

# DIAGNOSTIC CASE REPORT

U. S. GEOLOGICAL SURVEY-BIOLOGICAL RESOURCES DIVISION  
NATIONAL WILDLIFE HEALTH CENTER-HONOLULU FIELD STATION  
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**Case Number:** 25225

**Submitter Name:**

Dr. Stephen Zipper  
Le Meridien Bora Bora  
BP 190  
Vaitape, French Polynesia 98730  
France

**Species submitted (n):**

Turtle: Green (7)

**SPECIMENS SUBMITTED:** Tissue-Fixed formalin

These green turtles are from the lagoon in the Meridien Hotel. They have been dying intermittently from unexplained neurological signs and seizures. Past exams of turtles for histology have not been very revealing and have shown changes ranging from nothing to severe vascular fluke infection. Tissues from animals that either died or were sampled between March 2014 and August 2015 were sent to HFS to see if a diagnosis could be made.

Acc	Date_Coll	TagNo	Diagnosis
1	03/23/2014	POE	Undetermined
2	03/01/2014	3815	Undetermined
3	08/18/2014	J025	Undetermined
4	05/10/2015	J23	Undetermined
5	06/25/2015	Big Mama	Undetermined
6	07/15/2015	Maimiti	Undetermined
7	03/15/2015	Hope	Undetermined

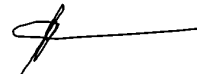
**Comments:** Tissues from one animal (POE) were examined on histology and revealed vacuolation of the liver suggestive perhaps of toxic hepatopathy. Blood chemistries were done on turtles 3815, J23, BigMama, Maimiti, and Hope and all revealed increases in creatinine kinase over several months compatible with clinical signs of seizures and muscle tremors. Heavy metal screens done on kidneys from 2 turtles (3818 and J025) failed to incriminate elevated levels of arsenic, cadmium, lead, mercury, thallium, selenium, iron, copper, zinc, manganese, molybdenum or cobalt as a cause of neurological signs. Hematology on animals J23, BigMama, Maimiti, and Hope revealed changes compatible with chronic active inflammation, probably secondary to musculoskeletal damage due to seizures. There was no evidence of eosinophilia characteristic of parasitic infections.

**Management:** To date, the cause of these tremors remains undetermined. Heavy metal toxicity is not likely an issue nor are parasite infections. One possibility is that animals are eating something in the lagoon causing a toxic response of sorts. Perhaps trying to better define the problem (time of onset, time of reversal, seasonality, close inspection of diet of animals in lagoon) might provide additional clues.

**Report Date (mm/dd/yyyy):** 9/30/2015

**Necropsy report:** Enclosed

**Copies of this report sent to:**



If you have questions regarding this case, contact Thierry M. Work MS, DVM, MPVM at 808-792-9520. Include above Case Number. Diagnostic findings may not be used for publication without the pathologist's knowledge and consent.

**NOTE: Information in this report supersedes any information from previous reports regarding this case.**

**N A T I O N A L   W I L D L I F E   H E A L T H   C E N T E R**  
**N E C R O P S Y   R E P O R T**

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**Submitter Name:**

Dr. Stephen Zipper  
Le Meridien Bora Bora  
BP 190  
Vaitape, French Polynesia 98730  
France

Case: 25225  
Accession: 1  
Date Collected: 03/23/2014  
Date Examined: 8/11/2015  
Prosector: T. M. Work  
Pathologist: T. M. Work

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**Signalment-Morphometrics-History**

CONDITION: (Unknown)                      POSTMORTEM: (Good)                      EUTHANASIA: (Not euthanized)  
TAG TYPE: (Reference Number) TAG NO.: (POE)  
SPECIES: (Turtle: Green)                      AGE: (Unknown)                      SEX: (Unknown)

COLLECTION-SITE: (Le Meridien Hotel Bora Bora) AREA: (Tahiti) STATE: (Departement Outre Mer) COUNTRY: (France)

HISTORY: Formalin-fixed samples were taken from a turtle (POE) at the Bora Bora Turtle Center that died three days after exhibiting signs of depression, anorexia, and nervous symptoms. The turtle was necropsied on 23 March 2014 and fixed tissues were submitted to HFS for histology.

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**External/Internal**

EXTERNAL:

INTERNAL:

PRELIMINARY DIAGNOSIS: Undetermined.

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**Samples**

SECIMENS RECEIVED: Tissue-Fixed formalin.

HISTO: Liver (A); Kidney (B); Brain (C); Spinal cord, Brain (D); Fat, Artery, Skeletal muscle, Nerve (E).

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**Laboratory Results**

**HISTOPATHOLOGY**

Brain: Rare round spirorchid eggs with little to no host response are within capillary walls.

Kidney: Rare trematode eggs surrounded by mononuclears are present.

Liver: Diffusely, hepatocytes contain variably sized distinct clear vacuoles. Vacuolation appears somewhat more prominent around central veins. Occasional nidi of mononuclears are scattered among hepatocytes. Rare trematode eggs surrounded by mononuclears are present.

All other Organs: No remarkable lesions are seen.

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COMMENTS: None

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Final Diagnosis (in order of importance)

Diagnosis	Topog	Morpho	Etiol	Funct	Dis	Link
1. Undetermined	(T00010 )	( )	(E00040 )	(FY3500 )	( )	( )

Diagnostic findings may not be published without the knowledge and consent of the pathologist.

Milt Code: (Open)

NATIONAL WILDLIFE HEALTH CENTER  
NECROPSY REPORT

**Submitter Name:**

Dr. Stephen Zipper  
Le Meridien Bora Bora  
BP 190  
Vaitape, French Polynesia 98730  
France

Case: 25225  
Accession: 2  
Date Collected: 03/01/2014  
Date Examined: 8/11/2015  
Prosecutor: T. M. Work  
Pathologist: T. M. Work

**Signalment-Morphometrics-History**

CONDITION: (Unknown) POSTMORTEM: (Good) EUTHANASIA: (Not euthanized)  
TAG TYPE: (Reference Number) TAG NO.: (3815)  
SPECIES: (Turtle: Green) AGE: (Unknown) SEX: (Unknown)

COLLECTION-SITE: (Le Meridien Hotel Bora Bora) AREA: (Tahiti) STATE: (Departement Outre Mer) COUNTRY: (France)

HISTORY: Tissues were taken from a turtle (3815) at the Bora Bora Turtle Center that died quickly after exhibiting signs of depression, anorexia, and nervous symptoms. The frozen tissues were submitted to HFS for heavy metal screening.

**External/Internal**

EXTERNAL:

INTERNAL:

PRELIMINARY DIAGNOSIS: Undetermined.

**Samples**

SECIMENS RECEIVED: Tissue-Frozen.  
LAB SPECIMENS: Kidney-Frozen (Toxicology).

**Laboratory Results**

COMMENTS: Arsenic-12.72 ug/g dry; Cadmium-56.3 ug/g dry; Lead-0.08 ug/g dry; Mercury-3.74 ug/g dry; Thallium-0.08 ug/g dry; Selenium-42.29 ug/g dry; Iron-625.88 ug/g dry; Copper-7.54 ug/g dry; Zinc-112.55 ug/g dry; Manganese-3.21 ug/g dry; Molybdenum-0.36 ug/g dry; Cobalt-0.21 ug/g dry.

Final Diagnosis (in order of importance)

Diagnosis Topog Morpho Etiol Funct Dis Link  
1. Undetermined (T00010) ( ) (E00040) (FY3500) ( ) ( )

Diagnostic findings may not be published without the knowledge and consent of the pathologist.  
Milt Code: (Open)

**NATIONAL WILDLIFE HEALTH CENTER  
NECROPSY REPORT**

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**Submitter Name:**

Dr. Stephen Zipper  
Le Meridien Bora Bora  
BP 190  
Vaitape, French Polynesia 98730  
France

Case: 25225  
Accession: 3  
Date Collected: 08/18/2014  
Date Examined: 8/11/2015  
Prosecutor: T. M. Work  
Pathologist: T. M. Work

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**Signalment-Morphometrics-History**

CONDITION: (Unknown) POSTMORTEM: (Good) EUTHANASIA: (Not euthanized)  
TAG TYPE: (Reference Number) TAG NO.: (J025)  
SPECIES: (Turtle: Green) AGE: (Unknown) SEX: (Unknown)

COLLECTION-SITE: (Le Meridien Hotel Bora Bora) AREA: (Tahiti) STATE: (Departement Outre Mer) COUNTRY: (France)

HISTORY: Tissues were taken from a turtle (J025) at the Bora Bora Turtle Center that died quickly after exhibiting signs of depression, anorexia, and nervous symptoms. The frozen tissues were submitted to HFS for heavy metal screening.

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**External/Internal**

EXTERNAL:

INTERNAL:

PRELIMINARY DIAGNOSIS: Undetermined.

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**Samples**

SECIMENS RECEIVED: Tissue-Frozen.  
LAB SPECIMENS: Kidney-Frozen (Toxicology).

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**Laboratory Results**

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COMMENTS: Arsenic-2.98 ug/g dry; Cadmium-0.13 ug/g dry; Lead-0.09 ug/g dry; Mercury-3.25 ug/g dry; Thallium-0.09 ug/g dry; Selenium-26.23 ug/g dry; Iron-170.12 ug/g dry; Copper-4.25 ug/g dry; Zinc-76.92 ug/g dry; Manganese-0.96 ug/g dry; Molybdenum-0.07 ug/g dry; Cobalt-0.05 ug/g dry.

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Final Diagnosis (in order of importance)

Diagnosis	Topog	Morpho	Etiol	Funct	Dis	Link
1. Undetermined	(T00010 )	( )	(E00040 )	(FY3500 )	( )	( )

Diagnostic findings may not be published without the knowledge and consent of the pathologist. Milt Code: (Open)

**NATIONAL WILDLIFE HEALTH CENTER  
NECROPSY REPORT**

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**Submitter Name:**

Dr. Stephen Zipper  
Le Meridien Bora Bora  
BP 190  
Vaitape, French Polynesia 98730  
France

Case: 25225  
Accession: 4  
Date Collected: 05/10/2015  
Date Examined: 8/11/2015  
Prosector: T. M. Work  
Pathologist: T. M. Work

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**Signalment-Morphometrics-History**

CONDITION: (Unknown) POSTMORTEM: (Good) EUTHANASIA: (Not euthanized)  
TAG TYPE: (Reference Number) TAG NO.: (J23)  
SPECIES: (Turtle: Green) AGE: (Unknown) SEX: (Unknown)

COLLECTION-SITE: (Le Meridien Hotel Bora Bora) AREA: (Tahiti) STATE: (Departement Outre Mer) COUNTRY: (France)

HISTORY: Blood was taken from a turtle (J23) at the Bora Bora Turtle Center that exhibited early symptoms of depression, anorexia, and nervous signs. The turtle began to eat again all alone. Blood smears were submitted to HFS for analysis.

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**External/Internal**

EXTERNAL:

INTERNAL:

PRELIMINARY DIAGNOSIS: Undetermined.

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**Samples**

SECIMENS RECEIVED: Blood smear-Fresh.

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**Laboratory Results**

HEMATOLOGY: Neutrophil-35%, Eosinophil-1%, Basophil-0%, Lymphocyte-34%, Monocyte-30% (8/11/2015).

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COMMENTS: 12 May, 2015: Sodium-150 mmol/L; Potassium-3.6 mmol/L; Chloride-107 mmol/L; Ca-61.2 mg/L; Phosphorus- mg/L; Urea-116.52 mg/dL; Uric acid-6 umol/L; SGOT-458 IU/L; SGPT-14 IU/L; CPK- IU/L; Total protein-48 g/L. 2 June 2015: Sodium-146 mmol/L; Potassium-3 mmol/L; Chloride-96 mmol/L; Ca-76 mg/L; Phosphorus-81 mg/L; Urea-199.4 mg/dL; Uric acid-61 umol/L; SGOT-181 IU/L; SGPT-1 IU/L; CPK-288 IU/L; Total protein-52 g/L. 3 July 2015: Sodium-150 mmol/L; Potassium-2.8 mmol/L; Chloride-97 mmol/L; Ca-77.6 mg/L; Phosphorus-70 mg/L; Urea-83.48 mg/dL; Uric acid-8 umol/L; SGOT-154 IU/L; SGPT-1 IU/L; CPK-727 IU/L; Total protein-53 g/L. 17 July 2015: Sodium-145 mmol/L; Potassium-3.8 mmol/L; Chloride-93 mmol/L; Ca-63.2 mg/L; Phosphorus-60 mg/L; Urea-81.68 mg/dL; Uric acid-12 umol/L; SGOT-130 IU/L; SGPT-0 IU/L; CPK-1114 IU/L; Total protein-51 g/L. 7 August 2015: Sodium-148 mmol/L; Potassium-3.1 mmol/L; Chloride-112 mmol/L; Ca-72 mg/L; Phosphorus-60 mg/L; Urea-72.07 mg/dL; Uric acid-10 umol/L; SGOT-130 IU/L; SGPT-0 IU/L; CPK-3673 IU/L; Total protein-44 g/L.

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Final Diagnosis (in order of importance)

Diagnosis	Topog	Morpho	Etiol	Funct	Dis	Link
1. Undetermined	(T00010 )	( )	(E00040 )	(FY3500 )	( )	( )

Diagnostic findings may not be published without the knowledge and consent of the pathologist.

Milt Code: (Open)

NATIONAL WILDLIFE HEALTH CENTER  
NECROPSY REPORT

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**Submitter Name:**

Dr. Stephen Zipper  
Le Meridien Bora Bora  
BP 190  
Vaitape, French Polynesia 98730  
France

Case: 25225  
Accession: 5  
Date Collected: 06/25/2015  
Date Examined: 8/11/2015  
Prosecutor: T. M. Work  
Pathologist: T. M. Work

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**Signalment-Morphometrics-History**

CONDITION: (Unknown) POSTMORTEM: (Good) EUTHANASIA: (Not euthanized)  
TAG TYPE: (Reference Number) TAG NO.: (Big Mama)  
SPECIES: (Turtle: Green) AGE: (Unknown) SEX: (Unknown)

COLLECTION-SITE: (Le Meridien Hotel Bora Bora) AREA: (Tahiti) STATE: (Departement Outre Mer) COUNTRY: (France)

HISTORY: Blood was taken from a turtle (Big Mama) at the Bora Bora Turtle Center that exhibited early symptoms of depression, anorexia, and nervous signs. The turtle began to eat again all alone. Blood smears were submitted to HFS for analysis.

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**External/Internal**

EXTERNAL:

INTERNAL:

PRELIMINARY DIAGNOSIS: Undetermined.

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**Samples**

SECIMENS RECEIVED: Blood smear-Fresh.

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**Laboratory Results**

HEMATOLOGY: Neutrophil-44%, Eosinophil-1%, Basophil-0%, Lymphocyte-14%, Monocyte-41% (8/11/2015).

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COMMENTS: 17 July 2015: Sodium-158 mmol/L; Potassium-4 mmol/L; Chloride-107 mmol/L; Ca-86 mg/L; Phosphorus-73 mg/L; Urea-189.79 mg/dL; Uric acid-10 umol/L; SGOT-932 IU/L; SGPT-11 IU/L; CPK-650 IU/L; Total protein-52 g/L. 7 August 2015: Sodium-157 mmol/L; Potassium-2.9 mmol/L; Chloride-110 mmol/L; Ca-75.6 mg/L; Phosphorus-60 mg/L; Urea-112.31 mg/dL; Uric acid-6 umol/L; SGOT-1312 IU/L; SGPT-16 IU/L; CPK-6560 IU/L; Total protein-50 g/L.

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Final Diagnosis (in order of importance)

Diagnosis	Topog	Morpho	Etiol	Funct	Dis	Link
1. Undetermined	(T00010 )	( )	(E00040 )	(FY3500 )	( )	( )

Diagnostic findings may not be published without the knowledge and consent of the pathologist.

Milt Code: (Open)



NATIONAL WILDLIFE HEALTH CENTER  
NECROPSY REPORT

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**Submitter Name:**

Dr. Stephen Zipper  
Le Meridien Bora Bora  
BP 190  
Vaitape, French Polynesia 98730  
France

Case: 25225  
Accession: 6  
Date Collected: 07/15/2015  
Date Examined: 8/11/2015  
Prosecutor: T. M. Work  
Pathologist: T. M. Work

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**Signalment-Morphometrics-History**

CONDITION: (Unknown) POSTMORTEM: (Good) EUTHANASIA: (Not euthanized)  
TAG TYPE: (Reference Number) TAG NO.: (Maimiti)  
SPECIES: (Turtle: Green) AGE: (Unknown) SEX: (Unknown)

COLLECTION-SITE: (Le Meridien Hotel Bora Bora) AREA: (Tahiti) STATE: (Departement Outre Mer) COUNTRY: (France)

HISTORY: Blood was taken from a turtle (Maimiti) at the Bora Bora Turtle Center that was injured and had the left hind flipper amputated. The turtle was recovering since mid-July but it was very anemic according to blood work. Blood smears were submitted to HFS for analysis.

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**External/Internal**

EXTERNAL:

INTERNAL:

PRELIMINARY DIAGNOSIS: Undetermined.

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**Samples**

SECIMENS RECEIVED: Blood smear-Fresh.

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**Laboratory Results**

HEMATOLOGY: Neutrophil-56%, Eosinophil-1%, Basophil-0%, Lymphocyte-29%, Monocyte-14% (8/11/2015).

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COMMENTS: 17 July 2015: Sodium-156 mmol/L; Potassium-3.5 mmol/L; Chloride-117 mmol/L; Ca-54 mg/L; Phosphorus-82 mg/L; Urea-275 mg/dL; Uric acid-155 umol/L; SGOT-352 IU/L; SGPT-3 IU/L; CPK-14036 IU/L; Total protein-15 g/L. 7 August 2015: Sodium-150 mmol/L; Potassium-3.1 mmol/L; Chloride-120 mmol/L; Ca-42.8 mg/L; Phosphorus-60 mg/L; Urea-179.58 mg/dL; Uric acid-21 umol/L; SGOT-413 IU/L; SGPT-5 IU/L; CPK-3120 IU/L; Total protein-17 g/L.

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Final Diagnosis (in order of importance)

Diagnosis	Topog	Morpho	Etiol	Funct	Dis	Link
1. Undetermined	(T00010 )	( )	(E00040 )	(FY3500 )	( )	( )

Diagnostic findings may not be published without the knowledge and consent of the pathologist. Milt Code: (Open)

**NATIONAL WILDLIFE HEALTH CENTER  
NECROPSY REPORT**

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**Submitter Name:**

Dr. Stephen Zipper  
Le Meridien Bora Bora  
BP 190  
Vaitape, French Polynesia 98730  
France

Case: 25225  
Accession: 7  
Date Collected: 03/15/2015  
Date Examined: 8/11/2015  
Prosecutor: T. M. Work  
Pathologist: T. M. Work

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**Signalment-Morphometrics-History**

CONDITION: (Unknown)                      POSTMORTEM: (Good)                      EUTHANASIA: (Not euthanized)  
TAG TYPE: (Reference Number) TAG NO.: (Hope)  
SPECIES: (Turtle: Green)                      AGE: (Unknown)                      SEX: (Unknown)

COLLECTION-SITE: (Le Meridien Hotel Bora Bora) AREA: (Tahiti) STATE: (Departement Outre Mer) COUNTRY: (France)

HISTORY: Blood was taken from a turtle (Hope) at the Bora Bora Turtle Center that was injured and had the left hind flipper amputated. The turtle was recovering since mid-March. Blood smears were submitted to HFS for analysis.

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**External/Internal**

EXTERNAL:

INTERNAL:

PRELIMINARY DIAGNOSIS: Undetermined.

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**Samples**

SECIMENS RECEIVED: Blood smear-Fresh.

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**Laboratory Results**

HEMATOLOGY: Neutrophil-49%, Eosinophil-1%, Basophil-0%, Lymphocyte-24%, Monocyte-26% (8/11/2015).

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COMMENTS: 12 May 2015: Sodium-157 mmol/L; Potassium-2.1 mmol/L; Chloride-112 mmol/L; Ca-50.8 mg/L; Phosphorus-160.36 mg/L; Urea-14 mg/dL; Uric acid- umol/L; SGOT-1798 IU/L; SGPT-398 IU/L; CPK- IU/L; Total protein-46 g/L. 7 August 2015: Sodium-155 mmol/L; Potassium-4 mmol/L; Chloride-114 mmol/L; Ca-79.4 mg/L; Phosphorus-150 mg/L; Urea-169.97 mg/dL; Uric acid-39 umol/L; SGOT-1028 IU/L; SGPT-101 IU/L; CPK-1238 IU/L; Total protein-56 g/L.

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Final Diagnosis (in order of importance)

Diagnosis	Topog	Morpho	Etiol	Funct	Dis	Link
1. Undetermined	(T00010 )	( )	(E00040 )	(FY3500 )	( )	( )

Diagnostic findings may not be published without the knowledge and consent of the pathologist.

Milt Code: (Open)