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Fibers with nanoscale diameters supply a benefit because of the high surface area for biomaterial scaffolds. Electrospun silk fibroin-based fibers prepared from aqueous silkworm silk solutions. With the Biodegradability and Biocompatibility of the silk protein matrix merged with the electrospun silk matrices capability of supporting BMSC attachment, growth and spreading, result shown suitable biomaterial matrices as scaffolds for tissue engineering [3]. Scaffold configuration, composition, and resulting properties which it is effects into tissue development. The influence of silk fibroin concentration processing method and three-dimensional scaffold structure on bone tissue formation by osteogenic differentiation of human adipose tissue derived stem cells (hASC). It is resulted in a very similar to bone tissue that was formed in all silk fibroin scaffold groups. [4]As a suitable material for anterior cruciate ligaments (ACL) tissue engineering a silk-fiber matrix was studied. The matrix intended to match the mechanical requirements and complexity of the natural human ACL, involving adequate fatigue performance. The results show that suitably prepared silk fiber matrices, away from giving unique benefits in terms of biocompatibility and slow degradability as well as mechanical properties, proper biomaterial matrices can be provided for supporting the adult stem cell differentiation toward ligament lineages. To overcome current limitations with synthetic and other degradable materials, results point to this matrix as a new option for ACL repair.[5] Recently silk fibroin and elastin scaffolds were produced for the treatment of burn wounds SF & Elastin scaffolds were produced for the treatment of burn wounds. The excellent properties of SF were combined with elastin protein and resulted in a scaffold which mimics the extracellular matrix (ECM). By using genipin as a

cross-linker they obtained scaffolds with smaller pore size and reduced swelling ratio degradation and release rates. The composition had a great effect on the scaffold's physical properties; composition can be easily controlled to make the scaffold suitable for biological applications. The cytocompatibility with human skin fibroblasts along with the healing improvements make these scaffolds suitable for wound dressing applications [6] This study describes the developmental physicochemical properties of silk fibroin scaffolds derived from 26 high-concentration aqueous silk fibroin solutions. The silk fibroin scaffolds were prepared by leaching and freeze-drying methodologies. The results indicated that the antiparallel β -pleated sheet (silk-II) conformation was present in the silk fibroin scaffolds. All the scaffolds possessed a macro/microporous structure. Based on these results, the scaffolds developed in this study are proposed to be suitable for use in meniscus and cartilage tissue-engineered scaffolding. [7] Bone morphogenetic protein (BMP)-2 has a very important role in bone regeneration and formation. So, the ability to immobilize this molecule in certain matrices in bone tissue engineering. Using carbodiimide chemistry, BMP-2 was immobilized on silk fibroin films. Whereas human bone marrow stromal cells cultured on unmodified silk fibroin films in the presence of osteogenic stimulants exhibited little if any osteogenesis, the same cells cultured on BMP-2 decorated films in the presence of osteogenic stimulants differentiated into an osteoblastic lineage as assessed by their significantly elevated alkaline phosphatase activity, calcium deposition, and higher transcript levels of collagen type I, bone sialoprotein, osteopontin, osteocalcin, BMP-2, and *cbfa1*. The results explain that BMP-2 covalently

coupled on silk biomaterial matrices retains biological function in vitro based on the induction of osteogenic markers in seeded bone marrow stromal cells. [8]Silk is reviewed as a biomaterial scaffold. We report on the covalent decoration of silk films with integrin recognition sequences (RGD) as well as parathyroid hormone (PTH, 1–34 amino acids) and a modified PTH 1–34 (mPTH) involved in the induction of bone formation. Calcification was also significantly elevated on RGD compared to the other substrates with an increase in number and size of the mineralized nodules in culture. Thus, RGD covalently decorated silk appears to stimulate osteoblast-based mineralization in vitro. [9] This study was to check biocompatibility effect on bone regeneration, and to reform the biocompatibility of the SF Nano fiber membrane. The SF Nano fiber membrane was shown to have a suitable biocompatibility with enhanced bone regeneration and no evidence of any inflammatory reaction. The results shown that the SF membrane very important for bone regeneration and should be useful like guider for bone regeneration. [10] the influence of silk fibroin concentration has an adjusted (6 or 17%) and three-dimensional scaffold structure (lamellar or porous, with distinct pore size) on bone tissue formation by osteogenic differentiation of human adipose tissue derived stem cells (hASC) and correspondent processing method (aqueous or HFIP-derived). The result was shown that very similar bone tissue was formed in all silk fibroin scaffold groups, evaluated by alkaline phosphatase activity, calcium production, collagen type I deposition and scaffold bone volume fraction.[11] The development of a novel biomimetic design of a SF-based nerve graft (SF graft) has been prepared, which was made up of a SF-nerve guidance tube inserted with

oriented SF monofilaments. The observed morphological and functional factors show that SF grafts could stimulate peripheral nerve regeneration with outcomes close to those produced by nerve auto grafts which in general are considered as the best for healing large peripheral nerve defects, therefore raising a great prospect of using these recently developed nerve grafts as an encouraging alternative to nerve auto grafts.[12] Rat dorsal root ganglia (DRG) was cultured on a substrate consisting of SF fibers and the cell outgrowth from DRG throughout the culture was observed by using electron and light microscopy together with immunocytochemistry. On the other hand, we cultured Schwann cells from rat sciatic nerves in the silk fibroin extract fluid and examined the changes of Schwann cells after different times of culture these data indicate that silk fibroin has good biocompatibility with DRG and is also beneficial to the survival of Schwann cells without exerting any significant cytotoxic effects on their phenotype or functions, thus providing an experimental foundation for the development of silk fibroin as a candidate material for nerve tissue engineering applications.[13] Nerve conduits (NC) for peripheral nerve repair should guide the sprouting axons and physically protect the axonal cone from any damage. The NC should also degrade after completion of its function to obviate the need of subsequent explantation and should optionally be suitable for controlled drug release of embedded growth factors to enhance nerve regeneration. Silk fibroin (SF) is a biocompatible and slowly biodegradable biomaterial with excellent mechanical properties that could meet the above stated requirements. SF material (films) supported the adherence and metabolic activity of PC12 cells and in combination with nerve growth factor (NGF), supported neurite

outgrowth during PC12 cell differentiation. Further exploitation is encouraged for the use of SF-NC for the delivery of growth factors and the estimation in peripheral nerve reparation. [14]The potential of silk fibroin and chitosan blend (SFCS) biological scaffolds was investigated for the purpose of applications in tracheal tissue reconstruction with cartilage tissue engineering. cartilage generation on engineered chondrocyte-scaffold constructs with and without a perichondrium wrapping was tested and The capability of these scaffolds as cell carrier systems for chondrocytes was determined . Result shown in a tracheal transplant with properties which it is similar to those of the fully functional native trachea. [15]Biodegradable polymer, poly (3-hydroxybutyrate-co-3-hydroxyhexanoate) (PHBHHx), used to fabricate the tissue engineering as cardiovascular scaffolds because of its suitable mechanical properties and also controllable. Silk fibroin (SF) with no blood clotting, low inflammation and good cell and tissue compatibility in vitro and vivo is adopted as a surface modifier to improve the biocompatibility of PHBHHx. The adhesion of SF on PHBHHx surface was investigated. Silk fibron modified PHBHHx scaffolds have very good biocompatibility with cardiovascular related cells, that is mean its potential help for the extensive applications of PHBHHx in the cardiovascular regeneration.[16] Cell affinity is one of the important issues required for developing tissue engineering materials. Although the poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) (PHBHHx) has been attractive for its controllable mechanical properties recent years, its cell affinity is still necessary to be improved for the requirements. For this purpose, the regenerated silk fibroin (SF) was coated on the PHBHHx films and its porous

scaffolds the SF modified PHBHHx material is maybe a potential material applicable in the cardiovascular tissue engineering.[17] Currently synthetic grafts demonstrate moderate success at the macro vascular level, but fail at the micro vascular scale (<6 mm inner diameter). The improvement of microtubes made of silk fibroin for blood vessel repair with numerous advantages over current scaffold designs. By dipping stainless steel wires into aqueous silk fibroin these microtubes were prepared, the control over microtube's porosity is enabled by the addition of poly (ethylene oxide) (PEO). The results show that silk microtubes are suitable for micro vascular grafts by implanting them directly or pre-seeding them with cells.[18] the core silk fibroin fibers have a high biocompatibility in vitro and in vivo by comparable with other most commonly used biomaterials such as collagen and polylactic acid . as well as , the matchless silk fibers mechanical properties, the diversity of side chain chemistries for ' decoration' with adhesion factors and growth, and the additional rationale supported by genetically tailor and the protein provide for the investigation of these fibrous proteins for applications as biomaterials. Studies about silks to address biomaterial and matrix scaffold were focused on silkworm silk. With the diversity of fibrous proteins from insects and spiders, a variety of bioengineered or native variants can be anticipated for application into different junctions of clinical needs. [19]