PERSPECTIVE ARTICLE

Advanced Healthcare Biomaterials

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Biomedical field is developing towards advanced healthcare direction, including the regeneration and reconstruction of damaged tissues and organs, the restoration and enhancement of physiological functions, personalized and minimally invasive treatment, and early detection and diagnosis, etc. Traditional medical materials such as metal, macromolecule and bioceramics cannot meet the needs of rapid development of medicine. The emergence of advanced healthcare biomaterials with novel technology brings new opportunities and challenges. Especially in the recent 10 years, the International Association of Advanced Materials (IAAM) has been committed to promoting advancement of materials to global excellence, certainly would include advanced healthcare biomaterials [1,2]. The goal of this Special Issue is to publish review/original articles covering the recent studies and progress in different aspects of advanced healthcare biomaterials to celebrate 10th anniversary of IAAM in the thematic issue of "Advancement of Materials to Global Excellence". A brief summary of all accepted papers is provided below.

Ren *et al.* reported a diamond-like carbon (DLC) coating deposited by a vacuum arc using the anode-cathode diameter ratio of da/dc=3/1 with the negative bias applied to the P2000 steel substrate. Wherein, DLC deposited at –750V improved the tribological property and biocompatibility of the P2000 substrate, suggesting potential application of artificial joint. Wang *et al.* reported a facile synthesis of the tens-micron-sized carboxylated polystyrene (PS) microspheres aiming at the isolation of chiral drugs. The data indicated that their PS microspheres with narrow size distribution can be fabricated by regulating the ratios of water/ethanol, and make the proportion of -COOH reached up to ~11%. Liu *et al.* reviewed the recent researches on biodegradable magnesium (Mg) alloy vascular stent, including the degradation mechanism, structural design, and basic investigation of the Mg-base stents. They pointed out excessively rapid degradation was a bottleneck problem that limits the further application of Mg alloy in biodegradable stents.

In fact, another bottleneck for the Mg-base vascular stents development is the delayed endothelialisation [**3**]. Generally speaking, the endothelial monolayers regenerated on the surface of cardiovascular stents have the same effect as the vascular intima, that is, through the barrier effect and the functional factors release, such as nitric oxide (NO), prostacyclin (PGI_2), thrombomodulin (TM), and tissue pathway factor inhibitor (TPFI), to achieve the goal of long-term anti-thrombosis and anti-hyperplasia, and then maintain vascular patency. Therefore, the related studies have been devoted to promote the adhesion, migration and proliferation of endothelial cells (EC) or endothelial progenitor cells (EPC) on the stent surface directly, while inhibiting the migration and proliferation of smooth muscle cells (SMC) [**4,5**]. However, our research in 2017 discovered a new phenomenon which indicated that the regenerated endothelial monolayer might not contact the stent surface directly [**6,7**]. Between EC/EPC and stent materials, there are distributed with contractile SMC and M2 macrophages. Although in earlier studies, we found that contractile SMC can promote the adhesion and proliferation and release of NO, PGI_2, TM and TPFI of EC **[8-11]**, this finding make us realize for the first time that contractile SMC may be a necessary condition for endothelial monolayer to regenerate on the stent surface, and M2 macrophages undoubtedly play an active role in this process. The behaviours and distribution of EC, EPC, contractile SMC and M2 macrophages on the material surface showed strict order in time and space. Thus, we define it as the concept "spatiotemporal orderliness of function" of surfaces which can regulate the cells or tissues in both time sequence and space sequence (**Fig. 1**). We hope that this concept will help to solve the problem of delayed endothelialization on the surface of cardiovascular materials from another direction.

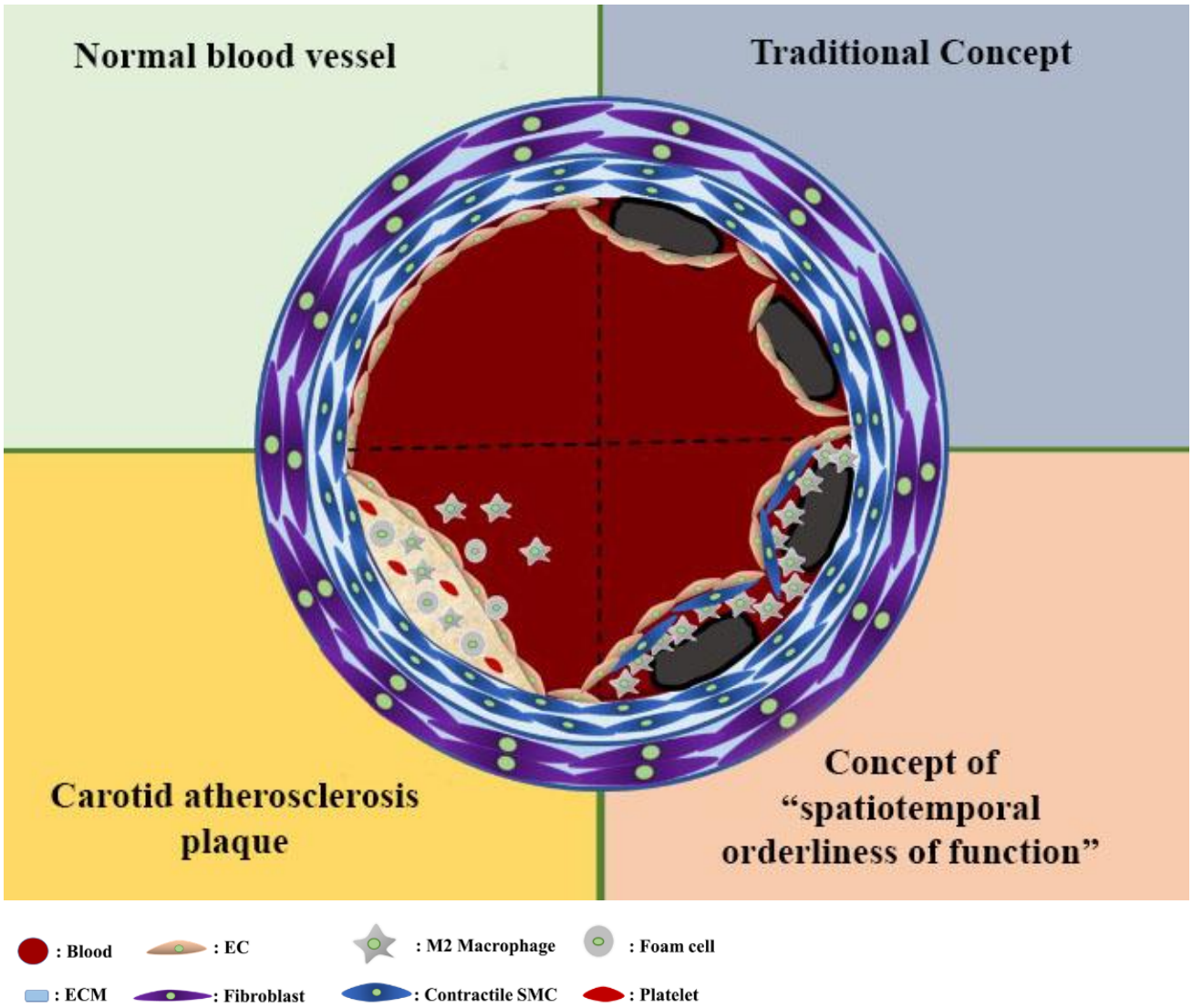

Fig. 1. Comparison of traditional concept and the concept "spatiotemporal orderliness of function" on surface endothelialisation of the cardiovascular stents.

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Conflicts of interest

There are no conflicts to declare.

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