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HISTOLOGICAL FEATURES OF PNEUMONIA IN SOME LABORATORY ANIMALS: A SUBJECT REVIEW

Aseel K. Hameed[*] , Jihad A. Ahmed[**] Alaa A. Hussein Sawad[***]

[*]Department of Basic science , College of dentistry, University of Basrah, Iraq.

[**] Department of Pathology and poultry Dept., College of Vet. Medicine, University of Basrah, Iraq.

[***] Department of Anatomy and Histology Dept., College of Vet. Medicine, University of Basrah, Iraq.

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***Corresponding authors*:** aseel.hameed@uobasrah.edu.iq

ABSTRACT

The animals model of pneumonia assist to observe the distinct types of pneumonia in a variety disease stages, when the study that aren't possible in patients, especially the respiratory infections constitute a major problems, besides to breeders than for veterinarians, because of a majority in economic losses that causes, and the expense of caring and prevention. The lungs are the most exposed organs to various aggression agents as a result to their anatomical and histological properties; therefore, the deterioration of the hygienic conditions is the important factor that promote respiratory diseases, particularly when the lower parts of respiratory system inflammation were amongst the leading etiology of mortality and morbidity globally.

INTRODUCTION

Pneumonia defines as either acute or chronic inflammation of the pulmonary tissue characterized by disturbed in respiration and hypoxemia and accompanied by systemic disorders of associated toxins. The most common causes are the primary viral infection of the lower tract. For many, the animals model of infections were utilized in medical researches and responsible

for accelerate progresses in various field such as cancers, neurosciences, infectious disease and drugs development.

The aims of develop the animals model in the pneumonia is to mimic the pathophysiology and phenotype characteristic in humans in a more controlled setting. Such models gave a more accreted control of significant variable through the courses of infections by minimizing confounder like comorbidity or antibiotics uses. The study of the animal's model also had advantage included circumvent sampling limitations issue that were commonly encounter with humans subject. The précised control over time of the infectious challenges in the animals model may allowed for a more understand of the temporal evolutions of the diseases and developments of complication that were mostly related to altered immune-inflammatory responses of the hosts. The partial or isomorphic induction of the animals model of pneumonia were always designed into purpose of studied particular phenotypic features of the diseases besides the lack other clinical symptoms or etiologies. Moreover, the animals model of the pneumonia, particularly the rodents pneumonia model, had aid considered in the understand of the diseases mechanisms and it utilities in pre-clinical pharmaceutical testing.

The human and the rodent belong the monophyletic group of Mammalia; considered the differences between the rodents and the humans including their immune systems. Especially, the mice had few circulated neutrophils compared to humans, had a different Toll like receptors expressions specify in the cells subsets, and responded in a different ways toward a specific chemotactic.

The IL-10 has a predominant Th2 anti-inflammatories functions in rodent, while in the human, both Th1 and Th2 cells secreted IL-10 which served the immunomodulatory cytokines. Moreover, the activated and proliferative Th17 cells, a T-cell subsets that have an importance in the defenses against Gram negative bacteria causing pneumonia was induced by IL-1β, IL-6, and IL-23 in humans when compared to IL-6 and TGFβ that were the common driver of Th17 differentiations in rodents, also within the same species, that noted a differences that influence experimentally outcome. For instance, BALB/c mice classified as a Th2 responders strains compared to C3H/HeN mice that were Th1 responders; and established infections by using same bacterial doses led to high mortalities in the Th2 responded strains.

In the last decade, the inherits difference among rodents and humans had mostly contribute to high numbers of failure observed in the human clinical trials. Moreover, the adult when immune-

competent humanized HAP animals model that mimics host cytokines responses may generated the data and mechanisms with more translation values in the direct investigation mostly clinical relevant infectious processes of human pneumonia. In addition, the potential majority of the advantage of utilized a humanized immunity to study bacterial pneumonia; the common used wild-type animals model described earlier were currently simply to create and allow for most flexibilities in the experimental setups therefore remained an important tools to tackle the problem surrounded hospital acquired pneumonia.

The respiratory disorders in rats (*Rattus norvegicus*) and mice (*Mus musculus*) may presence in vague, nonspecific sign that was indistinguishable from other organs system disease. That because of a higher metabolic rate, sick rodent deteriorated acutely and must examined and promptly for example:

1. Sick rats and mice often do not groom themselves as fastidiously as normal, resulting in a rough coat.
2. They are often lethargic and may separate from cage mates if group housed. Behaviorally, they are much less curious and are less likely to investigate novel areas. This may result in the owner reporting decreased interest or response to the owner or other people.
3. Nasal discharge is infrequently noted in mice even in cases of sinusitis but may be seen with some respiratory conditions in rats.
4. Audible evidence of excessive respiratory secretions (tracheal) may be heard as evidence of "chattering" as the animal breathes.
5. The character of the respiratory effort may also change but is more difficult to appreciate because of the rapid respiratory rate. Rats, like most rodents, possess Harderian glands that surround the orbit. These glands produce a unique porphyrin pigment that is a normal component of tears; however, in times of stress in rats, the pigment may become apparent around the fur of the eyes and also on the external nares- a condition known as chromodacryorrhea.

The pigment may be confused with dried blood. The presence of this red pigment is not evidence of upper respiratory disease but rather of generalized stress from environmental or husbandry problems or from dehydration. Guinea pigs with respiratory illness often present

with dyspnea that may be quite severe. Nasal and ocular discharge is common in guinea pigs, and the generalized unkempt appearance resulting from poor grooming is seen. Dehydration and anorexia may result in an appearance of weight loss, with a loss of the normal rounded abdominal contour.

Thin alveolar walls with occasional intra-alveolar macrophages and few neutrophils characterized the normal lung, during the dehydration processes associated with the preparation of tissues; the per bronchial space may appeared expanded. This findings didn't confused with peri-bronchial edema. The intra-tracheal intubation of injured substances was associated with patchy lesions, and large areas of the lung may spared. In addition, some type of injuries were associated with neutrophils infiltration as well as a deposition of proteinaceous debris or fibrins' strands in the airspace with normal alveolar walls.

In contrast, other types of injury may be associated with marked thickening of the alveolar walls, which may contain abundant neutrophils but no evidence of intra-alveolar neutrophil infiltrates or protein deposition. Hyaline membranes, when seen, appear as pink deposits on the alveolar walls stained with hematoxylin and eosin.

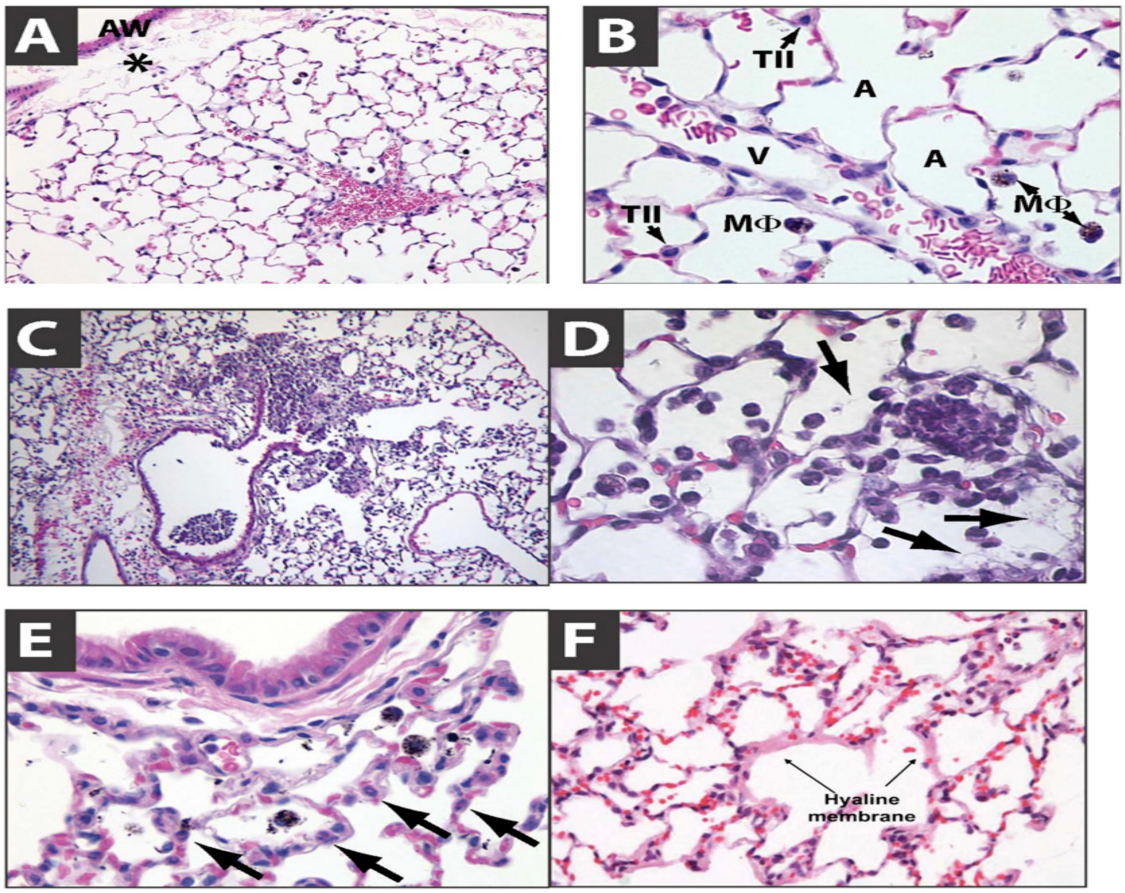

Figure 1. Normal and injured lungs. (A, B) Normal mice lung, the alveolar wall were thin and alveoli contained occasional alveolar macrophages. In addition to art factual expansions of the peri-bronchial tissues, which commonly resulted from tissues processing, doesn't represented edema. A, airspace; V, blood vessels; TII, type II cell; M, alveolar macrophages; AW, airways. (C and D) shows a patchy neutrophilics infiltrate with deposition of fibrins strand (arrows in D). Note the alveolar walls were thin. (E) Shows thickened alveolar walls with intramural neutrophils (arrows). Note absence of neutrophils inside the alveoli. The black substances inside the macrophages was colloidal carbon. (F) Shows hyaline membrane (arrows). (Figure cited from 11). Internet address: www.atsjournals.org

The present of increased neutrophils number in the bronchial associated lymphoid (BAL) fluids was unlikely associated with obvious intra-alveolar neutrophils infiltrate, as a result of the BAL procedures collects neutrophils from the all lung, moreover, in certain laboratory animals the neutrophils may displayed a light stain; for instance, in the rabbits neutrophils were slightly eosinophilic and therefore didn't strict a neutrophils in the sense of a cell that doesn't stain.

الصفات النسيجية لذات الرئة في بعض الحيوانات المختبرية: مراجعة علمية

اسيل كامل حميد* ، جهاد عبد الامير احمد** , علاء عبدالخالق حسين سواد***

*فرع العلوم الأساسية، كلية طب الاسنان، جامعة البصرة، العراق.

**فرع الامراض وامراض الدواجن، كلية الطب البيطري، جامعة البصرة، العراق.

**فرع التشريح والانسجة، كلية الطب البيطري، جامعة البصرة، العراق.

الخلاصة

تتيح نماذج الالتهاب الرئوي في الحيوانات المختبرية بالتحقيق في أنواع مختلفة من مراحل ذات الرئة الغير ممكن دراستها في الانسان وخاصة بعض امراض الجهاز التنفسي التي تؤدي الى مشاكل خطيرة ومهمة، اضافتا الى أهميتها البيطرية وكذلك للمربين بسبب الخسائر الاقتصادية الكبيرة التي تسببها ونفقات الرعاية والوقاية التي تنتج عن تلك الامراض الخطيرة. الرئة هي أكثر الأعضاء تعرضا لعوامل الآمراضية المختلفة نتيجتا لخصائصها التشريحية والنسيجية لذلك فان تدني الظروف الصحية هو العامل الأبرز الذي يعزز امراض الجهاز التنفسي ولاسيما عندما تكون التهابات الجهاز التنفسي السفلي من بين الأسباب الرئيسية للوفيات والامراضية على مستوى العلم..

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