Preventative Health Care of Primates in Captivity

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Introduction

• Primates are commonly kept in zoological collections, research establishments and private facilities.
  – Prone to infectious, non-infectious, nutritional and behavioral maladies.
  • Some of these are zoonotic and anthropozoonotic.
  – Preventative health care is fundamental to long term welfare of primates in captivity
Introduction

• An ideal program of preventative care includes routine exams, dental prophylaxis, appropriate diet, housing, enrichment, proper social grouping, routine vaccination, fecal exams, and screening for infectious disease.
Preventative Health Care

- Routine exams
  - Exam under anesthesia
    - Safe!
  - Physical examination
    - Ophthalmic, aural, oropharyngeal, musculoskeletal
    - Abdominal palpation
    - Body score
    - Pelage characteristics
    - Reproductive tract assessment
    - Rectal examination

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Preventative Health Care

- **Routine exams**
  - Exam under anesthesia
  - Physical examination
  - Clinical assessment
    - CBC, serum profile
    - Viral titers
    - Ultrasound
    - Colonoscopy
    - Whole body radiographs
    - Bank sera, plasma
    - Skin biopsy
    - Urinalysis
    - ECG
    - Dentistry
    - Tuberculin testing
    - Fecal exam
    - Weight

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– Routine exams
  • Vaccinations
    – As indicated
      » Influenza
      » Tetanus
      » Rabies
      » Measles
      » DPT/MMR/polio-great apes

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- Routine exams
  - Contraceptive evaluation

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– Nutrition
  • General principles
    – Majority are omnivorous
    – Commercially available pellets
      » Balanced nutrition but minimal “variety”
    – Foregut fermentors
      » Colobus
      » High fiber requirement
      » Supplement browse
      » Avoid high fiber vegetables

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- Nutrition

  - General principles
    - Protein requirements
      » 16% DM Old World monkeys
      » 25% DM New World monkeys
    - Vitamin C
      » Required in diets of all except prosimians
    - Vitamin D
      » NWP requirement (not exposed to sunlight)- D3
      » Callitrichids have highest requirements
      » Vit D2 adequate for old world primates.

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Preventative Health Care

– Nutrition

• General principles
  – Vitamin D
    » NWP requirement (not exposed to sunlight)- D3
    » Callitrichids have highest requirements
    » Vitamin D2 adequate for old world primates
    » Lack of sunlight/appropriate balance of calcium and phosphorous leads to metabolic bone disease
      Common!!!
Preventative Health Care

– Behavioral problems
  • Rule-out organic causes
  • Many issues relating to stereotypic pacing/behavioral abnormalities, overgrooming, and self-mutilation may be attributed to;
    – Improper husbandry
    – Inappropriate social groupings
    – Lack of conspecific(s)
    – Lack of or inappropriate enrichment

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• Behavioral problems
  – Natural history of particular species should be adhered to
    » Social groupings
    » Nocturnal vs diurnal
    » Foraging/diet
    » Reproduction
    » Appropriate housing

• Medication is seldom, if ever warranted as a default!
  – Masks underlying issue, but doesn’t correct it
Preventative Health Care

- Parasitic diseases
  - *Acanthocephalus*
  - *Gongylonema pulchrun*
  - *Entamoeba histolytica* *
  - *Balantidium coli* *
  - *Giardia* *
  - Nematodes
Preventative Health Care

- Bacterial diseases
  - Tuberculosis
    - *Mycobacterium bovis*
    - *Mycobacterium tuberculosis*
    - *Mycobacterium avium*
  - *Salmonella*
  - *Shigella*
  - *Campylobacter*
Preventative Health Care

– Viral diseases-screen as appropriate for species
  • RSV-great apes
  • Influenza-great apes
  • Hepatitis A, B-great apes-chimpanzee
  • Enteroviruses-most taxa
  • Adenoviruses-most taxa
  • Reoviruses-most taxa
  • Rhinoviruses-great apes
  • Papillomavirus-most taxa
  • Herpesviruses- all taxa
  • Etc. etc………..
Preventative Health Care

– Viral diseases
  • Zoonotic
    • Herpes B- FATAL!
      • Macaques
    • Lymphotropic polyomavirus
    • Simian foamy virus
    • Simian immunodeficiency virus (SIV)
    • SV40
    • Chimpanzee herpesvirus
    • Cytomegalovirus?
    • Epstein-barr?

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Preventative Health Care

- Viral diseases
  - Zoonotic
  - Anthropozoonotic
    - Adenovirus
    - *Herpes hominis*, simplex
    - Chicken pox
    - Small pox
    - Measles
    - Mumps
    - RSV
    - Coxsackie virus
    - Rhinovirus
    - Rubella
    - Hepatitis
    - Monkeypox
Anthropozoonoses

- A disease transmitted from people to animals
Anthropozoonoses

- Classes of diseases people can transmit to animals
  - Viruses
  - Bacteria
  - Funguses
  - Parasites
Anthropozoonoses

• Viruses

  • Influenza A (Flu)
    – Transmitted to pigs (1998)
    – Ferrets, Great Apes, Giant anteaters

• All great apes are vaccinated on a yearly basis against influenza
Anthropozoonoses

• Viruses
  • Respiratory syncytial virus (RSV)
    – Contributed to the demise of an infant orangutan at the Kansas City Zoo
    – Most of our apes have positive titers
    – Very common in people!
  • Metapneumovirus
    – Gorillas, chimpanzees
    – Has caused death in Mountain gorillas
    – Caused demise of chimpanzees at Lincoln park zoo
Anthropozoonoses

• Viruses
  • Human Herpesvirus 1 (Herpes simplex)
    – Fatal to marmosets, cotton topped tamarins, tree shrews
    – Staff infected with cold sores should not work with these species or diet preparation
    – Transmitted by direct contact, aerosolization
    – No vaccine available for people or animals
  • Coxsackie B virus (enterovirus)
    – Have had one chimpanzee and two orangutans with documented coxsackie virus in cardiac tissue and one chimpanzee clinical illness
    – All primates are tested for enteroviruses
Anthropozoonoses

• Bacteria

• *Staphylococcus aureus* (*Staph*)
  - Normal flora of the skin (hands, hair, and nares) of people
  - The resistant strain is termed MRSA (*Methicillin Resistant Staphylococcus aureus*)
    » At some point has been transmitted from staff to several chimpanzees
    » Female Red capped mangabey died of a MRSA encephalitis transmitted from the bite of an infected male
    » MRSA infected African elephant calf at San Diego WAP
Anthropozoonoses

• **Bacteria**
  
  • *Staphylococcus warneri (Staph infection)*
    - Normal flora of the skin (hands, hair, and nares) of people and animals
    - The resistant strain is termed resistant “Staph” (Resistant *Staphylococcus*)
      » At some point may have been transmitted from staff to an orangutan at the zoo
  
  • **Other resistant bacteria**
    - *Staphylococcus sp*
    - *Enterococcus sp*
Anthropozoonoses

• Bacteria
  • *Mycobacteria tuberculosis (TB)*
    – People to Asian elephants (India, Nepal)
    – Paucity of information regarding transmission to primates
    – ??????
Anthropozoonoses

- **Bacteria**
  - *Escherichia coli*
    - Intestinal tract-fecal contamination
    - Can carry resistance factors
    - Chimpanzees
  - *Salmonella typhimurium*
    - Intestinal tract-fecal contamination
    - “Typhoid Mary”
      - Cook
      - Infected 53 people, 3 died
    - Tony Labella
      - Cook
      - Infected 100 people, 5 died
Anthropozoonoses

- **Funguses**
  - *Microsporum audouinii*
    - Dog, guinea pig, monkey
Anthropozoonoses

- Parasites
  - *Giardia lamblia*
    - Transmitted to Mountain gorillas
    - Transmitted to chimpanzees
    - Fecal-oral route
  - Strongyles
    - Hookworms (Ancylostoma)
    - Transmitted to gorillas, chimpanzees
    - Fecal-oral or direct skin penetration
  - Cryptosporidium
    - Fecal-oral route
    - No treatment
    - Controversial contagion
Anthropozoonoses

• Parasites
  • *Entamoeba histolytica*
    – Humans are primary hosts
    – Transmits through fecal-oral route
    – Can penetrate intestinal tract
      » Travels through bloodstream
      » Causes hepatic abscesses
    – Have had clinical illness in a gorilla at the Kansas City zoo
    – Has infected chimpanzees at the Kansas City zoo
    – Has caused demise of colobus monkeys at the Kansas City zoo
    – Has infected staff at the Kansas City zoo
Anthropozoonoses

• Preventing transmission of pathogens from us to our animals (and from them!).
  – Do not directly touch animals without gloves—especially primates
  – Routine surveillance (TB tests, fecal exams)
  – Wear masks when in close proximity to primates (i.e. restraint, netting, cleaning, etc.)
  – Practice proper hygiene principles
    • Do not work with susceptible animals or food preparation when you are ill
    • Wash hands!
    • Shower/bathe regularly
    • Routine vaccination (school vaccines)
    • Use footbaths!
Conclusion

• Preventative health care programs should be tailored on a risk/benefit basis, including manpower and costs.

• Preventative health care is integral to the long term benefit of captive primates

• Basic hygiene and an understanding of maladies affecting primates is necessary to prevent zoonoses and anthropozoonoses
Routine Health Care

– Non-infectious diseases of primates

• MBD
• Scurvy
• Iron storage disease
• Dental diseases
• Diabetes
• Hypothyroidism
• Renal disease
• Reproductive disease
• Laryngeal air sacculitis
• Cardiovascular disease

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The end