

## MAIN RESEARCH ARTICLE

## Plasminogen activator inhibitor-1 4G/5G polymorphism in infertile women with and without endometriosis

RUBENS P. GONÇALVES-FILHO, ARIEL BRANDES, DENISE M. CHRISTOFOLINI, TATIANA G. LERNER, BIANCA BIANCO & CAIO P. BARBOSA

*Division of Gynecological Pathology and Human Reproduction, Department of Gynecology and Obstetrics, Faculty of Medicine of ABC (Santo André, São Bernardo do Campo and São Caetano do Sul County), Santo André, Sao Paulo, Brazil*

### Key words

Endometriosis, fibrinolytic system, infertility, plasminogen activator inhibitor-1, polymorphism

### Correspondence

Caio Parente Barbosa, Avenida Príncipe de Gales, 821 – Santo André/SP, Brazil – CEP: 09060-650.  
E-mail: caiopb@uol.com.br

### Conflict of interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

Received: 27 August 2010

Accepted: 23 January 2011

DOI: 10.1111/j.1600-0412.2011.01086.x

### Abstract

**Objective.** To evaluate *PAI-1* genotypes in a group of infertile women with or without endometriosis and control subjects. **Design.** Case–control study. **Setting.** Human Reproduction Center of Medicina do ABC Faculty. **Population.** One hundred and forty infertile women with endometriosis, 64 women with idiopathic infertility and 148 fertile women as control subjects. **Methods.** The *PAI-1* 4G/5G polymorphism was identified by restriction fragment length polymorphism–polymerase chain reaction. **Main outcome measures.** Genotype distribution and allele frequency of the 4G/5G polymorphism of the *PAI-1* gene. **Results.** The frequencies of genotypes 4G/4G, 4G/5G and 5G/5G of the *PAI-1* gene in the infertile women with endometriosis were 38.6, 37.1 and 24.3%, respectively, and in the control group 24.3, 33.8 and 41.9%, respectively ( $p=0.003$ ). When the infertile women with endometriosis were divided according to their endometriosis stage, genotypes 4G/4G, 4G/5G and 5G/5G were identified, respectively, in 36.7, 32.9 and 30.4% of the patients with minimal/mild endometriosis ( $p=0.102$ ) and in 41.0, 42.6 and 16.4% of the patients with moderate/severe endometriosis ( $p=0.001$ ); in the women with idiopathic infertility, these genotypes were found at a frequency of 29.7, 34.3 and 36%, respectively ( $p=0.637$ ). **Conclusion.** The data suggest that, in Brazilian women, the *PAI-1* 4G/5G polymorphism may be associated with a risk of endometriosis-associated infertility.

**Abbreviations:** CI, confidence interval; EDTA, ethylenediamine tetraacetic acid; G, guanine;  $MgCl_2$ , magnesium chloride; OR, odds ratio; PA, plasminogen activator; PAI-1ag, plasminogen activator inhibitor-1 antigen; *PAI-1* gene, plasminogen activator inhibitor-1 gene; RFLP–PCR, restriction fragment length polymorphism–polymerase chain reaction; SERPIN, serine protease inhibitor; tPA, tissue-type plasminogen activator.

## Introduction

Endometriosis is a common gynecological disease, defined as the growth of endometrial tissue outside the uterine cavity, that often results in a vast array of gynecological problems, including dyspareunia, dysmenorrhea, pelvic pain and infertility (1,2). Previous studies have revealed a great number of genetic markers related to the immune, neuroendocrine and reproductive function and of gene interactions, indicating an

association between the development of endometriosis and genetic polymorphisms (3–5).

The fibrinolytic system includes a broad spectrum of proteolytic enzymes with physiological and pathophysiological functions such as fibrinolysis, tissue remodeling, tumor invasion, and also participation in the reproductive process (6,7). The plasminogen activator inhibitor-1 (*PAI-1*) gene, a member of the serine protease inhibitor family, is a main regulator of the endogenous fibrinolytic system. It inhibits the