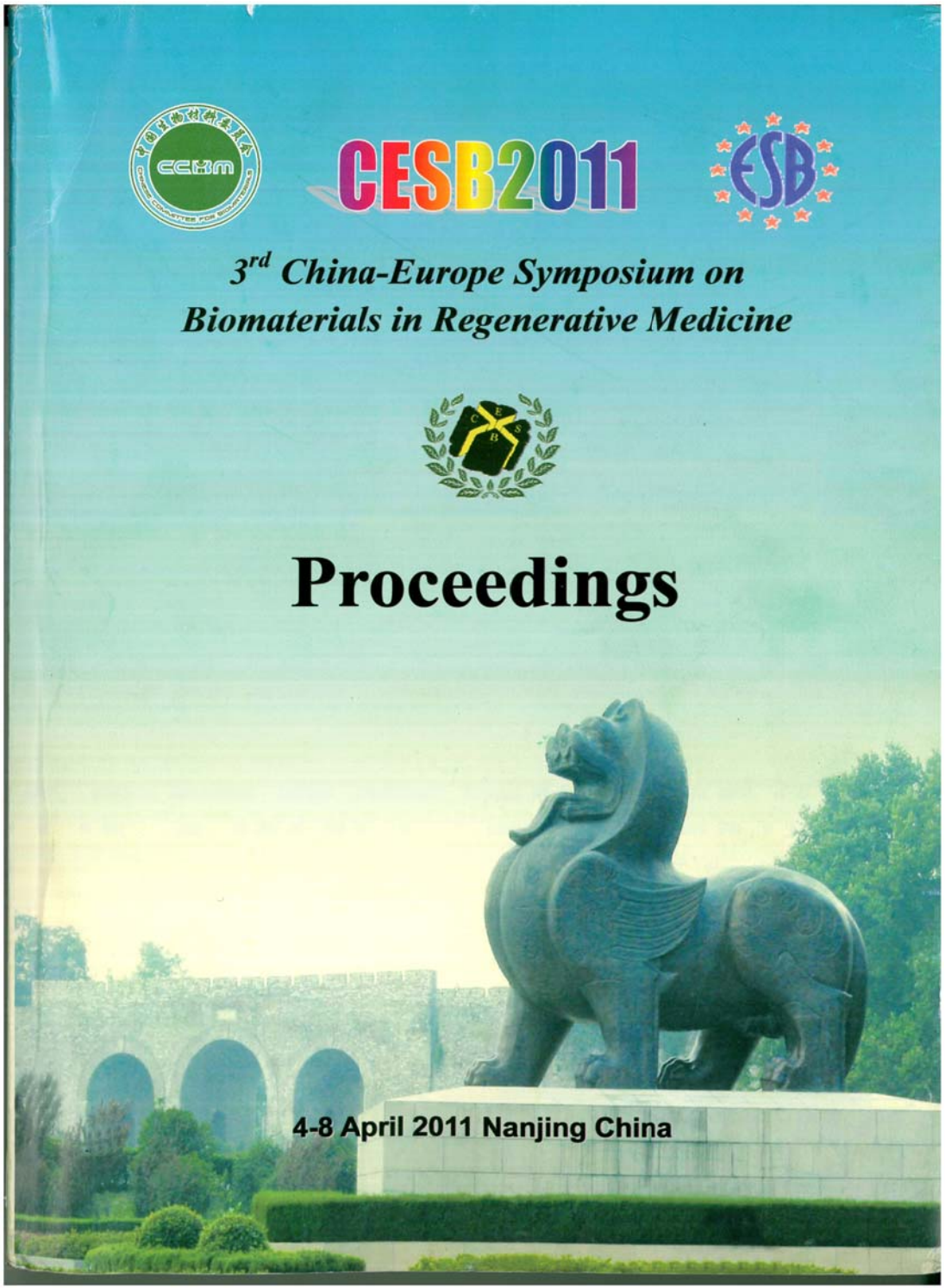

Decellularized media of cows aorta as a appropriate bioscaffold for use in engineering and regenerative medicine researches of vascular tissue

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Problems associated with coronary artery and peripheral vessels are one of the main reasons for high mortality rate in various communities. In order to treat these problems, a few of individuals own arteries and veins, with suitable dimensions, are available to replace the malfunctioned ones. However, this approach creats many difficulties, including the need for multiple surgical procedures, with increased risk and cost to the patient. Tissue engineering of blood vessels is an alternative method, which has been started nearly 20 years ago. It is one of the promising technologies in designing suitable tissues, similar to the healthy ones. Scaffold, cells and growth factors are the three pillars of tissue engineering. Since mammalian cells are dependent on adhesiveness, the use of suitable scaffold is very important. These scaffolds should have a porous network for delivery of nutritions, waste disposal and provision of extracellular matrix formation and angiogenesis. Another necessary element for the success of tissue engineering is selection of appropriate cells. Blastema tissue is one of the cellular sources, which is composed of undifferentiated blastema cells and can be created in some parts of special animals. These cells have the ability of self-renewal and differentiation, similar to embryonic cells. In this study, part of cows aorta was used as a scaffold and its cells and collagen were removed by treatment with 50 mg/ml cyanogen bromide in 70% formic acid; using this strategy the effects of elastic matrix on the blastema tissue could be investigated. The prepared scaffold were then placed inside the blastmea rings and kept in culture media for 40 days. The interaction between blastema tissues and elastic scaffolds were studied in 10 days intervals. Microscopic studies based on haematoxylin-eosin and orcein-pick indigo carmine-haematoxylin stainings, revealed that cells and collagen fibers were omitted successfully from the elastic scaffold. Moreover, histological studies indicated that in day 10, the cells had penetrated into the scaffold. After 20 days beside penetration, cell devision and differentiation of blastema cells to probably fibroblast and myocyte and also angiogenesis were observed. After 30 days, results were similar to day 20, but collagen fibres and connective tissue were also obsereved. Finally on day 40, the scaffold and blastema cells were destroyed, probably due to cell death (apoptosis and necrosis). Thus, our results indicated that it is possible to prepare a natural elastic scaffold from aorta by treatment with cyanogen bromide. On the other hand, this scaffold had inductive effects on cell behaviors such as migration, adhesiveness, division and probably differentiation. Further studies are required to confirm the indentity of cells and other properties of the scaffold and also its possible use in vascular tissue engineering.

Key words: vascular tissue engineering, decellularization, three dimensional elastic scaffold, regenerative medicine, differentiation