Clinical Significance of Angiopoietins in Different Pathological Conditions

Essay
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

{قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا

إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ

الْعَلِيمُ الْحَكِيمُ}

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LIST of ABBREVIATIONS

aFGF : Acidic fibroblast growth factor

Angs : Angiopoietins

AM : Adrenomedullin

bFGF : Basic fibroblast growth factor

DNA : Deoxy ribonucleic acid

E8.5 : Embryonic day 8.5

ECM : Extra-cellular matrix

EDTA : Ethylene Diamine tetra acetic acid

EGF : Epidermal growth factor

ELISA : Enzyme linked immunosorbent assay

eNOS : Endothelial nitric oxide synthase

Eph : Ephrin

FGF : Fibroblast growth factor

Flk-1 : Fetal liver kinase

Flt-1 : Fms-like tyrosine kinase 1

HGF : Hepatocyte growth factor

HSPG : Heparan sulfate proteoglycans

IHC : Immunohistochemistry

Ig : Immunoglobulin

IL : Interleukin

ILMA : Immunoluminometric assay

LIST of ABBREVIATIONS (Cont.)

ISH : In situ hybridization

IRMA : Immunoradiometric assay

KDR : Kinase domain region

mAbs : Monoclonal antibodies

MMPs : Matrix metallo-proteinases

mRNA : Messenger ribonucleic acid

ND : Not determined

NGF : Nerve growth factor

NPY : Neuropeptide Y

PAMP : Proadrenomedullin N-terminal 20 peptide

PDGF : Platelet derived growth factor

PI3-K : Phosphatidylinositol 3' kinase

PlGF : Placental growth factor

RA : Rheumatoid arthritis

RGD : Arginine glycine aspartic acid

RTK : Receptor tyrosine kinase

RT-PCR : Reverse transcriptase polymerase chain reaction

SMC : Smooth muscle cells

Tek : Tunica endothelial kinase

TF : Tissue factor

LIST of ABBREVIATIONS (Cont.)

Tie : Tyrosine kinase with immunoglobulin and epidermal growth factor homology domain

TP : Thymidine phosphorylase

tPA : Tissue type plasminogen activator

uPA : Urokinase type plasminogen activator

VEGF : Vascular endothelial growth factor

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INTRODUCTION and AIM of THE ESSAY

INTRODUCTION

The formation of functional vasculature is a complex process requiring spatial and temporal coordination of multiple, receptors, intracellular signaling pathways, regulatory factors and angiogenic factors ***(Saito et al., 2003).***

Angiopoietins (Angs) are promising angiogenic protein growth factors which include four members namely Ang1, Ang2, Ang3 and Ang4. Angiopoietins exert their action through binding to a specific tyrosine kinase receptor named Tie receptor ***(Eklund and Oslen, 2006).*** Ang1 has been shown to promote the integrity of blood vessels through inhibition of vascular inflammation and suppression of vascular leakage ***(Shyu, 2006).*** Meanwhile, Ang2 exhibits a context dependent behaviour; in the absence of VEGF, Ang2 promotes vessel destabilization and regression, while in the presence of VEGF, Ang2 stimulates sprouting of new blood vessels ***(Haninec et al., 2006)***. The effect of Ang3 and Ang4 have been less characterised but they also show

context dependent actions as antagonistic and agonistic ligands respectively ***(Eklund and Oslen, 2006).***

The angiopoietin family also plays a crucial role in the pathogenesis of different pathological conditions including, diabetic retinopathy ***(Peters et al., 2007)*** , arthritis ***(Clavel et al., 2007)*** and carcinomas ***(Caine et al., 2007).***

AIM of THE ESSAY

The aim of the present study is to highlight the different members of angiopoietin family, their structure, mechanisms of action with special emphasis on their role in the pathogenesis of different pathological conditions.