Cardiovascular diseases account for three of the four leading causes of death in the world. One of the most common forms of heart valve disease, affecting about 5%-6% of the population over 65 years, is heart valve disease. Heart valve prostheses are currently among the most widely used cardiovascular devices (projected number of valve replacements: 850,000 per year by 2050) in Western countries. However, the ideal valve substitute does not exist, and each of the currently available prosthetic valves has inherent limitations. Mechanical prostheses provide long-term durability but bear a high risk of thrombosis, which necessitates permanent anticoagulation therapy leading to possible hemorrhagic complications. The alternative biological prostheses are made of porcine or bovine pericardium, providing good biocompatibility without the need for anticoagulation but they are prone to degeneration and, therefore, require more revision operations. Factors used to determine which valve is most suited for a patient include the patient's age, comorbidities, need of associated procedures, patient's preferences, and surgeon's expertise. With changing demographics and lifestyle choices, the demand for a more durable and biocompatible prosthesis is on the rise. The research in the field of valvular heart disease substitute is thus booming. Mechanical valves are the preferred valves for individuals under the age of 65 due to their high durability and longevity. There have been many different developments for mechanical heart valves since their inception in the 1950s. According to recent reports, bileaflet mechanical valves are the most widely implanted valves, accounting for 85% of the mechanical valves implanted. There is a need to reduce the thrombogenicity of artificial valves and its anticoagulant-related risks. Efforts to reduce the thrombogenicity of artificial valves and its anticoagulant-related risks have prompted...
...
Therefore, the use of adapted additional anchoring additive was needed to improve coating adhesion. The authors mentioned the importance of the thermal treatment, improving the adhesion of the graphene layer when high temperatures are reached. As the valve leaflet substrates are composed of pyrolytic carbon, there can withstand high temperatures. However, this heating step might impair the biological environment of the valve leaflets or increase damage when the valve is exposed to severe stresses while the anchoring additive was needed to improve coating adhesion. Therefore, the use of adapted additional anchoring material could be esteemed to reach efficient anchoring at low temperature. Although only a few numbers of complete tests were carried out, the study demonstrated the very first demonstration of the coating of a graphene monolayer coating applied to prosthetic cardiac valves. It should be noted that the haemocompatibility and thromboresistant properties of the graphene-coated valve material have unique properties of graphene in terms of low adhesivity and dual mode of possible combination with biocompatible molecules with local action or progressive controlled drug release, i.e. self-adaptation agents, the coating strategy described here offers quite promising potential for the future evolution of prosthetic cardiac valves and other medical implants.

CONFLICT OF INTEREST: none

REFERENCES

1. Martin P, Czubryt MP, Healey JS, Kay A, Sarnat SE, Weisfeldt ML. The importance of reperfusion with local action or progressive controlled drug release, i.e. self-adaptation agents, the coating strategy described here offers quite promising potential for the future evolution of prosthetic cardiac valves and other medical implants.

CONFLICT OF INTEREST: none

REFERENCES

1. Martin P, Czubryt MP, Healey JS, Kay A, Sarnat SE, Weisfeldt ML. The importance of reperfusion with