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# Meta-analysis of associations of genetic polymorphisms with cerebral vasospasm and delayed cerebral ischemia after aneurysmal subarachnoid hemorrhage

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## Abstract

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### Introduction

Cerebral vasospasm (CV) and delayed cerebral ischemia (DCI) are among the most hazardous complications of aneurysmal subarachnoid hemorrhage (aSAH). Genetic factors are thought to play a significant role in the development of both complications.

### Aim

To perform a comprehensive meta-analysis of studies that study the association between different genetic polymorphisms and development of DCI and/or CV.

## Methods

We searched MEDLINE and Science Direct databases on May 29, 2021, using iterations of the keywords “subarachnoid hemorrhage”, “vasospasm”, “delayed cerebral ischemia”, and “gene”. After duplicates were removed, the two reviewers screened the titles of the articles and abstracts independently. A random-effect model was used to calculate the relative risk with 95% CI; a fixed-effect model was additionally explored.

## Results

We pooled data from 16 articles that reported an association between eNOS, apolipoprotein E4 (ApoE4), haptoglobin (Hp), or ryanodine-1 (RYR-1) and CV, DCI, or both. Presence of Hp 2–2 was associated both with CV (RR 2.10, 95% CI 1.33–3.31,  $p = 0.0014$ ) and DCI (RR 1.57, 95%CI 1.06–2.34,  $p = 0.026$ ). ApoE4 allele had a borderline association with CV (RR 1.48, 95%CI 0.99–2.21,  $p = 0.054$ ).

## Conclusion

Our meta-analysis supports the association between the presence of the Hp2-2 allele and the occurrence of CV and DCI after aSAH. Further studies investigating this association are needed to reinforce this finding.

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