A Genetic Basis for Design of Biomaterials for *In Situ* Tissue Regeneration

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Abstract	Historically the function of biomaterials has been to replace
	diseased, damaged and aged tissues. First generation biomaterials,
	including bio ceramics, were selected to be as inert as possible in
	order to minimize the thickness of interfacial scar tissue. Bioactive
	glasses provided an alternative from the 1970's onward; second
	generation bioactive bonding of implants with tissues and no
	interfacial scar tissue. This chapter reviews the discovery that
	controlled release of biologically active Ca and Si ions from
	bioactive glasses leads to the up-regulation and activation of seven
	families of genes in osteoprogenitor cells that give rise to rapid
	bone regeneration. This finding offers the possibility of creating a
	new generation of gene activating bioceramics designed specially
	for tissue engineering and in situ regeneration of tissues.