALT (reactive). There is neutrophilic intravascular leukocytosis and mild septal edema. No viral inclusions or infectious agent are observed by H&E. On Gram stain, rare scattered gram-positive cocci in diploid formation and chains are seen predominantly within airway lumen. Extensive immunostaining of Streptococcus species is observed predominantly within the bronchial/bronchiolar lumen with some immunostaining within alveoli.

Spleen: The red pulp is moderately congested. Lymphoid follicles of white pulp exhibit central regions of karyorrhexis and apoptosis (reactive). No bacterial agents are observed on Gram stain. Scattered granular immunostaining of Streptococcus species is seen.

Liver: Small regions exhibit small and large droplet steatosis. Scattered individual hepatocyte necrosis are observed. No bacterial agents are observed on Gram stain. Immunostaining of Streptococcus species is observed within Kupffer cells.

Brain: There is mild to moderate meningeal edema with dilated/congested meningeal vessels. Some sections of brain exhibit more prominent intravascular leukocytosis composed of mixed inflammatory infiltrates with multifocal perivascular and neuropil edema. Rare perivascular inflammation is seen. No viral inclusions are observed. No bacterial agents are observed on Gram stain.

Kidney: There is multifocal acute proximal tubular necrosis and congestion. No bacterial agents are observed on Gram stain.

Heart: Unremarkable.

Thymus: Unremarkable.

Pancreas: Unremarkable.

Results:

Specimen	Test	Result

Special Stains

Adrenal gland 3	L-T Gram	Positive
LUL lung 6	L-T Gram	Positive
RLL lung 10	L-T Gram	Positive
RUL lung 8	L-T Gram	Positive
Thymus, pancreas, spleen 1	L-T Gram	Negative
Brain 13	L-T Gram	Negative
Liver, kidney 2	L-T Gram	Negative

IHC

Adrenal gland 3	Streptococcus pyogenes (GAS) (0517)	Negative
Thymus, pancreas, spleen 1	Haemophilus spp. (1141)	Negative
Liver, kidney 2	Haemophilus spp. (1141)	Negative
RUL lung 8	Haemophilus spp. (1141)	Immunoreactive
LLL lung 7	Streptococcus species (1707)	Immunoreactive
RLL lung 10	Streptococcus species (1707)	Immunoreactive
Adrenal gland 3	Neisseria meningitidis group C (0336)	Negative
Adrenal gland 3	Neisseria meningitidis groups A/B/C/W/Y (0710)	Negative
LUL lung 6	Neisseria meningitidis group C (0336)	Negative
LUL lung 6	Neisseria meningitidis groups A/B/C/W/Y (0710)	Negative
LUL lung 6	Streptococcus pyogenes (GAS) (0517)	Negative
LUL lung 6	Haemophilus spp. (1141)	Negative
Liver, kidney 2	Dengue virus (0050)	Negative
Liver, kidney 2	Leptospira spp. (0142)	Negative
Adrenal gland 3	Haemophilus spp. (1141)	Negative
LUL lung 6	Streptococcus species (1707)	Immunoreactive
RUL lung 8	Streptococcus species (1707)	Immunoreactive
Thymus, pancreas, spleen 1	Select gram-negative bacteria (1606)	Negative
Thymus, pancreas, spleen 1	Streptococcus species (1707)	Immunoreactive
Liver, kidney 2	Streptococcus species (1707)	Immunoreactive
Adrenal gland 3	Select gram-negative bacteria (1606)	Negative
Adrenal gland 3	Streptococcus species (1707)	Immunoreactive
RUL lung 8	Streptococcus pyogenes (GAS) (0517)	Negative
Brain 13	Streptococcus species (1707)	Negative

PCR

LUL lung 6	Influenza A/Influenza B	Negative
LUL lung 6	Human parainfluenza virus (1-4)*	Negative
LUL lung 6	Respiratory syncytial virus*	Negative
RLL lung 10	Influenza A/Influenza B	Negative
RLL lung 10	Human parainfluenza virus (1-4)*	Negative
RLL lung 10	Respiratory syncytial virus*	Negative
LUL lung 6	Neisseria meningitidis group*	Negative
Adrenal gland 3	Neisseria meningitidis group*	Negative
RUL lung 8	Neisseria meningitidis group*	Negative
RUL lung 8	Streptococcus species*	Positive for Streptococcus spp.
Adrenal gland 3	Streptococcus species*	Positive for Streptococcus spp.

LUL lung 6	Streptococcus species*	Positive for Streptococcus spp.
Thymus, pancreas, spleen 1	Streptococcus species*	Positive for Streptococcus spp.
Thymus, pancreas, spleen 1	Streptococcus (pneumolysin)*	Negative
Thymus, pancreas, spleen 1	Streptococcus (autolysin)*	Negative
Adrenal gland 3	Streptococcus (pneumolysin)*	Negative
Adrenal gland 3	Streptococcus (autolysin)*	Negative
LUL lung 6	Streptococcus (pneumolysin)*	Positive for Streptococcus spp.
LUL lung 6	Streptococcus (autolysin)*	Positive for Streptococcus spp.
RUL lung 8	Streptococcus (pneumolysin)*	Positive for Streptococcus spp.
RUL lung 8	Streptococcus (autolysin)*	Negative
Thymus, pancreas, spleen 1	Streptococcus (comC)*	Negative
Adrenal gland 3	Streptococcus (comC)*	Negative
LUL lung 6	Streptococcus (comC)*	Positive for Streptococcus spp.
RUL lung 8	Streptococcus (comC)*	Positive for Streptococcus spp.
Liver, kidney 2	Streptococcus species*	Positive for Streptococcus spp.
LLL lung 7	Streptococcus species*	Positive for Streptococcus spp.
RLL lung 10	Streptococcus species*	Positive for Streptococcus spp.
Thymus, pancreas, spleen 1	Haemophilus influenzae (P6)*	Negative
Adrenal gland 3	Haemophilus influenzae (P6)*	Negative
LUL lung 6	Haemophilus influenzae (P6)*	Negative
RUL lung 8	Haemophilus influenzae (P6)*	Positive for Haemophilus spp.
Liver, kidney 2	Streptococcus (pneumolysin)*	Negative
LLL lung 7	Streptococcus (pneumolysin)*	Positive for Streptococcus spp.
RLL lung 10	Streptococcus (pneumolysin)*	Positive for Streptococcus spp.
Liver, kidney 2	Streptococcus (autolysin)*	Negative
LLL lung 7	Streptococcus (autolysin)*	Negative
RLL lung 10	Streptococcus (autolysin)*	Negative
Liver, kidney 2	Streptococcus (comC)*	Negative
LLL lung 7	Streptococcus (autolysin)*	Positive for Streptococcus spp.
LLL lung 7	Streptococcus (comC)*	Positive for Streptococcus spp.
RLL lung 10	Streptococcus (comC)*	Positive for Streptococcus spp.

LABORATORY DEVELOPED TESTS:

Histochemical stain(s), Immunohistochemistry test(s), molecular assay(s) and electron microscopy reported herein were developed by the Infectious Diseases Pathology Branch laboratory. This laboratory is qualified to perform high complexity clinical laboratory testing under the Clinical Laboratory Improvement Amendments of 1988 (CLIA '88). The tests have not been cleared or approved by the U.S. Food and Drug Administration (FDA) and the performance characteristics have been established by the Infectious Diseases Pathology Branch. These tests are used for clinical purposes and should not be regarded as investigational or for research.

(*) For Tests designated by an asterisk the performance characteristics have NOT been fully established by the Infectious Diseases Pathology Branch. The results of these tests should not be used as the only evidence for diagnosis, treatment, or assessment of patient health or management.

IHC Footnotes:

Immunohistochemical (IHC) testing using an immunoalkaline phosphatase technique was performed with appropriate positive and negative controls

- IMMUNOREACTIVE: Immunostaining present with target antigen having appropriate distribution and localization; antibody may cross react with non-target pathogens (see IHC footnotes).
- NEGATIVE: no specific immunostaining present.
- INDETERMINATE: immunostaining is rare/scarce or has inappropriate distribution and/or localization for target antigen(s).
- INADEQUATE: insufficient or inadequate patient tissue is present on the slide for evaluation.

Information on the specific antibody including relevant references (as available) on primary antibody production or IHC utility is described below:

Dengue virus (0050): This hyperimmune mouse ascitic fluid was generated by immunizing mice with dengue virus type 2 and is known to cross-react with all four types of dengue virus. It also cross-reacts with other flaviviruses to some extent, such as yellow fever virus, Japanese encephalitis virus, and West Nile virus. (Am. J. Trop. Med. Hyg.,

86(2). 2012. pp. 335-340)

Leptospira spp. (0142): This is a mixture of 16 reference rabbit polyclonal anti-leptospira antisera, which reacts with most pathogenic species. (Lancet 1996; 347:535-536).

Neisseria meningitidis group C (0336): This mouse monoclonal antibody was raised against Neisseria meningitidis group C. It does not cross-react with other groups of Neisseria meningitidis (Am J Clin Pathol 2004; 122(5):754-64).

Group A Streptococcus (0517): This rabbit polyclonal antibody was raised against group A Streptococcus (S. pyogenes). It is known to cross-react with Bordetella pertussis but does not cross-react with S. pneumoniae, group B Streptococcus, or Staphylococcus (Am J Clin Pathol 2006 Jul; 126(1):1-8).

Neisseria meningitidis groups A/B/C/W/Y (0710): This horse polyclonal antibody was raised against Neisseria meningitidis and is known to cross-react with Neisseria meningitidis group A, B, C, W, and Y, as well as N. gonorrheae, N. lactamica, and N. subflava. Its cross-reactivity with other types of Neisseria meningitidis is unknown (Am J Clin Pathol 2004 Nov; 122(5):754-64).

Haemophilus spp. (1141): This polyclonal rabbit antibody reacts with several types of Haemophilus influenzae, including a, b, c, d, e, f (Clin Infect Dis 2006; 43(2): 132-140). The reactivity to unsubtypeable H. influenzae is variable. It is also known to cross-react with Pasteurella species and S. aureus.

Select gram-negative bacteria (1606): This rabbit polyclonal antibody was raised against Klebsiella pneumoniae, and is known to cross react with Klebsiella oxytoca, Shigella sonnei, Salmonella species, Haemophilus influenzae, Yersinia pestis, and some Escherichia coli serotypes. It does not cross react with E. coli 018:H7. Streptococcus pneumoniae, Fusobacterium species, Acinetobacter baumannii, Pseudomonas aeruginosa, Legionella pneumophila (serogroups 1 and 6), Enterococcus faecalis, Morganella morganii, Proteus mirabilis, or Clostridium species. The full spectrum of reactivity against E. coli serotypes is unknown.

Streptococcus species (1707): This mouse monoclonal antibody was raised against S. pneumoniae and is known to cross-react with S. mitis, S. suis, S. pseudopneumoniae, and group B Streptococcus. It does not cross react with S. mutans, S. sanguinis, group A Streptococcus, S. intermedius, S. salivarius or Staphylococcus aureus.

PCR Footnotes:

Real-time or conventional assays (investigational) were performed as noted below. The quality of extracted nucleic acids was assessed by a housekeeping gene assay for every test.

- POSITIVE: amplification of specific gene target sequence.
- NEGATIVE: no amplification of specific gene target sequence, but the presence of amplifiable nucleic acids in the sample is assured by housekeeping gene PCR assays.
- INDETERMINATE: an amplicon was obtained but the presence of specific gene target sequence could not be confirmed.
- INADEQUATE: poor quality or insufficient quantity of nucleic acids.

Information on the specific assay including relevant references (as available) is described below:

Neisseria meningitidis group*: DNA extracted from tissue was used as a template for Neisseria meningitidis specific PCR assay targeting the CtrA gene. Positive amplicons (177 bp) if obtained are sequenced to further confirm and characterize. Housekeeping genes for this assay are B-globin (500bp) and GAPDH (200bp).

Streptococcus (pneumolysin)*: DNA extracted from tissue was used as a template for a Streptococcus specific nested PCR assay targeting the pneumolysin gene. Positive amplicons (348 bp, 208 bp respectively) if obtained are sequenced to further confirm and characterize. This gene may be present in several Streptococcal species, and therefore may detect S. pneumoniae, S. pseudopneumoniae, or S. mitis species; sequencing may not be able to differentiate between these species. Housekeeping genes for this assay are B-globin (500bp) and GAPDH (200bp).

Influenza A/Influenza B: RNA extracted from tissue was used as a template for a real-time RT-PCR assay designed to detect influenza A (target M gene) and influenza B viruses and characterizes influenza A-positive samples as either H1 or H3 (J Mol Diagn 2011 Mar; 13(2):123-8). Housekeeping gene for this assay is B2-microglobulin (82 bp).

Streptococcus species*: DNA extracted from tissue was used as a template for a Streptococcus species PCR assay targeting the 16S rRNA gene. Positive amplicons (440 bp) if obtained are sequenced to further confirm and characterize. Housekeeping genes for this assay are B-globin (500bp) and GAPDH (200bp).

Streptococcus (autolysin)*: DNA extracted from tissue was used as a template for a Streptococcus specific PCR assay targeting the autolysin gene. Positive amplicons (101 bp) if obtained are sequenced to further confirm and characterize. This gene may be present in several Streptococcal species, and therefore may detect S. pneumoniae or S. pseudopneumoniae species; sequencing may not be able to differentiate between these species. Housekeeping genes for this assay are B-globin (500bp) and GAPDH (200bp).

Haemophilus influenzae (P6)*: DNA extracted from tissue was used as a template for Haemophilus influenzae specific PCR assay targeting the P6 gene. Positive amplicons (296 bp) if obtained are sequenced to further confirm and characterize. Housekeeping genes for this assay are B-globin (500bp) and GAPDH (200bp).

Human Parainfluenza virus (1-4)*: RNA extracted from tissue was used as a template for a multiplex real-time RT-PCR assay targeting the hemagglutinin-neuraminidase or nucleoprotein and detects HPIV-1, HPIV-2, HPIV-3 and HPIV-4. Housekeeping gene for this assay is B2-microglobulin (82 bp).

Respiratory Syncytial virus*: RNA extracted from tissue was used as a template for a real-time RT-PCR assay targeting the M gene. Housekeeping gene for this assay is B2-microglobulin (82 bp).

Streptococcus (comC)*: DNA extracted from tissue was used as a template for a PCR assay targeting the Streptococcus comC gene. Housekeeping genes for this assay are B-globin (500bp) and GAPDH (200bp).

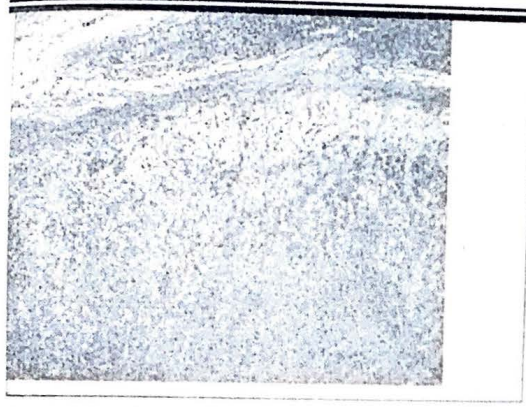

Image 1. Adrenal gland, HE.

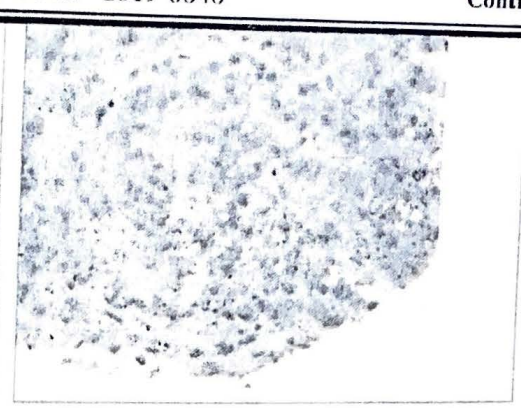

Image 2. Adrenal gland, Streptococcus species IHC.

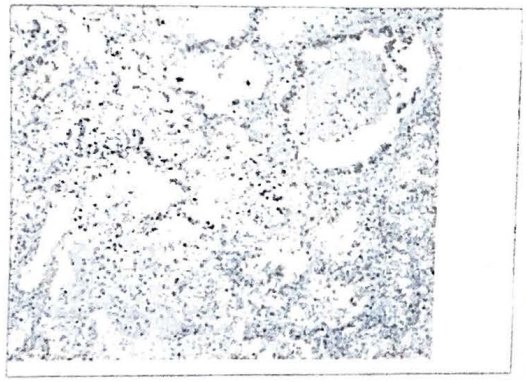

Image 3. Lungs, HE.

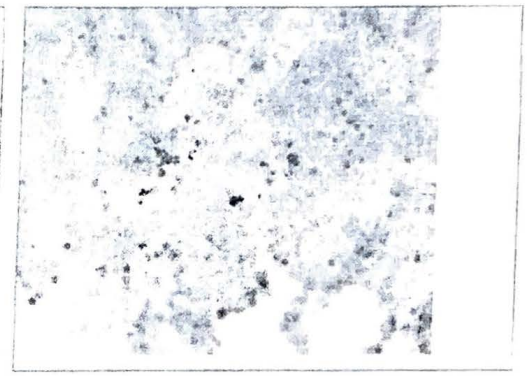

Image 4. Lungs, Streptococcus species IHC.

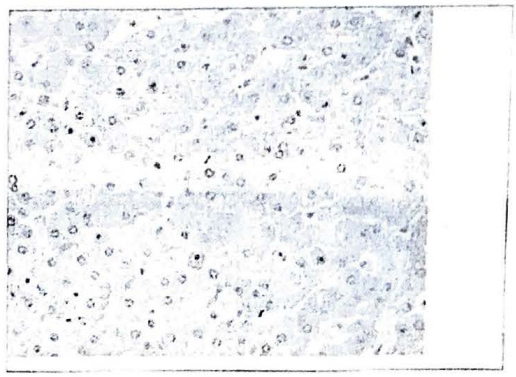

Image 5. Liver, HE.

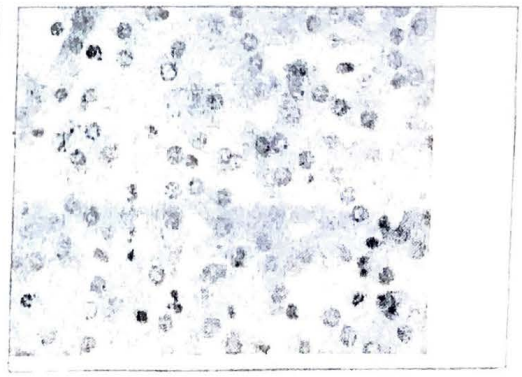

Image 6. Liver, Streptococcus species IHC.

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COUNTY OF EL PASO
OFFICE OF THE MEDICAL EXAMINER
AND FORENSIC LABORATORY

Autopsy Report
Case 2018-0585

JAKELIN AMEI ROSMERY CAAL MAQUIN

Cause of Death: Sequelae of Streptococcal Sepsis
Manner of Death: Natural

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Chief Medical Examiner for El Paso County, Texas