Aspirin in the Primary Prevention of Cardiovascular Disease

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Introduction

- Cardiovascular disease is a leading causes of morbidity and mortality in the US, largely due to an individual's unhealthy lifestyle behaviors.[1,2]
- Individual degrees of platelet aggregability is highly variable and heavily genetically influenced.[3]
- Over-platelet aggregation leads to plaque formation, a culprit for CVD.[3]
- Aspirin has a well established role in the secondary prevention of CVD, but not primary prophylaxis.[1]
- Aspirin's protective benefits against athlerosclerotic plaque formation must be weighed against its risks, namely bleeding.[3]
- Practitioners should be enlightened as to whether or not prophylactic aspirin in persons over the age of 40 with modifiable CVD risk factors is indicated.

Methods and Results

Methods: This review was conducted by searching Primo, PubMed and ProQuest Education. **Results:** Six articles were selected for the purpose of this literature review.

Aspirin is a Cox-2 inhibitor and prevents platelet aggregation; baseline platelet aggregability is based on genetics. Light transmission aggregometry and platelet genetic signature can quantify platelet aggregability. Determining indication by this means is superior to traditional cardiovascular risk calculators. In measuring individual platelet aggregation, an objective culprit can be determined and used to determine if prophylactic aspirin is indicated (fig. 1).[3]

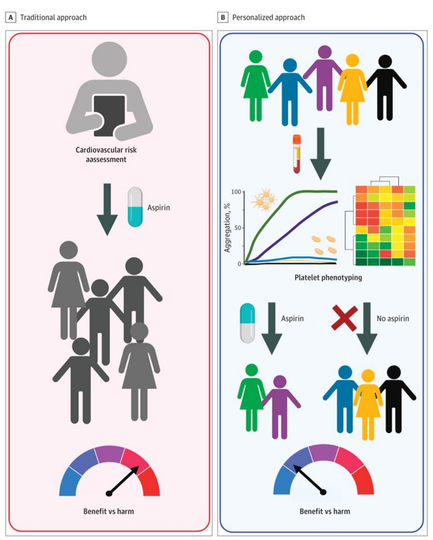

Figure 1. Conceptual Framework for Targeting Primary Prevention of Cardiovascular Disease With Aspirin Using the Platelet Phenotype in the Era of Precision Medicine.[3]

Table 1. *Aspirin to Reduce Risk of Initial Vascular Events[1], A Study of Cardiovascular Events in Diabetes[4],* and *Aspirin in Reducing Events in the Elderly[5]*

Study	Objective	Procedure	Findings
Aspirin to Reduce Risk of Initial Vascular Events	Determine benefit of 100 mg ASA for CVD prophylaxis in non-diabetic persons with risk factors	Participants receive 100mg ASA vs placebo with key variables collected every 6 months	Treatment: **4.29%** deaths from cardiovascular death, MI, CVA, or TIA Placebo: **4.48%** deaths from cardiovascular death, MI, CVA, or TIA
A Study of Cardiovascular Events in Diabetes	Determine if 100 mg aspirin prevents CVD in diabetic persons	Participants receive 100mg ASA vs placebo and complete adverse effect questionnaires every 6 months	Treatment: **12%** decrease in major adverse cardiovascular events Placebo: **29%** increase in major bleeds, mainly GI
Aspirin in Reducing Events in the Elderly	Determine if ASA increases the life expectancy the elderly	Participants receive ASA vs placebo with annual adherence assessments	Treatment: **1.27%** risk of death from any cause Placebo: **1.11%** risk of death from any cause

ASA= aspirin, CVD= cardiovascular disease, CVA=cerebrovascular event, MI=myocardial infarction, TIA= transient ischemic attack

In assessing physiologic response to aspirin in persons with varying degrees of athleticism, (untrained, moderately-trained and well trained middle aged men), well trained middle aged men experience a more potent decrease in platelet aggregability.[7]

One study assessed the utility of polypill therapy (statin + 3 antihypertensive agents) with & without aspirin in persons without CVD who were followed for a mean of 5 years:[6]

- 5731 participants received aspirin alone vs placebo.
  - **14%** reduction in incidence of death from cardiovascular cause observed in the aspirin alone group (fig. 2)
- 2850 participants received polypill plus aspirin vs double placebo.
  - **31%** reduction in incidence of death from cardiovascular cause observed in the polypill plus aspirin group (fig. 3)
  - Observed increase in hypotension, dizziness, but not bleeding.[6]

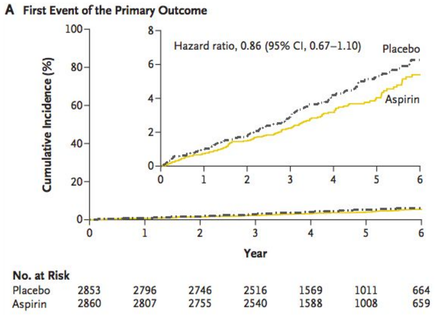

Figure 2. Effects of the Aspirin, as Compared with Placebo, on Clinical Outcomes.[6]

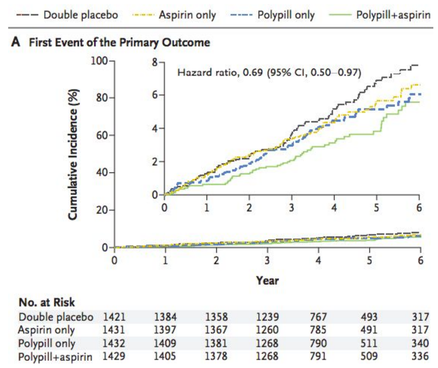

Figure 3. Effects of the Polypill plus Aspirin, as Compared with Double Placebo, on Clinical Outcomes.

Discussion

- The effects of prophylactic aspirin for CVD prevention varies based on one's physiology, degree of physical fitness and age; the benefit to risk ratio is a dynamic process that changes with time and lifestyle.[3,5,7]
- Prophylactic aspirin in persons with diabetes mellitus has both great potential for therapeutic benefits and hazards. Diabetes is a risk for CVD, yet modifiable to a degree.[4] This suggests that mitigating chronic comorbidities can alter aspirin's risk profile.
- Aspirin is often taken in combination with other medications, which contribute to side effects.[6] More evidence is needed to determine how polypharmacy alters aspirin's benefit to risk ratio.
- A standard which can be measured at interval times is needed for determining if prophylactic aspirin is indicated for each patient.[3]

Conclusion & Future Research

Conclusion:

- There is still no general consensus on role of prophylactic aspirin in CVD primary prevention.
- In general, aspirin's risks seem to outweigh it benefits. This assessment is based on dynamic processes that should be routinely revisited.

Future research:

- Determine role of light transmission aggregometry and platelet genetic signature to assess for aspirin prophylaxis indication
- Determine modulatory effect of diet and exercise on platelet aggregability.

References

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