RESPIRATORY DISEASE IN CAPTIVE ORANGUTANS

By Megan Fox

Los Angeles Zoo and Botanical Gardens
OVERVIEW

- RESPIRATORY DISEASE– WHAT WE KNOW
- IMPACT OF RESPIRATORY DISEASE IN THE LIVES OF ORANGUTANS
- RESPIRATORY DISEASE– WHAT WE DO NOT KNOW
- ORANGUTAN HEALTH WORKSHOP– RESPIRATORY GROUP GOALS
- FUTURE WORK– SURVEYS
WHAT WE KNOW

RESPIRATORY DISEASE IN CAPTIVE ORANGUTANS
WHAT WE KNOW

- 2012 SSP Health Survey—valuable information
- We know it is the #1 health issue facing captive orangutans
- Respiratory infections considered the most serious health issue in 31 of 45 reporting institutions
- Over one-third of responding institutions reported that they have or are currently managing long-term, chronic cases of respiratory disease
- Respiratory infection is the leading cause of death in orangutans between the ages of 8-40 years
<table>
<thead>
<tr>
<th>DISEASE</th>
<th># INSITITUTIONS/PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air sac infection</td>
<td>19 = 42%</td>
</tr>
<tr>
<td>Sinusitis</td>
<td>14 = 31%</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>14 = 31%</td>
</tr>
<tr>
<td>Bronchiectasis/Chronic bronchitis</td>
<td>11 = 24%</td>
</tr>
<tr>
<td>Allergies</td>
<td>7 = 16%</td>
</tr>
<tr>
<td>COPD</td>
<td>4 = 9%</td>
</tr>
<tr>
<td>Other (seasonal colds)</td>
<td>1 = 2%</td>
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Air sacculitis – infection of the upper and lower respiratory tract including the air sac by multiple bacteria.

Air sacculitis has been documented in a number of other captive primate species including: owl monkeys, baboons, pig-tailed macaques, chimpanzees, and bonobos.

Orangutans have a high incidence of air sacculitis, especially when compared to other species.

It has also been documented in a free-ranging mountain gorilla and in rehabilitant orangutans.
AIR SACCULITIS

- Most common form of respiratory disease
- Large amounts of fluid/pus that varies from thin to thick
- Thicker fluid may not be detected by distended air sac
- Persistent infections
- Recurrent infections
- Drainage typically required
### Signs of Air Sacculitis

- Loss of appetite
- Lethargy
- Nasal discharge
- Coughing
- Bad breath
- Enlarged air sac
- Intermittent diarrhea
- Skin problems
- Weight loss
- Depression
- Breathing problems
- Change in body odor
SURGERY

# INSTITUTIONS/ PERCENT

- Marsupialization
  14 = 31.11%
- Partial air sac removal
  4 = 8.89%
- Complete air sac removal
  2 = 6.67%
- Ostia closure
  2 = 6.67%
- Other (trained for periodic surgical drainage) Toean
  1 = 2.2%
TREATMENTS/MANAGEMENT

OTHER

- Nebulizing
- Environmental restrictions
- Temperature restrictions
- Oral/injectable medications
- Blood draws
- Regular weights
MINYAK AND HIS BATTLE WITH AIR SACculitis

IMPACT OF RESPIRATORY DISEASE IN THE LIVES OF ORANGUTANS
MINYAK

- Came to Los Angeles in late 2001 with advanced air sacculitis with chronic pneumonia
- Fistula to allow drainage of throat sac and had closed ostia
- He was depressed, despondent, and very sick
- In 2002 the zoo and staff knew that he needed immediate medical attention
BATTLEGRO AIR SACCULITIS

- Moved to the Health Center for treatment
- Major 9 hour surgery to remove air sac
- One year of recovery and treatment at the Health Center
- Returned home in 2003 to the Red Ape Rainforest
<table>
<thead>
<tr>
<th>MINYAK</th>
<th>CAREGIVERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Regular preventative exams</td>
<td>• Stressful and emotional experience</td>
</tr>
<tr>
<td>• Nebulized twice daily</td>
<td>• Long and risky procedure to remove air sac</td>
</tr>
<tr>
<td>• Occasional recurrence of pneumonia</td>
<td>• Long-term care</td>
</tr>
<tr>
<td>• Hand-injection trained for antibiotic treatment</td>
<td>• Daily detailed monitoring of health</td>
</tr>
<tr>
<td>• Blood draw trained</td>
<td>• Ensuring overall well-being</td>
</tr>
<tr>
<td>• Weather restrictions</td>
<td></td>
</tr>
<tr>
<td>• Air filtration system</td>
<td></td>
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</tbody>
</table>
MINYAK TODAY

- Introduced to multiple females
- Berani – 7 years old
- Elka – 1 year old
- Intan
- Frequency of illness lessened
- Understand warning sings better
WHAT WE DO NOT KNOW

RESPIRATORY DISEASE IN CAPTIVE ORANGUTANS
UNDERSTANDING THE CONNECTION BETWEEN RESPIRATORY DISEASES

- It is not known what role respiratory diseases play in connection to one another
- The cause of respiratory disease is not known
- It is unclear if air sacculitis leads to pneumonia
- We do not know the progression between pneumonia and bronchiectasis which can lead to permanent life altering disease status
- It is not known if sinusitis is connected to air sacculitis
- It is not understood what role the environment and other various factors play in the development of respiratory disease
UNDERSTANDING RESPIRATORY DISEASE

- To begin the process of understanding these diseases, we need to standardize the collection of husbandry and hereditary information.
- In order to effectively treat, diagnose, and understand respiratory disease, we need recommended standard protocols for veterinary respiratory evaluation and diagnostics.
- We need more information from facilities dealing with these diseases.
- This information needs to be made available.
AIR SACCULITIS

- It is not well understood
- We do not know why it exists more within the captive orangutan population than in other species with air sacs
- It is not clear what factors are involved for individual susceptibility
- Trying to find early warning signs and catch this disease early in order to treat it in the beginning stages before it has progressed
EUROPEAN ZOO STUDY FINDS INTERESTING RESULTS (1969-2009)

<table>
<thead>
<tr>
<th></th>
<th>Chronic respiratory signs</th>
<th>Air sacculitis</th>
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<tbody>
<tr>
<td>Bornean</td>
<td>13.8%</td>
<td>10%</td>
</tr>
<tr>
<td>Sumatran</td>
<td>3.6%</td>
<td>14.3%</td>
</tr>
<tr>
<td>Male</td>
<td>15.8%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Female</td>
<td>3.9%</td>
<td>12%</td>
</tr>
<tr>
<td>Hand-raised</td>
<td>NA</td>
<td>21%</td>
</tr>
<tr>
<td>Parent-raised</td>
<td>NA</td>
<td>5%</td>
</tr>
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</table>
EUROPEAN ZOO STUDY

- Respiratory status of parents known in 46% of cases in both categories
- 93% = one or both parents had an episode with respiratory disease
- Healthy orangutans = 54% had parents with an episode of respiratory disease
- Possible environmental factors involved
- We do not know if this would correlate with the North American orangutan population—need surveys to understand risks and potential predisposing factors
SSP ORANGUTAN HEALTH WORKSHOP: RESPIRATORY GROUP GOALS

WHAT WE NEED TO DO NEXT
RESPIRATORY GROUP GOALS

1.) Standardize data collection/create protocols

2.) Create a centralized database

3.) Create standard protocols/recommendations

4.) Create a library of therapeutic options

5.) Create a network of consultation, resources, and support

6.) Future research
1.) STANDARDIZE DATA COLLECTION/CREATE PROTOCOLS

- Standard method to collect and catalog information
- Review known cases and case histories
- Case definitions— for education and better data— work with human specialists to help determine
- Definitions of respiratory disease: rhinitis, sinusitis, airsacculitis, pneumonia, bronchiectasis
- Respiratory review of studbook
- Surveys: 1. current therapies 2. ID risk factors
- Possible creation of subcommittee
- Develop check list for physical exams, respiratory exams, and necropsy— zoos to send information to SSP vet advisor to filter/interpret/compare
DEVELOP CHECKLIST FOR EXAMS AND NECROPSY

- Diagnostic imaging—CT scan if possible: sinus, air sac, chest (other recommendations if CT not available)
- Sample collections—bronchial wash if possible (other options)
- Air sac flush
- Bloodwork
2.) CREATE A CENTRALIZED DATABASE

- Data quality control—ensuring reliability
- Accessible information of various aspects of respiratory diseases
- Case studies—potential contacts
- Image library
- Familial information/background information
- Grant proposal—upkeep of web site and other potential funding needs
3.) CREATE STANDARD PROTOCOLS/RECOMMENDATIONS

- Definitions: rhinitis, sinusitis, air sacculitis, pneumonia, bronchiectasis
- Physical exam protocol
- Diagnostic protocol: imaging, sample collections, endoscopies, screening, assessing the air sac
- Necropsy protocol
- Establish training priorities for medical management
- Pre-shipment evaluations
4.) CREATE A LIBRARY OF THERAPEUTIC OPTIONS

- Utilize expertise available to maximize the therapeutic options
- Gather information on current therapies
- Make this information accessible
5.) CREATE A NETWORK OF CONSULTATION, RESOURCES, AND SUPPORT

- Imaging centers for each institution

- Consulting specialists:
  - Pulmonology
  - Respiratory therapy
  - Radiology
  - Infectious disease

- Other institutions
6.) FUTURE RESEARCH

- Assessment of allergy testing
- Create an atlas of the anatomy of the orangutan respiratory system
- Genetics
- Surveys:
  - Current therapies
  - Identify risk factors
SURVEYS TO HELP UNDERSTAND RESPIRATORY DISEASES

CURRENT THERAPIES/IDENTIFY RISK FACTORS
SURVEY TO FIND CURRENT THERAPIES

- Survey sent to zoos with orangutans with cases of respiratory disease within the past 10 years
- Survey monkey or call individual institutions, blog, list serve
- Will begin to develop treatment options and knowledge of successful therapies
- Potentially standardize recommended treatments
<table>
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<th>ENVIRONMENT/ HUSBANDRY</th>
<th>INDIVIDUAL/GENETICS/ HISTORY</th>
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<tbody>
<tr>
<td>• Climate and restrictions</td>
<td>• Age</td>
</tr>
<tr>
<td>• Indoor/outdoor</td>
<td>• Gender</td>
</tr>
<tr>
<td>• Activity</td>
<td>• Species</td>
</tr>
<tr>
<td>• Space/# animals</td>
<td>• Relatedness</td>
</tr>
<tr>
<td>• Stress</td>
<td>• Obesity</td>
</tr>
<tr>
<td>• Bedding/substrate</td>
<td>• Stress</td>
</tr>
<tr>
<td>• Cleaning protocols</td>
<td>• Parent reared</td>
</tr>
<tr>
<td>• Off/on ground</td>
<td></td>
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<tr>
<td>PHYSICAL SIGNS</td>
<td>BEHAVIORAL SIGNS</td>
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<td>-----------------------------------</td>
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<tr>
<td>Nasal discharge</td>
<td>Lethargy</td>
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<tr>
<td>Coughing</td>
<td>Loss of interest</td>
</tr>
<tr>
<td>Enlarged throat sac</td>
<td>Change in social behavior</td>
</tr>
<tr>
<td>Weight loss</td>
<td>Depression</td>
</tr>
<tr>
<td>Loss of appetite</td>
<td>Change in attitude</td>
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<tr>
<td>Bad breath</td>
<td></td>
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<tr>
<td>Change in body odor</td>
<td></td>
</tr>
<tr>
<td>Change in breathing</td>
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CONCLUSION
RESPIRATORY DISEASE IN CAPTIVE ORANGUTANS

- Respiratory disease is a significant problem in captive orangutans
- Respiratory disease is the leading cause of death of captive orangutans between the ages on 8-40 years
- This group constitutes our breeding population and this can be problematic for the overall health of this population
- We need a better understanding of respiratory disease for early detection, to effectively treat and diagnose disease
- In order to accomplish goals we need the assistance and support of the zoo community
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