Clinical Notes - Individual Specimen Report
BURNET PARK ZOO

Scientific Name: ELEPHAS MAXIMUS (no subsp) Accession #: M85030
Common Name: Asiatic elephant Male
Name: INDY Birth: 1.Jan.1972

.....2000...

2.Mar.2000
Hx: No medical problems; first TB test of series performed today
Proc: 120 mL of saline instilled into trunk. Exhaled into 1 gallon plastic bag. Submitted for mycobaterial culture at NVSL.
Plan: Repeat sample collection on 3/7/00 and 3/9/00. On 3/5/00 collect blood for CBC, Chem panel, and serum banking. On 3/9/00 vaccinate for tetnus and rabies. Collect stool at convenience for culture and analysis. (NAM)

6.Mar.2000
Blood drawn for CBC and chemistry panel from ear vein for annual physical exam. CBC performed in-house. (RSC)

7.Mar.2000
Hx: annual physical including trunk washes for mycobacterium cultures.
Proc: 2nd trunk wash using 60 ml of saline. Send out to NVSL via DL for culture. (NAM)

9.Mar.2000
Hx: vaccination and TB test.
Proc: Third and last trunk wash using 60 ml of saline. Submitted to NVSL via Cornell's DL.
Both gluteal area were surgically prepped with nolvasan scrub and sterile saline irrigation. Tx: 1ml tetanus toxoid IM in left gluteal and 1ml rabies (ImRab) in right gluteal. A small amount of DMSO was applied topically around the site of each injection.
Plan: monitor for swelling, pain, discharge at/around the injection sites.
Fecal pending for culture and parasite check. (NAM)

30.Mar.2000
Hx-Semen was collected for examination by the reproductive physiologist. The sperm were not viable (moving) which is not unusual for an elephant that has not bred for a while.
As per the general curator, this elephant will be stripped once/week until further notice. (SF)

17.Aug.2000
Feces collected for parasite check. (NAM)

.....2001...

15.Feb.2001
Hx-Previous culture negative for Mycobacterium, pos for MTD (RNA

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15.Feb.2001
polymerase test for Mycobacterium complex-not validated for elephants as of yet).
P/E-Trunk wash done today as part of 3 tests done in a one week period and will be repeated 4 times this year. Trunk wash was done by inserting a sterile red rubber tube into the trunk, 60 cc of saline and commanding the animal to blow into a clean bag. All materials used were sterile to decrease the chance of contamination with Mycobacterial RNA. The material collected was submitted to the NVSL for both culture and MTD. (SF)

19.Feb.2001
Hx-Second trunk wash in series of 3 for the week. (SF)

20.Feb.2001
Hx-Third trunk wash in a series of 3 for the week.
Vaccinated with rabies (1 ml Imrab IM) on right triceps and tetanus toxoid (1 ml IM) on left triceps. Vaccination area was prepped by scrubbing it with chlorhexidine and alcohol. DMSO was applied to the area immediately after vaccination. (SF)

3.May.2001
Hx-Herd testing for tuberculosis via and MTD. Both were negative. (SF)

22.Aug.2001
Keeper report: right cheek patch hosed off, small amount of pus extracted (nickel size) and cleaned with nolvasan. (KW)

23.Aug.2001
Hx: Right cheek patch abscess. Keepers report that it may have occurred during last musth (reluctant to shift). Keepers have been hosing it off, hot packing it, opening the abscess, and irrigating the area with dilute Nolvasan. Keepers report that although a small amount of pus is still extractable from the abscess, it is considerably decreased in size and redness.
Diff Quik and Gram stain of pus cytology:
Assessment: Possible foreign body reaction. Healing.
Plan: Continue hosing, hot packing, opening the abscess, and irrigating with Nolvasan. Monitor improvement. (NAM)

1.Oct.2001
Blood results: Vitamin E= 0.0 ug/ml (1.0-2.5) (NAM)

6.Oct.2001
Keeper report 10/5: Checked cheek patch, area seems to be imporving very slowly. Area not as deep. (KW)

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9.Oct.2001
Elephant Herpesvirus testing:

2ml of whole blood EDTA or Heparin, send on ice packs overnight

Laura Richman, DVM
John Hopkins School of Medicine
1650 Orleans St
Building CRB 316
Baltimore, Maryland 21231
410 955-8682 (NAM)

25.Oct.2001
Blood submitted for Vit E levels. No detectable levels found. Vit E supplementation has been increased. (NAM)

5.Dec.2001
Keeper report 12/4: Foot care --> left rear and front feet completed, outside nails on both front feet need to be watched. Outside nail on right front has soft spot where the nail meets the pad, needs koppertox daily.Laboratory results indicate that the blood levels of vetamin E are still below detectable levels. Plan: increase vitamin E administration from 30ml per day to 60ml/day. Recheck blood levels in 6 weeks. Reassess supplementation plan at that time. (KW)

.....2002...

8.Feb.2002
Blood collected 1/18/02 revealed undetectable Vit E levels. Oral supplementation with Vit E was increased from 60 ml per day to 90 ml per day. (NAM)

22.Feb.2002
History: Beginning of annual physical and testing

Procedure: First trunk wash was performed using 60ml of sterile saline. Sample was submitted to NVSL for TB culture. (NAM)

26.Feb.2002
Proc: second trunk wash was performed today and submitted for TB culture at NVSL (NAM)

1.Mar.2002
Proc: third trunk wash was performed today and submitted for TB ~~culture at NVSL; blood was collected (left side) for CBC/chem~~ panel, vitE and selenium levels (NAM)

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12.Mar.2002
Final phase of annual physical examination: Rabies and tetanus toxoid vaccines
The skin was surgically prepped and rabies (ImRab) 2cc was given IM in the right hind semimemb and tendinous muscles, and tetanus toxoid 2cc on the Left hind semimemb and tendinous muscle. Both injections were followed by an application of DMSO to prevent swelling at the injection sites.
Plan: monitor the sites for swelling and pain. (NAM)

15.Mar.2002
Blood collected 3/01/02: all values are WNL except for a monocytosis (8.7 thou. normal range from 0.7-6.5 thou). WBC count was normal at 15.3.
creatinine was elevated at 2.2 (range 1.2-2.0) (NAM)

7.May.2002
Trunk Wash TB culture results:
Samples submitted 2/22/02, 2/26/02 and 3/1/02 all negative. (NAM)

10.Jul.2002
Blood collected 6/21/02 for vitamin E levels. We are at 0.9 ugm/mL. Normal range 0.75 to 1.3 ugm/mL. Conitnue at present level of supplementation (60,000U alpha tocopherol). Recheck levels in 6 weeks. (NAM)

30.Oct.2002
Vitamin E levels analysed at Michigan State lab: 0.73 ug/ml. This value is within normal suggested range. However, the amount of vitamin E that Indy is receiving since april 10th 2002 is 120 ml (four times the amount that he was receiving last year). It is unclear if we are giving him an adequate dose (as body weight is only estimated), or if he is storing the vitamin E in the liver. Discuss with Dr Kollias. Please submit banked serum from 3 and 5 years ago (if available) to compare levels from the same laboratory. (NAM)

31.Oct.2002
Ongoing discussion relating to disparate Vitamin E levels in the elephant group prompted a phone conversation with GVK and Dr. Ellen Dierenfeld at (ED) the Wildlife Conservation Society's Comparative Nutiriton Laboratory. ED's recommnedation for supplementation of d-alpha tocopherol (Emcelle-Purina) is approximately 1 IU(mg)/kg/day, which is much less than the 6 and 12mg/kg dose that has been offered to the female elephants and to the bull respectively. The WCS range for plasma Vit E levels in normal elephants is 0.5-1.0

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31.Oct.2002
micrograms/ml.RGZ cows range from 0.75-1.3 mircorgrams/ml and the bull has ranged from 0.00-0.73 micorgrams/ml, depending on the laboratory that has been conducting the analyses and the total daily dose of Vit E that has been offered. Based on the information provided by ED, RGZ elephants are receiving 3-13 times the dose that may be required. ED went on to state that the RGZ bull (weight approx. 10,500 lbs or 4772kg) should only need approximately 5000mg(IU) total dose of Vit. E/day. ED stated that there are disparities between laboratories relative to results obtained for plasma Vit E levels in animals. As an example, the Michigan State University Nutrition Laboratory's values are often 2x's greater than those values obtained by WCS Compartive Nutrition Laboratory. ED postulated that if we decrease the doseage of Vit E in the elephants, that the plasma levels may not be significantly altered (decreased)for up to a year, or may not be decreased at all as long as oral supplementation continues. Plan: 1)NAM will query Zoo Med Network to obtained information concerning the doses of Vit E that zoos are using for their elephants and the range of plasma levels that have been obtained over various time periods of continuous supplementation. Additionally, information will be attained relating to potential differences in these values between males and females 2)Consider decreasing the daily dose of Vit E in all elephants to 1-3 IU(mg)/kg/day.3)Concurrent with the changes in the doseages, we need to develop an protocol for blood sampling for Vit E analysis. In order to sort out some of the disparities described above, each sample should simultaneously be sent to 1-3 different laboratories. KW and CD need to discuss costs for the analyses (as an example, the WCS lab can run the assay and charges $10-15/smaple). (this entry has been copied to the clinical notes of all other RGZ elephants and dated 11/01/02). (GK)

1.Nov.2002
Indy's E supplementation since 10/01:
9/01 30ml/day (undetectable) Nutritional & Environmental Analy Serv Lab
10/01 30 ml/day (undetectable) Nutritional & Environmental Analy Serv lab
12/01 Raised from 30 to 60ml/day
1/02 60 to 90ml/day (undetectable) N&E Analy Serv Lab
4/01 Raised from 90 to 120 ml/day (cannot locate analysis...done?)
6/02 On 120 ml/day since April, 0.9 ug/ml (Michigan State lab)
10/02 Still on 120, 0.73ug/ml (Michigan State lab) (KW)

11.Nov.2002
Chemistry profile (collected on Oct. 25th): within normal limits. (SC)

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20.Nov.2002
Reduced Vitamin E back to 3 IU/kg -- 27 ml Emcelle (down from 120 ml/day) (KW)

27.Nov.2002
Hx: long tusks. In an attempt to locate the pulp cavity, radiographs were taken today under sedation.
Sedated with 600mg of Xylazine (based on 0.13mg/kg) at 10:00 administered in the semitendinous/membranous using an 18gauge needle and entering 5cm deep to inject intramuscularly. We used a higher dose of xylazine (usually 0.08mg/kg) because he has entered his musth period. Sedation was acheived within 45 minutes (started to vocalize 10 minutes post injection).
Radiographs were taken of the left tusk. 20cm increments were measured from the distal tip proximally and marked on the tusk, using both a highlight marker and lead markers (to see the distances on the films).
The first 20-40 cm (markers 1 and 2) were radiographs at 0.5sec and at a distance of 60cm. There was a curviline defect indicating a possible crack.
The area between 40 and 60cm (between markers 2 and 3) was radiographed at 0.8sec and 60cm
The area between 60 and 80cm (markers 3 and 4) was radiographed at 1sec and 60cm.
Reversal was achieved with 40 mg of Yohimbine IM in the left triceps (18gauge needle 3.5cm deep), administered at 11:42. At 11:55 he started to be more active. Keepers continued observations.
Plan: discuss with team plan to section the tusks and replace the bands. (NAM)

17.Dec.2002
Test run with Charles Gray to review semen collection procedure. Successful collection (confirmed underneath microscope - approximately 75% viable sperm in sample). Recommendation was to do collection procedure twice monthly (2 days in a row). (SC)

18.Dec.2002
Second session of semen collection with C. Gray. Procedure was again successful. The sample collected (50ml in the bag) was yellow, opaque. High sperm count, over 80% were alive. (NAM)

28.Dec.2002
Indy fractured off the bottom 30" of his right tusk yesterday. Today, while outside, KW saw blood and got the binoculars to check. He has fractured the remaining tusk. He has fractured it horizontally into the pulp cavity There is a fair amount of blood. As per NAM, we will

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28.Dec.2002
start him on TMS at 15mg/kg PO BID. We will also give him 3.66 gm of Siri's ketoprofen (1 tube) which comes to approximately 0.75mg/kg (5000 kg).
CD will be here in the am to assess him and will contact NAM.
At 4:30 pm, the area appears to have clotted and he is accepting treats and commands from MC. He will be given water all night if he wants to flush the tusk. A digital picture should be attempted tomorrow and emailed to NAM at na24@cornell.edu. (KW)

28.Dec.2002
Rx: TRIMETHOPRIM 74.86 gm PO BID until further notice. (NAM)

29.Dec.2002
Fx of right tusk. Keepers report that although he is painful he was laying down on his right side overnight. Appetite is normal. Bleeding was noted around the area of the tusk, and it appears that there is blood on his right cheek. Mild swelling was noted. Keepers report that he took his TMS overnight. After the tusk was cleaned it appears that no alveolar tissue is exposed however due to the depth/thickness of the fracture, it can be surmised that there is alveolar involvement. Blood was drawn for an in-house CBC and +/- chemistry. Digital photographs were obtained but due to software problems these could not be uploaded onto the computer. The fractured sections of tusk seems to be separating. DVM to assess tomorrow.

addendum: 3:30 pm Keepers noted a syrupy discharge in Indy's enclosure. Initially thought to be a phlegmer, its consistency was too thin. Keepers believe blood to have been present in the specimen although when seen by this LVT, the sample was too contaminated with urine and feces to ascertain this. (RSC)

30.Dec.2002
Hx: First fx of the right tusk on the 27th of december (only a small amount of blood noted by the keepers) then refractured same side on the 28th nearer to the sulcus. Because he is in musth, procedures and examinations are more challenging. He is not aggravating the tusk and is laying down on that side.
Observation today: the tusk is fractured 15cm from the sulcus. There is a point present tapered dorso-ventrally. A crack was present travelling in a horizontal plane ventral to the point. Pictures were taken.
Treatment was started Saturday with trimethoprim sulfa at 15mg/kg PO BID; The keepers are also flushing the tusk. One dose of 0.75mg/kg of Ketoprofen was given on saturday night, but he refused following doses

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30.Dec.2002
(does not like molasses flavor).
Plan:
1- continue antibiotics.
2- Discuss adding a drug that would also be effective against anaerobic organisms.
3- Keepers to flush tusk. When the elephant is out of musth or sedated, better evaluation and cleaning of the tusk will be done.
4- Blood should be collected every 3 days if possible to monitor WBC response (including differential)
5- Will send pictures around and get other's experience/recommendations with similar problem.
Note: Charlie Gray has used a product called Cothivet (used for cow's horn after dehorning) to be possibly used to help cauterize and harden the exposed pulp (tip). (NAM)

.....2003...

1.Jan.2003
Keeper report 1/1: Flushed tusk 2 times with water and betadine. Received 25 pills TMS then switched to 1 tube Tribrissen paste which he took in various foods. Received 1.5 tubes of probios in bread. top portion of right tusk moved a bit (1/4 inch) during the tusk flushing. Tusk was resting on top of vertical gate at the time. (KW)

Rx: TRIBRISSEN PASTE 150.0 gm PO SID until further notice.
Rx: PROBIOCIN RUMINANT GEL 1.5 tub PO SID until further notice.
(NAM)

2.Jan.2003
Hx: fractured right tusk. Taking tms well as a paste 2 days now. Per keepers, he does not seem painful and will push on tusk (on high bar). Dorsal fragment still unstable. No further bleeding noted. Keepers are flushing tusk 2 times a day and "injecting" diluted betadine afterwards.
Blood collected on 12/29/02 revealed a WBC 17.8 (within normal range) and a normal CBC.
Blood was collected again today for a CBC
5000IU of tetanus antitoxin was given sq in the left rear leg fold.
DMSO was applied topically after injection. (NAM)

7.Jan.2003
Sedated today with xylazine and butorphanol to examine and treat the fractured right tusk and to cut and band the left tusk (see anesthesia

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7.Jan.2003

record for details). Examination of the remainder of the right tusk revealed vertical fractures on the medial and caudal lateral aspects of the remainder of the fratured tusk. It was not possible to determine if these fracture lines entered into the pulp cavity and how far they extend vertically into the remainder of the tusk.The gingiva located at the level of the sulcus was inflammed and there was evidence of purulant discharge. The tusk was stable when manipulated.It did not appear that the horizontal(saggital) fracture extended into the pulp cavity nor is there any pulp exposed. The vertical fractures were flushed with saline and the sulcus and gingiva were flushed vigorously with water. A fabricated metal clamp was attached to the distal end of the fracutured tusk using bolts and nuts. Once this once accomplished, the distaljagged end of the tusk was cut off horizontally using a meat saw. Once cut, the pulp chamber appeared to be intact(not penetrated). Measurements of the body were taken in order to calculate body weight. Based on the values taken, Indy weighs between 10,500-11,000 lbs. The left tusk, which remains totally intact, was measured and shortened with a meat saw. The cut did not enter the pulp cavity. A similar protective clamp was placed on the distal end of the tusk. Conclusion: It is unkown at this point whether or not the right tusk will require additional treatment beyond local flushing and short term systemic antibiotic therapy. The worse senario is that the tusk, and associated pulp, will become infected and need to be extracted. The keepers were advised to monitor the tusk,sulcus, gingiva and facture sites carefully for purulant discharge and malodor. Tx: 2ml of tetanus toxoid was given IM in the left triceps region. Yohimbine (40mg) was given IM in the upper left rear leg. DMSO was applied to both areas post-injection. Clinical laboratory results: the CBC submitted on 1/2/03 was within normal limits.

Note: purulent material collected from under the sulcus was submitted for aerobic culture adn sensitivity (including Nocardia) and gram stain.

Rx: TETANUS TOXOID 2 ml IM (NAM)

8.Jan.2003

Gram stain of purulent material and body measurements from 1/7.
Heart girth: 162.5 inches
Length: 104 inches
Height: 9ft 4in
foot girth: 56in
Trimmed portion of L tusk: 38.5cm

Gram stain: uniform population of gram positive diplococci. (NAM)

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8.Jan.2003
Visual recheck examination 1 day following tusk repair and trimming. Visual examination performed with binoculars while he was out on exhibit. Injection sites visible - small amount of oozing from R hindlimb injection site - none appeared swollen. Both tusk bands appeared to be in normal position and the cut ends of the tusks appeared normal. He appeared bright and alert. The sulcus around the R tusk appeared mildly swollen and there was a small amount of erythematous tissue visible at the caudoventral surface. No discharge was visible. (SC)

13.Jan.2003
Left tusk band has shifted caudally about 1 inch from initial position. Chuck is looking for more permanent band (brass). The other band is still in good position. No other problem noted by keepers. (NAM)

15.Jan.2003
Received and consumed tribrissen and probios. Flushed tusk with water and sprayed with betadine. Small amounts of granulation tissue fell out of the top of the right tusk during flushing (near the gum line). (KW)

17.Jan.2003
Hx: recheck on fractured right tusk. Currently receiving TMS and probios.
Keepers report that they are still seeing a small amount of purulent material under the sulcus at the junction of the trunk and the tusk. He seems to be sensitive when the handlers are spraying of the tusk with the hose. No nasal discharge is noted. He continues to take the antibiotics and the probios reliably.
Plan: CBC submitted today. Blood for chem panel was collected but will be frozen submitted on monday. Discussion to re-sedate him within the next 2 weeks to replace the right band (which was pushed upwards) and recheck the right tusk. (NAM)

22.Jan.2003
Recheck fractured tusk and protective tusk bands. Observed from a distance of 15 feet: the right fractured tusk is not draining nor does it appear to be causing Indy discomfort; the band on the tusk remains in place.The band on the left tusk, as previously noted, has migrated about 2 inches craniad from the end of the cut tusk. Plan: continue to observe and schedule a time to sedate Indy again and cut the redundant portion of the left tusk and readjust the band. (GK)

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25.Jan.2003
Today is the 25th day of TMS for Indy. As per Dr. Kollias, continue for 3 more days to make total treatment 4 weeks and then stop. (KW)

29.Jan.2003
Culture of injured tusk:
Many Strep agalactica, moderate Nocardia (DL accession # 1791-03)
Sensitive to TMS. (KW)

26.Feb.2003
Sedated with butorphanol and xylazine to adjust tusk bands and trim left tusk. Sedation was uncomplicated, although was less effective than sedation on 1/7/03. This time he grumbled and moved his head occasionally during the procedure and was somewhat responsive to verbal commands.

45 minutes after initial injection, right tusk was examined. Minimal malodorous material was present in the sulcus. The band was removed, revealing a new fracture beneath it. The band was replaced in alignment with the tusk end. The sulcus was flushed with Nolvasan solution.

The tusk material distal to band on left tusk was removed with a saw. The cut edge was flat and smooth with no abnormalities.

Blood was drawn from the left ear vein and collected in an EDTA tube and serum tube. A firm 6"x2" mass was observed on the caudal pinna of the left ear, associated with a blood vessel. The mass is suspected to have first appeared some time between January 2003 and present. A needle aspirate was performed using an 18 gauge needle. Microscopic exam revealed few red blood cells and few inflammatory cells,but elelments were present that resembled nocardia or fungi. Slide submitted to DL Microbiol for review. Yohimbine and naltrexone were administered to reverse the sedation. Recovery was uneventful. (NAM)

1.Mar.2003
DL at Cornell called about aspirate from lump on Indy's ear. They did not see any fungus but did see many bacteria. Microbiology dept. recommended a culture. (KW)

3.Mar.2003
Hx: no ongoing medical problem; annual physical examination and TB testing

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3.Mar.2003
Water was withdrawn for 2 hours prior to procedure. Trunk wash #1 performed with 60ml of Saline and submitted for mycobacterial culture to NVSL.
CBC/Chemistry sent to DL, serum frozen for EEHV, TB ELISA and vitamin E. (NAM)

5.Mar.2003
Second trunk wash submitted for tuberculosis culture to NVSL.
Gram's stain results from aspirate from mass located on medial aspect of left ear revealed moderate gram positive cocci indicative of Strep. No fungal or yeast like organisms isolated.
Blood collected on 2/26 (under sedation) and 3/01 showed normal values for the sample collected awake, but marked changes under sedation (Xylazine and butorphanol). Chemistry panel was WNL. (NAM)

7.Mar.2003
Third trunk wash submitted for tuberculosis culture.
Rabies vaccine (2 ml) in right hamstring.
Tetanus toxoid (1 ml) in left hamstring. (GK)

15.Mar.2003
Lump on left ear is same size as per JM and does not seem to cause Indy any discomfort. Keepers continue to monitor. (KW)

20.Mar.2003
Hx: mass on left ear appears to be of same size but may be somewhat softer per Keepers. Indy is in musth so direct examination was postponed. (SC)

23.Apr.2003
Note:
Preya's heart tissues were unequivocally very positive for Elephant Herpesvirus with PCR. The serum submitted from Karina, Mali, Preya, Targa, and Romani yielded nebulous results on the ELISA. The cut off level is still unclear and the samples were all in the grey zone. According to Dr Richman, these results are low compared to other institutions which experienced an outbreak of this disease.
- We will get serum samples from Siri and Indy today and submit them tomorrow.
- Results from serum samples from March are still pending.
- In 2 weeks we will collect samples from every one and submit for another ELISA
- Once the ELISA is perfected, we can retrospectively study the elephants' serum around the time that Targa had her stillbirth.
(SC)

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7.May.2003
Blood collected for 21 day post-herpes exposure ELISA. Serum sent 5/8/03 to Dr. Laura Richmond via DL. Additional serum banked at RGZ.WW (GK)

15.May.2003
HX: TB tested via trunk washes (#2 and 3) on 3/7/03, and 3/5/03 culture send to NSVL, were negative. (NAM)

25.Jun.2003
Hx: bands on tusks need to be replaced before allowing mating with females.
Sedated with xylazine (600mg) and butorphanol (45mg) IM in left hind; mild sedation was acheived after 50 minutes but not enough to work on the tusks; supplemental xylazine (100 mg) and butorphanol (15mg) were given IM (left triceps). The left band was removed, the ivory was filed down to help fit the new brass band. The new brass band was warmed and placed easily. At that time, the sedation was wearing off. Supplemental sedation (Butorphanol 20mg IV) was given to perform the procedure on the right side. The old band was removed from the right tusk. The new brass band did not fit and the ivory could not be filed enough. A wax mold was made of the right tusk; the old band was cleaned and reapplied.
The fractures of the right tusk appeared unchanged since last time; there was possibly some (if any) mild inflammation under the sulcus. No further displacement of the fragments was noted.
Blood was collected from the left ear vein and submitted for CBC, chem panel and vitamin E levels.
Measurements of the mass (phlebitis) noted on the left ear were 1.5 inches (at the thickest) by 5 inches (previous size was 2 x 6 inches). Sedation was reversed with 450 mg of Naltrexone IV (right ear) and 40 mg of Yohimbine IM (right triceps). Recovery was prompt. (NAM)

26.Jun.2003
Hx: keeper noted that Indy has been quiet and has not defecated overnight.
He defecated shortly after 9AM twice. Boli are have a normal consistency. Food intake is slow but appetite is good.
Obs: he is quiet, alert and responsive, responding well to commands.
No drooling or bloat, but increased flatulence were noted.
A: the procedure yesterday should not have created muscle damage that is making him reluctant to move; however drug recycling can cause sedation and slow GI transit time.
P: Yohimbine was given 40 mg IM (right hind) and 300 mg of Naltrexone (none left for complete dose) IM (right hind). Observer for 30 minutes then allow access to outside.
One hour after administration of drugs, he was observed outside, quiet and resting on the pole. He had defecated once more. (NAM)

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30.Jun.2003
Bloodwork results (collected on 6/25/03): HCT low normal (30%: normal range 36.1+/-6.5), lymphopenia, mildly increased creatinine (2.6; normal 1.3+/-0.3), mild hypophosphatemia (4.8; normal 6.7+/-1.4).
A: WBC count is not elevated. Animal was heavily sedation with xylazine at time blood was collected (possible effect on results?). (SC)

7.Jul.2003
Blood collected on 6/25/03 was submitted to Michigan Animal Health Diagnostic Lab for vitamin E levels: 0.67ug/ml ("normal range": 0.75 to 1.3 ug/ml) (NAM)

2.Aug.2003
Indy is particularly aggressive this morning. More so than expected with this level of musth. He may be painful and we will give him ketoprofen 1mg/kg SID (11,500#) using Siri's paste, 22 cc. (244 mg/cc -- ~5227mg). Keeper able to flush well late in day, no abnormal discharge, little bleeding. (KWP)

4.Aug.2003
Recheck examination - fractured right tusk on 8/1/03. Had veen very agitated, but was also in musth. Was started on ketoprofen on 8/2 at 1mg/kg q24hrs. Keeper staff have been keeping him indoors (so he does not pack the area with sand) and have veen trying to flush the area daily.
Visual exam: the removed portion of tusk, (with metal band still attached) is fractured at an oblique angle, and reportedly had a fetid odor. The ivory is brittle and breaks easily. The remaining sharp oblique portion of the tusk extends approximately 1 foot distal to the sulcus, which is erythematous and swollen. At the junction with the sulcus there is visible grayish/whitish purulent material, which was successfully flushed away by using the hose (warm water).
A: fractured R tusk with likely infection
P: sedate Wednesday for more thorough examination. (NAM)

6.Aug.2003
Sedation for examination and treatment of broken right tusk.
Intramuscular injection of xylazine (600mg) and butorphanol (80mg) - resulted in fairly rapid effects (20-30 min).
HX: The area around the tusk has been being flushed with warm water since Sunday 8/3. There was some purulent exudate noted previously.
PE: On exam today there was no exudate or hemorrhage noted; the area at the base of the tusk, at the sulcus, had an acrid odor. The base of the fractured tusk had 2 sharp edges posteriorly; all areas of the

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6.Aug.2003
proximal portion of the fracture were probed with a canine urinary catheter and no tract exceeded 2 inches in length; the pulp cavity was not evident.
TX: the area at the base of the tusk and the sulcus were copiously flushed with warm water and dilute povidone iodine solution; because the distal portion of the oblique tusk fracture had sharp edges, and there is a high probability the Indy may attempt to fracture the remaining portion of the tusk, we elected to horizontally cut off the distal 3" of the tusk using a gigli wire; although there is a sharp edge present on the distal medial aspect of the tusk and 2 sharp edges present at the base of the tusk, we were unable to smooth or round these off because Indy was beginning to wake up and thrash his trunk around; following the procedure, Orabase was applied at the base of the tusk around the sulcus.
DX: blood was collected and submitted for a CBC and chemistry panel.
A&P: From our exam today it does no appear that the fracture involved the pulp cavity and that the purulent exudate was emanating from the base of the tusk at the sulcus, possibly from the tissues rubbing on the sharp fracture edges. Keepers will flush the base of the tusk and sulcus twice daily with a weak solution of povidone iodine and warm water using a garden sprayer or a sprayer attached to a hose for at least 5 days. If there is visually evidence that the proximal sharp fragments or the distal medial portion of the tusk are causing abrasions or ulcerations, then we will need to re-sedate Indy and file or dremel off these edges. Note: Indy remained sedated until 3pm even though he had been given 50mg yohimbine IV following the procedure. At 3:10pm he was given an additional dose of 50mg yohimbine and 16 mg naloxone IM, because IV administration would have been too dangerous. In approximately 15 minutes he was much more active and was moved to the larger holding area. JM will check Indy later tonight and give additional yohimbine if needed and call GVK if he has concerns. GK/SC will have naltrexone available and come to the zoo if needed. (NAM)

11.Aug.2003
Blood work collected 8/6: CBC and chemistry profile WNL. (NAM)

18.Aug.2003
Tusk fracture recheck: the tissues of the sulcus are moderately inflamed and pus is flushed out in the morning cleaning. There is a pressure point developing on the ventrocaudal aspect of the trunk where it touches the sharp tusk.
P: continue flushing as before and monitor the lesions. (NAM)

21.Aug.2003
S/O: Swelling is decreased from recent tusk fracture. (EMB)

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25.Aug.2003
Blood testing submitted 8/7/03 showed a leukopenia of 5.7 (19.4+/-6.2) with a neutropenia 1.1 (6.0+/-4) and lymphopenia 1.1 (7.4 +/-4.1). The BUN was elevated at 19 (12+-4) and the creatinine was 2.9 (1.3+-.3). The phosphorous was slightly low at 4.0 (6.7+-1.4). (EMB)

4.Sep.2003
Review of clinical laboratory data indicates a fluctuating BUN and creatinine, with the highest creatinine reported on 8/7/03.These fluctuating values are not associated with Indy being in musth based on communications with JM. Plan: A serum sample saved back from 8/7/03 will be submitted to the Diag Lab for a leptospirosis titer.Other differentials include chronic renal disease (bacterial,degerative). A plan will be developed once we have the results of the UA and the lepto titer. Urinalysis from free catch this afternoon: SG 1008, no abnormalities. Indy was observed drinking a large quantity of water this afternoon. (NAM)

8.Sep.2003
Hx: previous history of fractured tusk with sharp edges irritating the sulcus and the side of the trunk. Keepers have been cleaning twice daily with water (hose) and diluted betadine. They have noted a decreased amount of purulent material.
Obs: the raw area on the side of the trunk has healed completely. A white scar is present. The sulcus showed redundant mucosa but no inflammation. Pieces of tusks are growing out and overall the tusk edges appear rounder. Upon flushing there was a small amount of pus that exited from under the sulcus (maybe 3-4 ml at the most).
P: see plan from september 4th (NAM)

10.Sep.2003
Leptospira micro-agglutination (collected 8/8): L. pomona neg 1:100, L. hardjo neg. 1:100, L. icter/cop neg 1:100, L. grippo neg 1:100, L. canicola neg 1:100. (SC)

11.Sep.2003
Visual examination of R tusk: appears to be growing and the fractured edges are now exposed beyond the gingiva. The lesion on the R ventrolateral aspect of the trunk appears to be healed and no longer ulcerated.
P: keepers be less vigorous with hose flush (so doesn't undermine healthy gingiva), continue betadine spray as previously recommended (UFN) - collect urine for UA tomorrow or Monday. (SC)

18.Sep.2003
Urinalysis (performed 9/15 by RSC): (midstream catch). color: yellow, appearance: sl. turbid, SG: 1.016, blood: neg, bibirubin: neg, ketone: neg, glucose: trace, protein: neg, pH 8-9. Microscopic examination: few calcium carbonate crystals. (SC)

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22.Sep.2003
Collected blood and submit for West Nile serology (NAM)

16.Oct.2003
West Nile Positive at 1:8. (EMB)

27.Oct.2003
Recheck examination of R tusk: keepers report that there has been minimal if any growth over the last several months. The ivory appears to be becoming devitalized (grayish in color). The sulcus appears less inflamed. The area was flushed with cool water, and a small amount of purulent material was seen along the left edge of the sulcus. A small central oval cavity was observed at the distal end of the tusk - possibly communication with the pulp cavity?
P: keepers will attempt to get a measurement of the tusk. Should also compare current appearance with previous photographs. Keepers to discontinue povidone iodine flushes, and will use just water. Will consult GVK regarding future plan. (SC)

4.Dec.2003
As per CD, we are reducing the vitamin E dose from 3IU/kg to 1 IU/kg as per Dr. Ellen Dierenfield's recommendation. (KWP)

23.Dec.2003
S/O: Recurrence of the chronic proliferative skin lesion on the right cheek caudal and ventral to the temporal gland. The skin is hyperkeratotic and thickened, with a rostral ulcerated area. A/P: Keepers to clean daily with nolvasan solution, keep covered with furacin ointment and bag balm. Switch to betadine ointment when order is received. (EMB)

29.Dec.2003
Hx: cheek patch is hyperkeratotic; treatment of bag balm (on dried tissues) and nitrofurazone (on exposed tissues) appears to improve healing and sloughing of the dead tissues. The dried tissues is slowly peeling off. P: continue treatment as indicated, try to use the soft scrub brush to clean the area before application of the creams (will remove more of the debris). (NAM)

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12.Jan.2004
Hx: cheek patch inflammation - resolving
Obs: most of the dried devitalized tissue covering the area has sloughed off. The underlying tissue is leathery and depigmented

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12.Jan.2004
(scar). There is only a small amount of dried tissue caudal and dorsal to the scar that still needs to be sloughed off.
Keepers continue to clean with nolvasan and apply nitrofurazone ointment to the wound and bag balm to the surround skin.
Fecal collected on 1/6/04 was negative for ova and parasite. (NAM)

23.Feb.2004
Annual TB test: Water was withheld for 2 hours prior to the procedure. 60cc of sterile saline was instilled into one nostril using a 60cc syringe and a 12Fr red rubber catheter. A rectal examination glove was then immediately placed over the end of the trunk and he blew the saline out of his nose. The resultant sample was transferred into a screw-top centrifuge tube. The sample was placed in the freezer.
P: collect sample again on Wednesday and Friday, and then submit all samples for Mycobacterium culture. (SC)

25.Feb.2004
Annual TB test #2: Water was withheld for 2 hours and he was lightly exercised prior to the procedure. 60cc of sterile saline was instilled into one nostril using a 60cc syringe and a 12Fr red rubber catheter. A rectal examination glove was then immediately placed over the end of the trunk and he blew the saline out of his nose. The resultant sample was transferred into a screw-top centrifuge tube. The sample was placed in the freezer.
P: collect sample again on Friday, and then submit all samples for Mycobacterium culture. (SC)

27.Feb.2004
Annual TB test #3 plus vaccinations: Water was withheld for 2 hours and he was lightly exercised prior to the procedure. 60cc of sterile saline was instilled into one nostril using a 60cc syringe and a 12Fr red rubber catheter. A rectal examination glove was then immediately placed over the end of the trunk and he blew the saline out of his nose. The resultant sample was transferred into a screw-top centrifuge tube. The sample was placed in the freezer. Injections administered: Imrab 2ml IM R rear, tetanus toxoid 1ml IM L rear. Injection sites were surgically prepped and treated with DMSO.
P: Submit all samples for Mycobacterium culture. Monitor for injection site reactions.
Blood was submitted for CBC and chem panel, West Nile serology, Vitamin E submitted to both Cornell and Michigan using 2 separation techniques: in the first, the blood was centrifuged immediately and frozen at -20C. In the second, the blood was stored for 2 hours in the fridge and then centrifuged (old technique). Serum was banked for TB ELISA. (SC)

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1.Mar.2004
Blood collected on 2/27/04 showed: Slight decrease in WBC (9.4 - ref range 14.43+/-4.41), AST slightly increased (39 ref range 22+/-11). BUN (16 - ref range 12+/-4) and creatinine (1.6 - 1.3+/-3) were back within normal ranges. All other values were WNL.
All 6 elephants had decreased phosphorus and decreased alk phosphate. (NAM)

10.Mar.2004
Vitamin E from Michigan Animal Health Diagnostic Lab: .66ug/ml immediate, .67 ug/ml delayed. (EMB)

15.Mar.2004
WNV titer (collected 2-27): negative 1:40 (SEC)

3.May.2004
Trunk wash mycobacterial culture: (collected 2/23, 2/25, and 2/27): all negative (SEC)

14.Sep.2004
Semen stripping under direction of Dr. Dennis Schmidt. Rectal ultrasound was performed to identify the ampullae, which were palpable when his wrist was located at the level of the anus. The first attempt at semen collection was not successful. At the second attempt, there was a short ejaculation immediately followed by urination (the sample was therefore urine contamination). A third try in the afternoon also yielded a urine-contaminated sample. (SEC)

15.Sep.2004
Successful semen stripping this morning by Dr. Dennis Schmidt. The sperm in the sample had poor to no motility however, a finding that can be common with some elephants, according to Dr. Schmidt. (SEC)

16.Sep.2004
S/O Semen collection this morning. Poor to no motility in all fractions, no urine contamination. Samples were separated and shipped to CRC for seminal plasma analysis. A/P: Semen will be collected on a twice weekly basis for the next several months, with a varying schedule of days and staff to habituate Indy to collection for future AI. After establishing regular high quality collections (defined as 60% motility at least 80% of the time) the schedule can be altered randomly to establish which patterns of collection will result in the most consistent collection quality ie, sequential days vs weekly collections. The collected fractions should be maintained at 35 degrees C and analyzed by light micropsy for motility and urine contamination (crystals, yellow appearance) as soon as possible after collection. If Indy develops any indication of rectal irritation (blood on the rectal sleeve after stimulation) he should be rested for a period of a week to 10 days. (EMB)

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29.Sep.2004
Semen collection this afternoon by JM and NAM was successful. A large amount of sperm was collected, but motility was almost 0%. (SEC)

6.Oct.2004
Semen collection successful today. Slow and soft stimulation was used, he passed about 1-2 ml today (drops), sperm was concentrated but very few were alive by the time we looked at it under the microscope. P: repeat stimulation tomorrow. (NAM)

7.Oct.2004
Semen collection today. Only a few drops were collected again but motility was >50%. Beth tried different transport media. Will write specific next week when she is on. (NAM)

23.Nov.2004
Supplement Update:
10 ml Vitamin E (1U/kg)
1 Scoop Elephant biotin (43 cc)
Salt/mineral block small handful
All supplement given daily. Vitamin E recalculated when weights taken. (KWP)

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28.Feb.2005
Today 2 attempts were made to collect semen for an AI (Seattle). In the morning, we collected a few drops - no motility in the early sample and urine contamination in the later samples. In the afternoon as second attempt was made, but resulted in only urine.
P: will try again tomorrow morning (SEC)

14.Mar.2005
Trunk wash performed (#1): 120mls of sterile saline instilled into 1 nostril: submitted for first mycobacterial culture. Sample frozen until all three can be submitted together. (SEC)

16.Mar.2005
Charlie Gray coming on March 29 for collection. (NAM)

16.Mar.2005
Trunk Wash #2 performed: 120mls of sterile saline instilled into one nostril. Sample collected frozen and will be submitted for mycobacterial culture after all 3 samples have been obtained. (SEC)

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17.Mar.2005
Trunk Wash #3 and annual PE. Blood drawn from the ear vein and submitted for CBC, chemistry panel, West Nile serology, and vitamin E level. 60mls of sterile saline instilled into one nostril and resultant fluid submitted for mycobacterial culture (previous 2 samples also submitted). Feces submitted for parasitology and enteric culture. Injections (1cc tetanus toxoid IM L caudal thigh and 2cc Imrab IM R caudal thigh) were preceded by a surgical scrub and followed by topical DMSO. (SEC)

21.Mar.2005
CBC and chemistry panel (collected 3/17):
mild leukopenia 10.8 thou/ul (normal 19.8+/-6.2)
mildly elevated creatinine 1.7 mg/dl (normal 1.3 +/- 0.3)
mildly elevated calcium 11.6 mg/dl (normal 10.6 +/- 0.6)
mild hypophosphatemia 4.2 mg/dl (normal 6.7+/-1.4)

A/P: these findings are likely nonspecific. Most of the other elephants had the same changes. The hypophosphatemia may be lab-related or may indicate a dietary deficiency. Indy's creatinine should be monitored on a regular basis. (SEC)

23.Mar.2005
Fecal (collected 3/17): no parasites detected. (SEC)

29.Mar.2005
At 10 am, ultrasound revealed 3.7 cm right ampullae and 3.29 cm left ampullae and a full bladder. Attempted to stimulate to urinate but was unsuccessful. After 1 and 1/2 hours, Indy urinated on his own. At 11:30am stimulated ampullae per rectum and induced ejaculation. Seven samples were obtained. The first sample contained only a few drops, the 2nd sample contained 0.5 ml, 3rd sample - 3.7 ml, 4th sample - 1.4 ml, 5th sample - 1.2 ml, 6th sample - 4.4 ml, and the 7th sample - 2.7 ml. On microscopic examination, no motile sperm were observed. A total of 14 ml of ejaculated was collected.
At 2pm, ultrasound revealed right ampullae 2.49 x 0.7 cm and left ampullae 2.29 x 1.0 cm. Indy urinated spontaneously and was stimulated per rectum to ejaculate. Four samples were collected. 1st sample at 2:24pm outside of collection cup - 1.7 ml, 1st sample at 2:24pm inside collection cup - 1.4 ml, 2nd sample at 2:26pm - 4.0 ml contained some urinary crystals, 3rd sample at 2:28pm - 0.5 ml, and 4th sample at 2:30pm contained a few drops. No motile sperm were seen in samples 1 through 3. One minimally motile sperm was seen in sample 4. The total volume of ejaculate collected was 7.8 ml. After collection at 2:30pm, ultrasound revealed the ampullae were minimally filled. (NAM)

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30.Mar.2005
Serum vitamin E concentration in sample collected 3/17/05 was 67 ug/dl (normal range 23 -157 ug/dl). (NAM)

3.Apr.2005
Three attempts were made today to collect Indy for potential AI (California). Although the penis dropped, we were unable to stimulate him completely. The drops that were collected were of urine. No sperm were seen. An ultrasound showed a left ampulla of 2.8cm of length.
P: contact Charlie Grey and try again tomorrow. (NAM)

4.Apr.2005
Lab results:
WNV SN (collected 3/17): negative 1:40
Attempts to collect semen today resulted in ejaculation with urination. Ultrasound after enema showed filled ampullae, one of the seminal vesicle was seen, the prostate was briefly visualized, and the left bulbourethral gland was seen. Stimulation was started at 10:00 and stopped at 10:50 when no semen was collected, and resumed at 11:00. Around 11:15 one drop of pure semen was collected (non-motile) and around 11:25, he ejaculated and urinated at the same time. (SEC)

20.Apr.2005
EEHE ELISA submitted when Mali was sick showed low titers. All other elephants in herd had low titers except for Siri who had high titers.
P: repeat 6 weeks after this last sample was collected. The lab will try to retrieve the serum that was sent around the time when Preya was sick to assess seroconversion. (NAM)

27.Apr.2005
Semen collection was attempted today (as PEM demonstration). Ultrasound by Dr Schmitt, ampullae about 3-4 cm, but bladder was not completely empty. Session started at 12:40PM. Penis dropped but by 12:55 he retracted. Session was stopped and resumed at 12:59. He dropped again but did not ejaculate. at 1:10, the session was terminated. 2 samples were collected (1 drop then about 0.5 ml) but consisted in urine. (NAM)

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25.May.2005
Trunk washes performed on 3/14, 3/16 and 3/17/05 submitted to NVSL for mycobacterial culture were all negative. (NAM)

23.Jun.2005
Blood collected on May 18th 2005 was submitted as the paired sample for the samples collected after Mali's illness (in March 2005). Results were identical to those obtained in March with all elephants showing low levels except for Siri who showed again high titers. Interpretation is still tentative with many disclaimers from the lab. Siri's results may mean that she has been exposed to EEHV sometime in the past. Mali's low results may mean that she has never been exposed. Right now the lab is trying not to draw any conclusions based on the ELISA results as they need to test more animals. (SEC)

13.Jul.2005
Keeper report 7/12: cleaned out right cheek patch and applied nitrofurazone to area. (KWP)

5.Oct.2005
Per keeper report 10/4: treated right cheek patch. A little bit of pus inside cheek patch. Cleaned with nolvasan solution and applied ointment. (KWP)

17.Nov.2005
S/O:Seasonally recurring chronic proliferative/ulcerative dermatitis on right lateral facial area.The lesion is approximately 3.5 in long and 3 in wide.The margins are firm/fibrous and there is a partially healed central longitudinal partially epithelialized crater.Keepers indicate that Indy sleeps on both sides but predominately on his left side. The wound has been treated with washing with dilute chlorhexidine and nitrofurazone ointment for approximately 3 months ranging in application from daily to weekly. By this time of the year the lesions genrally regresses and is inactive during the winter months.A: Chronic proliferative/ulcerative dermatitis. Etiology presummed to be trauma with secondary bacterial or fungal infection It is possible that he sleeps more on his left side to prevent pressure on the lesion. Plan: D/C nitrofurazone ointment and apply Preparation H daily for the next month. Reassess at that time. If the lesion is not progressing well, then consider biopsy of central and peripheral areas of the lesion for histopathology and culture/sensitivity. (GVK)

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20.Nov.2005
Tech noted that this elephant was acting lethargic ... leaning against fence, quiet. CD out to check and agreed. CD asked keepers to draw blood for in-house CBC on 21 November. Keepers report that he is in musht, dribbling urine, draining from temporal glands, showing aggression to keepers, and tusk driving (all typical behaviors). (RSC)

21.Nov.2005
Blood drawn today for in-house CBC.
PCV: 41%
TS (refractometer): 8.0g/dL
WBC: 14,500/uL
Differential:
Neutrophils: 30%
Bands: 1%
Lymphocytes: 38%
Monocytes: 29%
Eosinophils: 2%
RBC morphology: normochromasia, normocytosis
Platelets: adequate (~20/OIF)
CD reports that Indy is behaving completely (in musht) normal today. (RSC)

23.Nov.2005
Recheck condition of right cheek patch. The wound is smaller. Afternoon check: the wound is arch shaped, about 5 cm long, thin caudally and widest cranially (about 1cm). The initial defect is filling in and we cannot probe inside the wound.
P: continue treatment as prescribed using prep H. Consider as prevention for next year to start applying prepH or maalox on the susceptible area. (NAM)

6.Dec.2005
Discussed with Chuck recommendation from Charlie Grey to supplement Indy with Beta carotene (vit A) in order to improve semen collection/viability. Since vitamin A is liposoluble, there is a risk of accumulation in the body and possibly toxicity. Another factor to take into consideration, is the fact that excess supplementation of one liposoluble vitamin may interfere with the absorption of other liposoluble vitamin (i.e. E).
We will try to supplement as recommended and monitor for side effects. (NAM)