# Pentraxin 3 as a biomarker in diagnosis of ventilator associated pneumonia

Thesis

Submitted for Partial Fulfillment of the Master Degree in Medical Microbiology and Immunology

By

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2019

# البنتراكسين3 كعلامة في تشخيص الالتهاب الرئوي المرتبط بالتنفس الصناعي

رسالة

توطئة للحصول على درجة الماجستير في الميكروبيولوجيا الطبية والمناعة

مقدمه من


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2019

# Acknowledgement

*Thanks first and last to* ***Allah*** *for his guidance, support and care in every step throughout my life. I have the greatest pleasure to express my deepest gratitude to* ***Prof. Lamiaa Abdel Monem Adel ,*** *Prof. of Medical Microbiology and Immunology, Faculty of Medicine, Ain Shams University. for his unlimited help, encouragement, valuable supervision, support, profuse knowledge, precious opinions and contributive comments that served much in the construction of this work.*

*I wish to express my profound gratitude and sincere appreciation to* ***Dr. Nagwa Mahmoud Ahmed,*** *lecturer of Medical Microbiology and Immunology, Faculty of Medicine, Ain Shams University for her kind help and assistance, instructive guidance, valuable suggestions, criticism and supervision, as well as her kindness, continuous encouragement, faithful concern and energetic help to ensure that this work would reach an updated level, and to* ***Dr. Noha Othman Ahmed,*** *Lecturer of Chest diseases ,Faculty of Medicine ,Ain-Shams University, for her kind help and assistance*

*My greatest thanks and best regards to my colleagues in the department of Microbiology and Immunology, for their cooperation and advice.*

*Lastly, I wish to express my appreciation to my family, without their support and help this work would have not been fulfilled.*

***Shaima Ahmed Abd Alhamid***

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# List of Abbreviations

| | |
|---|---|
| VAP | Ventilator associated pneumonia |
| PTX3 | Pentraxin 3 |
| CRP | C-reactive protein |
| SAP | Serum amyloid P component |
| RICU | Respiratory intensive care unit |
| URTIs | Upper respiratory tract infections |
| LRTIs | Lower respiratory tract infections |
| ICUs | Intensive care units |
| TNF | Tumour necrosis factor |
| IL-12 | Inter-lukine-12 |
| paO2:Fio2 | Arterial oxygen tension/inspiratory oxygen fraction ratio |
| TGF | Transforming growth factor |
| ET | Endotracheal tube |
| TLR | Toll-like-receptors |
| QS | Quorum sensing |
| MSSA | Methicillin sensitive *Staphylococcus aureus* |
| MRSA | Methicillin resistance *Staphylococcus aureus* |
| CNS | Coagulase-negative *staphylococcus* |
| NHSN | National Healthcare Safety Network |
| CDC | Centers for Disease Control |
| PCT | Procalcitonin |
| CPIS | Clinical Pulmonary Infection Score |
| Mini-BAL | Mini-bronchoalveolar lavage |

| | |
|---|---|
| sTREM-1 | Soluble triggering receptor expressed on myeloid cell-1 |
| MR-proANP | mid-regional pro-atrial natriuretic peptide |
| IHI | The Institute for Healthcare Improvement |
| DVT | Deep venous thrombosis |
| MIC | Minimum inhibitory concentration |
| DC | Dendritic cells |
| TLR | Toll-like receptor |
| fibroblast growth factors | FGF |
| TAM | Tumor-infiltrating macrophages |
| EMT | Epithelial-mesenchymal transition |

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# Abstract

**Background:** Timely diagnosis of pneumonia in intubated critically ill patients is challenging because the clinical signs and symptoms lack sensitivity and specificity also microbiological identification of organisms may take 48–72 h. Pentraxin 3 (PTX3) is a marker produced at sites of infection and inflammation which can be measured in few hours.

**Objective:** to assess the role of PTX3 as a biomarker in the diagnosis of Ventilator Associated Pneumonia (VAP).

**Methodology:** This prospective study was conducted on 60 patients, 30 patients were admitted in the Chest Intensive Care Unit (CICU) of Ain Shams University Hospitals suspected to have VAP by modified Clinical Pulmonary Infection Score (CPIS), Level of PTX 3 was measured in serum and Mini Bronchoalveolar Lavage (MiniBAL) using an ELISA, level of C-Reactive Protein (CRP), Complete Blood Picture (CBC) and bacteriological culture were done to diagnose VAP. In 30 healthy controls we measured the serum level of PTX 3.

**Results:** Bacteriologically confirmed VAP was diagnosed in 24 patients, with most common isolated organism was *staphylococcus aureus* (23%). The Receiver Operating Characteristic (ROC) curve analysis was done to assess the discriminative capacity of PTX3 (in serum and MiniBAL) to identify bacteriologically confirmed VAP. For PTX 3 in MiniBAL the Area Under the Curve(AUC) was 0.993 and a cut-off point of ≥3.6 had sensitivity of 95.83% and a specificity of 100.Serum PTX 3 AUC value was 0.826 and cut-off point of 7ng/ml was associated with 62.5% sensitivity, 100% specificity. For CRP, a cut-off level ≥12 mg/dl in serum was associated with 62.5% sensitivity, 83.3% specificity.

**Conclusion**: PTX3 may serve as a useful biomarker in the detection of bacteriologically confirmed VAP patients.



**Keywords:** Pentraxin 3, mini bronchoalveolar lavage, serum, ventilator associated pneumonia.

# Introduction

# Aim of the Work

# Review of Literature

# Chapter (1)
# Ventilator-associated pneumonia

# Chapter (2)
# Pentraxin-3