The invention relates to a method and device for the in vitro detection of polycystic ovary syndrome (PCOS) and pathologies involving cardiovascular risk. An in vitro assay method and assay device (kit) for the diagnosis of the presence or the predisposition to suffer from PCOS and/or cardiovascular risk factors including: general obesity, abdominal obesity, hypertension, glucose intolerance, diabetes, hyperinsulinemia, general hypercholesterolemia, hypercholesterolemia with high LDL-cholesterol levels, low HDL-cholesterol levels and hypertriglyceridemia, as well as the grouping of some of these cardiovascular risk factors known as metabolic syndrome. The method and the kit are characterized in that they are based on the detection of at least one genotype or haplotype of a polymorphism in the CAPN5 gene selected from: Nt g.86 A>G, Nt g.344 G>A, Nt c.1320 C>T and Nt c.1469 G>A or combinations thereof.