

## **Factor II (Prothrombin) G20210A Mutation Detection by PCR**

**Test Update**  
May 27, 2005

### **Overview**

---

PathGroup Labs are now offering a polymerase chain reaction (PCR)-based test to detect the Factor II (Prothrombin) G20210A polymorphism, a common genetic risk factor for venous thromboembolic disease. The Factor II (Prothrombin) G20210A polymorphism is a single base mutation (guanine to adenine transition) in the 3'-untranslated region of the prothrombin gene that causes elevated plasma prothrombin levels (1). This increased prothrombin level is associated with increased tendency toward coagulation and venous thrombosis (1). On a worldwide basis, the prevalence of this polymorphism varies greatly with ethnic origin. Prevalence within Caucasian populations ranges from 1% to 3%, although it is very uncommon in individuals of Asian or African descent. For those patients with a personal and family history of venous thromboembolic disease, the prevalence of the Factor II polymorphism reportedly ranges up to 20%.

Not all individuals heterozygous for the Factor II (Prothrombin) G20210A allele will develop thrombosis, although they have a 3-7 fold increased

risk compared to individuals without the polymorphism. Homozygotes have been described but are very uncommon. The risk of thromboembolic disease is further increased in those patients who are also carriers of Factor V Leiden (2) or who have other inherited abnormalities predisposing to thrombosis.

The Factor II (Prothrombin) G20210A polymorphism should be evaluated in patients for whom testing is undertaken to identify other risk factors for venothrombotic disease, including activated protein C resistance (Factor V Leiden), and deficiencies of protein S, C and antithrombin (3).

After isolation of DNA from patient cells, the Factor II (Prothrombin) G20210A allele is identified by PCR using a specific pair of Hybridization Probes for the normal and mutated (abnormal) Factor II gene. In normal individuals no Factor II (Prothrombin) G20210A (mutated) allele is detected. Heterozygotes express one normal and one abnormal gene and homozygotes, although rarely encountered, express two abnormal alleles.

### **Clinical Utility**

---

- Venous thromboembolism
- Pulmonary embolism
- Recurrent miscarriages
- Coronary artery disease, and/or stroke
- Other Thrombotic problems

### **Method**

Real-Time Polymerase Chain Reaction (PCR)

### **Specimen Collection & Storage**

3-5 ml EDTA whole blood (lavender-top tube). Store and transport at room temperature. If delayed more than 72 hours, store and transport refrigerated. Do not freeze specimen.

### **Reference Ranges**

Mutation not detected

### **Turnaround Time**

3-5 days

### **References**

1. Poort SR, Rosendaal FR, Reitsma PH, Bertina RM. A common genetic variation in the 3' untranslated region of the prothrombin gene is associated with elevated plasma prothrombin levels and an increase in venous thrombosis. *Blood* 1996. **88**:3698-3703.
2. Margaglione M., Brancaccio V, Giuliani N, D'Andrea G, Cappucci G, Iannaccone L, Vecchione G, Grandone E, Di Minno G. Increased risk for venous thrombosis in carriers of the prothrombin G→A gene variant. *Ann Intern Med* 1998. **129**:89-93.
3. Bertina RM. Factor V Leiden and other coagulation factor mutations affecting thrombotic risk. *Clin Chem* 1997.**43**(9):1678-1683.