# Reticuloendothelial Clearance of *Klebsiella pneumoniae*

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## Abstract

A lapin adult and baby experimental model were elected to assess the bacterial RES clearance . The clearance indicator was *Klebsiella pneumoniae* ($5 \times 10^9$ (viable cell/ml) / Kg),the inoculation route was intravenous (IV) , the clearance time was one hour post an IV injection and the judjment criteria for clearance ability were the remaining viable count of *K. pneumoniae* in tissue homogenate cultures . The highest clearing effeciency was that of blood followed by liver, lung and then spleen in babies, while the highest was blood , lungs , spleen , followed by liver in adults . The mean whole adult clearing efficiency was higher than in baby , comparing *K. pneumoniae* clearance to *E. coli* clearance indicates a lapin *E.coli* enhanced clearance than *K. pneumoniae* clearance.

## الخلاصة

تم استخدام ارانب بالغة وآخرى رضيعة لفحص التصفية البكترية للجهاز البطاني الشبكي. كان دليل التـصفية هـو بكتريـا *K. pneumoniae* (5× $10^9$ خلية حية/مل لكل كغم) باستخدام الحقن الوريدي وكان وقت التصفية ساعة واحدة بعد الحقن الوريدي وكان مقياس قابلية الجهاز البطاني الشبكي على التصفية هو العدد الحي المتبقي من البكتريا في مزارع خلاصات الانسجة.كانت اعلى كفاءة للتصفية في الدم ويليها الكبد الرئة والطحال في الارانب غيرالبالغة، بينما كانت اعلى كفاءة في الحيوانات البالغة في الدم-الرئة-الطحال، ويليها الكبد . كان متوسط التصفية الكلي اعلى في البالغين مقارنة مع الرضع بمقارنة تصفية بكتريا *K. pneumoniae* مع بكتريا *E.coli* مما يؤشر تصفية محفزة لبكتريا *E.coli* مقارنة مع تصفية *K. pneumoniae* .

## Introduction

Ageing chronic infection and / or cardiomyopathies did affect immune impairment in cellular immune functions and bacteriolytic complement activity [1,2] Ageing does affect the gut mucosal immunology [3] . *E.coli* RES clearance in rabbit model have been reported to be an age related mechanism [4]. It has been proved that *E.coli* RES clearance in collard dove is an age related processes[ 5] .In the present work , the changes in , pathogen nature , virulence factor , and host age in rabbits are being examined .

## Materials and Methods

A nine month old adult rabbits *O. annulus* with (1-1.5kg) body weight and one month old babies with (350 gm) body weight were the test animals .Test rabbits received ($5 \times 10^9$ cell/ml) *K. pneumonia* via intravenous injection for each (kg) body weight . Control rabbits received saline via IV injection under the same experimental conditions[6] .

## Results and Discussion

The *K.pneumoniae* RES clearance in baby and adult lapin model were attempted

. Providing Same initial dose for both adult and baby rabbits . The RES clearance studies were made by assessing of the remaining viable bacterial count one hour post IV injection of an initial dose . The highest clearing efficiency dose was that of blood followed by liver , lungs , then spleen in baby model ,while the highest was blood , lungs , spleen , followed by liver in adult model. The mean whole animal clearance adults were more clearing efficient than babies (tables , 1,2,3).

Differences were noted in RES cells containing organs, so far clearance ability is concerned . Rabbits are more RES clearance efficiency for *E.coli* than *K.pneumoniae* (table 4) . This was attributed to capsule effect of *K. pneumoniae* [7,8]. Adult rabbits were of highest RES clearance of both *K. pneumoniae* and *E. coli* than in baby rabbits [4]. This could be an indication for an age related enhancement in RES clearance .

RES clearance for *E. coli* using the remaining bacterial count in adult and baby rabbit and culture study / hr post intraperitoneal injection protocol . Adults were more clearing than babies . No such age related enhancement was evident in dove [5] . Results in this study and that of Shnawa and Hassan (2001) as well as Hassan (2002) can be interpretated on the basis of age effect , since life extremes in mammals are mostly associated with lowered by resistance. Such resistance is genetically controlled through regulation and gene expression for major histocompatability system which in turn regulate aging processes , antigen recognition , self - non self recognition and immune responses [9,10,11,12].

Data presented in this work showed that within the same species ,breed ,pathogen nature virulence determinant (capsule),host age ,and organ nature are among the basic determinant factors and RES clearance ability in rabbit model. [ 7,4]

**Table 1** Adult Rabbits *K. pneumoniae* RES clearance .

| Organ | Initial count ($5 \times 10^9$) | | |
|---|---|---|---|
| | R1 | R2 | Ŕ |
| Blood | $0.15 \times 10^4$ | $0.17 \times 10^4$ | $0.16 \times 10^4$ |
| lungs | $1.5 \times 10^4$ | $0.27 \times 10^4$ | $0.9 \times 10^4$ |
| liver | $225 \times 10^4$ | $27 \times 10^4$ | $126 \times 10^4$ |
| spleen | $3 \times 10^4$ | $0.3 \times 10^4$ | $1.1 \times 10^4$ |
| Mean Whole adult rabbit clearance (MWARC) | $56.55 \times 10^4$ | $7.936 \times 10^4$ | $32.04 \times 10^4$ |

**Table 2** Baby rabbits *K. pneumoniae* RES clearance

| Organ | Initial count ($5 \times 10^9$) | | |
|---|---|---|---|
| | R1 | R2 | Ŕ |
| Blood | $0.75 \times 10^4$ | $0.125 \times 10^4$ | $0.347 \times 10^4$ |
| lungs | $165 \times 10^4$ | $407.5 \times 10^4$ | $536.25 \times 10^4$ |
| liver | $500 \times 10^4$ | $152 \times 10^4$ | $326 \times 10^4$ |
| spleen | $1150 \times 10^4$ | $412.5 \times 10^4$ | $781.25 \times 10^4$ |
| Mean Whole babies rabbit clearance (MWBRC) | $453.93 \times 10^4$ | $368.1 \times 10^4$ | $411.06 \times 10^4$ |

**Table 3** Mean *K. pneumoniae* organ / whole animal RES clearance

| MIC | Initial count ($5 \times 10^{9}$) | |
|---|---|---|
| | Baby | Adult |
| MRC* | 0 | |
| Blood | $0.347 \times 10^4$ | $0.16 \times 10^4$ |
| lungs | $536.25 \times 10^4$ | $0.9 \times 10^4$ |
| liver | $326.0 \times 10^4$ | $126.0 \times 10^4$ |
| spleen | $781.25 \times 10^4$ | $1.1 \times 10^4$ |
| MWRC | $411.06 \times 10^4$ | $32.04 \times 10^4$ |

* Mean remaining count

**Table 4** Comparative view to *K. pneumoniae* and *E.coli* clearance in adult and baby rabbits

| Mean ID | Initial dose $5 \times 10^9$ | |
|---|---|---|
| | *K. pneumoniae* | *E.coli* * |
| MWARC | $32.04 \times 10^4$ | $0.860 \times 10^4$ |
| MWBRC | $411.06 \times 10^4$ | $1.135 \times 10^4$ |

*Shnawa unpublished information

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