



# THE UNIVERSITY *of* EDINBURGH

## Edinburgh Research Explorer

### Non Tuberculous Mycobacteria in Swine: Is it a Public Health Problem?

**Citation for published version:**

Muwonge, A 2012, 'Non Tuberculous Mycobacteria in Swine: Is it a Public Health Problem?' Mycobacterial diseases, vol. 2, no. 2, e110. DOI: 10.4172/2161-1068.1000e110

**Digital Object Identifier (DOI):**

[10.4172/2161-1068.1000e110](https://doi.org/10.4172/2161-1068.1000e110)

**Link:**

[Link to publication record in Edinburgh Research Explorer](#)

**Document Version:**

Publisher's PDF, also known as Version of record

**Published In:**

Mycobacterial diseases

**Publisher Rights Statement:**

© 2012 Muwonge A.

**General rights**

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

**Take down policy**

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact [openaccess@ed.ac.uk](mailto:openaccess@ed.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.



## Non Tuberculous Mycobacteria in Swine: Is it a Public Health Problem?

Adrian Muwonge\*

Department of Food Safety and Infection Biology, Norwegian School of Veterinary Science, P.O. Box 8146, Norway

The importance of infections caused by non-tuberculous mycobacteria (NTM) in animals and humans has gained considerable recognition during the past few years. Unlike the members of *Mycobacterium tuberculosis* complex (MTC) that are highly pathogenic, majority of the NTM have been regarded as non-pathogenic. This opinion is now changing as more NTM are associated with disease [1]. *Mycobacterium avium* subspecies *avium* and *hominissuis* belong to a much wider group of non tuberculous mycobacterium (NTM) called *mycobacterium avium* complex (MAC) [2]. This group is reported to be the most frequently encountered form of NTM in the Western world. Its members have a wide range of sources including water, soil, animal beddings, domestic and wild animals [3-5]. At the beginning of the AIDS pandemic, Non-Tuberculous Mycobacteria (NTM) were reported as emerging pathogens responsible for opportunistic infections, found in most HIV/AIDS infected patients, especially those with CD4 cell counts B/100/ml [6]. Currently, it is estimated that 50% of the AIDS patients are likely to develop MAC complex, predominately *M. avium* if their CD4 count is below 50 [2]. The other species documented to cause opportunistic human infections are ; *Mycobacterium avium*, *M. intracellulare*, *M. kansasii*, *M.paratuberculosis*, *M. scrofulaceum*, *M. simiae*, *M. habana*, *M. interjectum*, *M. xenopi*, *M.heckeshornense*, *M. szulgai*, *M. fortuitum*, *M. immunogenum*, *M.chelonae*, *M. marinum*, *M.genavense*, *M. haemophilum*, *M. celatum*, *M. conspicuum*, *M. malmoense*, *M. ulcerans*, *M.smegmatis*, *M. wolinskyi*, *M. goodii*, *M. thermoresistible*, *M. neoaurum*, *M. vaccae*, *M.palustre*, *M.elephantis*, *M. bohemicam*, *M.conceptionense* and *M. septicum* [7-9]. It is however difficult to accurately describe the situation in Sub Saharan Africa and other developing countries since most of the data on which these inferences are made comes from Europe or North America.

Swine tuberculosis is a chronic infectious disease characterized by inflammatory reactions in various body parts but mostly in the digestive system. Calcification prone tubercles, inflamed lymph nodes and sarcoid-like granulomas are the most common features of this disease [4,5,10]. The lesions are generally small foci 1 to 10mm in diameter which are unlikely to cause detectable clinical signs in the pigs. In additions cases may also develop milliary lesions along the course of the lymphatic system especially if infected by *M.avium* complex. These lesions are however most detectable at slaughter which result into financial losses. These economic losses primarily result from condemnation of pork, head and visceral organs at inspection [11,12]. The following have been isolated from infected pigs; *M. bohemicum*, *M. intracellulare*, *M. avium*, *M. hemophilum*, *M. malmose*, *M. szulgai*, *M. kansasii*, *M. scrofulaceum*, *M. tuberculosis*, *M.simiae*, *M. palustre*, *M. gordonae*, *M. terrae*, *M. xenopi* and *M. heckershornense* [5,13]. Reports from Czech Republic indicated that outbreaks in herds have been due to contaminated peat, compost and saw dust [11] while in Nigeria it is reported that swine are mainly infected by ingestion of soil, litter, dust contaminated by faeces of tuberculous chicken or consumption of improperly processed infected chicken [4].

The absence of documented human to human and animal to

human transmission in the last 30 years has led to the conclusion that the environment is the source of NTM for human, however there is growing evidence that food of animal origin could be the source of these infection to human [1,4,14]. In Netherland [12] showed a close genetic relatedness between *M. avium* subsp. *Hominissuis* isolated from swine and humans. Since then many scholars have continued to document more evidence re-affirming the role pigs could be playing in the transmission of mycobacterial infections to immune compromised and immune competent individuals. In 2007, Oloya et al. isolated *M. avium* subsp. *Hominissuis* from tuberculous lesions in cattle and T.B patients with cervical lymphadenitis in pastoral areas of Karamoja in Uganda. The molecular findings too showed a very high genetic relatedness between animal and human isolates [15]. Although the true source of human infection is still a matter of dispute, these findings tend to point us to zoonotic scenario. Diagnostics and early detection are believed to be the greatest public health hindrance in sub Saharan Africa and many developing countries, as infection are mostly detected at slaughter, at which point food safety is outweighed by food security.

The relative importance of mycobacterial diseases has indeed been evolving over the past few years, and new challenges are expected to overwhelm the available prevention, control and surveillance strategies. The growing evidence that swine could be playing a role in dissemination of NTM is of public health concern especially in developing countries where HIV/AIDS is more prevalent.

### References

1. Falkinham JO 3rd (2009) Surrounded by mycobacteria: Nontuberculous mycobacteria in the human environment. *J Appl Microbiol* 107: 356-367.
2. AIDSINFONET (2011) *Mycobacterium Avium* Complex (MAC) Fact sheet 514 accessed 04. February 2012.
3. Krizova K, Matlova L, Horvathova A, Moravkova M, Beran V, et al. (2010) Mycobacteria in the environment of pig farms in the Czech Republic between 2003 and 2007. *Veterinari Medicina* 55: 55-69.
4. Ofukwo RA, Iortyom BK, Akwuobu CA (2010) *Mycobacterium avium* and *Mycobacterium intracellulare* Infections in Slaughtered Pigs in Makurdi, North-Central Nigeria: An Emerging Zoonosis. *Int J Anim Vet Adv* 2: 43-46.
5. Cvetnić Ž, Špičić Š, Benić M, Katalinić JV, Mateja P, et al. (2007) Mycobacterial infections of pigs in Croatia. *Acta Vet Hung* 55: 1-9.
6. Masur H (1993) Recommendations on prophylaxis and therapy for disseminated *Mycobacterium avium* complex disease in patients infected with the human

\*Corresponding author: Adrian Muwonge, Department of Food Safety and Infection Biology, Norwegian School of Veterinary Science, P.O. Box 8146, Norway, Tel: 46390663; E-mail: [adrian.muwonge@nvh.no](mailto:adrian.muwonge@nvh.no), [edroxuk@yahoo.co.uk](mailto:edroxuk@yahoo.co.uk)

Received February 11, 2012; Accepted February 17, 2012; Published February 20, 2012

Citation: Muwonge A (2012) Non Tuberculous Mycobacteria in Swine: Is it a Public Health Problem? *Mycobact Diseases* 2:e110. doi:10.4172/2161-1068.1000e110

Copyright: © 2012 Muwonge A. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

- immunodeficiency virus. Public Health Service Task Force on Prophylaxis and Therapy for *Mycobacterium avium* Complex. *N Engl J Med* 329: 898-904.
7. Katoc VM (2004) Infections due to non-tuberculous mycobacteria (NTM). *Indian J Med Res* 120: 290-304.
  8. Griffith DE, Aksamit T, Brown-Elliott BA, Barbara A, Catanzaro A, et al. (2007) An Official ATS/IDSA Statement: Diagnosis, Treatment, and Prevention of Nontuberculous Mycobacterial Diseases. *Am Thoraci Soc* 175: 367-416.
  9. Shojaei H, Hashemi A, Heidarieh P, Ataei B, Naser AD (2011) Pulmonary and extrapulmonary infection caused by *Mycobacterium conceptionense*: the first report from Iran. *JRSM Short Rep* 2: 31.
  10. Coetzer JAW, Tustin RC (2004) *Infectious Diseases of livestock*. Oxford University press 3: 1973-1987.
  11. Matlova L, Dvorska L, Ayele WY, Bartos M, Amemori T, et al. (2005) Distribution of *Mycobacterium avium* complex isolates in tissue samples of pigs fed peat naturally contaminated with mycobacteria as a supplement. *J clin microbiol* 3: 1261-1268.
  12. Komijn RE, de Haas PE, Schneider MM, Eger T, Nieuwenhuijs JH, et al. (1999) Prevalence of *Mycobacterium avium* in slaughter pigs in The Netherlands and comparison of IS1245 restriction fragment length polymorphism patterns of porcine and human isolates. *J Clin Microbiol* 37: 1254-1259.
  13. van Ingen J, Wisselink HJ, van Solt-Smits CB, Boeree MJ, van Soolingen D (2010) Isolation of mycobacteria other than *Mycobacterium avium* from porcine lymph nodes. *Vet Microbiol* 144: 250-253.
  14. Muwonge A, Kankya C, Godfroid J, Djonje B, Opuda-Asibo J, et al. (2010) Prevalence and associated risk factors of mycobacterial infections in slaughter pigs from Mubende district in Uganda. *Trop Anim Health Prod* 42: 905-913.
  15. Oloya J, Kazwala R, Lund A, Opuda-Asibo J, Demelash B, et al. (2007) Characterisation of mycobacteria isolated from slaughter cattle in pastoral regions of Uganda. *BMC Microbiol* 7: 95.

### Submit your next manuscript and get advantages of OMICS Group submissions

#### Unique features:

- User friendly/feasible website-translation of your paper to 50 world's leading languages
- Audio Version of published paper
- Digital articles to share and explore

#### Special features:

- 200 Open Access Journals
- 15,000 editorial team
- 21 days rapid review process
- Quality and quick editorial, review and publication processing
- Indexing at PubMed (partial), Scopus, DOAJ, EBSCO, Index Copernicus and Google Scholar etc
- Sharing Option: Social Networking Enabled
- Authors, Reviewers and Editors rewarded with online Scientific Credits
- Better discount for your subsequent articles

Submit your manuscript at: <http://www.omicsonline.org/submission>

