INTRODUCTION

Background

Recent developments on bone reconstruction concern mainly in implantable synthetic materials, although there are different kind materials in bone reconstruction as like as autograft, allograft and xenograft. Autograft are the materials from others body part of patient itself for bone reconstruction. However, the clinical use involves some difficulties such as septic complication, viral transmission and the unavailability of native bone (Daculsi 2004). On the other hand, allografts are more readily available than autograft since it is from the donor. In spite of that, allograft bone has revealed a risk of disease transmission (such as HIV and hepatitis), post-surgery pain, increased blood loss, secondary surgical wounds, risk of thrombosis and it is also difficult to shape (Daculsi 2004 & Ooi *et al* 2007). A significant additional limitation of allograft is the delayed remodeling by the host. In the case of very large defects, the allograft may remain in the implant site throughout the patient's life, creating area more prone to fracture or infection (Ooi *et al* 2007). Likewise, xenograft also bears limitation since it is from others species as like as animals, which has different characteristic in mineral bone composition (Dewi 2009). In short, synthetic biomaterials were preferable in answering others method limitation in bone reconstruction.

The minimum requirements of synthetic biomaterial include the following: (1) the material must be biocompatible, such as nontoxic, blood- or tissue-compatible, noncarciogenic; (2) the material must not leach or release harmful components into the living system; (3) the mechanical and physical properties of the material, such as strength, elasticity, durability, and stability, must be appropriate for the intended application; and (4) the desired mechanical properties must last for the expected life of the implant; (5) the materials must be sterilizable (Shi *et al* 2004).

Biocompatibility is the ability of a material to perform with an appropriate host response in a specific application (Shi *et al* 2004). Previously, hydroxyapatite is well known as biocompatible implantable materials. But, the dense hydroxyapatite is almost non-resorbable when used as bone implant (Victoria &

Gnanam 2002). While, the porous β-tricalcium phosphate (TCP) displays affinity for high speed biological degradation, they are bioactive and bioresorbable materials (Victoria & Gnanam 2002). TCP were later identified as Biphasic Calcium Phosphate (BCP) consisting of hydroxyapatite (HA) and tricalcium phosphate (β-TCP) (Li *et al* 2003). Recently, there is a growing interest in developing Biphasic Calcium Phosphate (BCP) ceramics as implant materials because they are more effective in bone repair or regeneration which proved *in vitro* and *in vivo* (Ramay & Zhang 2004).

Hypotheses

1. Both BCP and HA *in vitro* analysis show as nontoxic materials.
2. There appear morphological properties change of BCP and HA after *in vitro* indicating adhesion interaction between HA or BCP and cells.

Objective

In vitro analysis that has been held from 0 up to 14 days could explain the biocompatibility. In this study, the biocompatibility of BCP compared to HA was being performed through in vitro analysis by cytotoxicity screening by using MTT analysis. Furthermore, the change of morphological properties after in vitro was being characterized using Scanning Electron Microscopy (SEM). BCP was being synthesized through hydrothermal method while HA through precipitation method.

Benefit

It is expected from this research that BCP is able to serve as biocompatible bone implant *in vitro*. The short-term responses of cells to an implant material *in vitro* may provide valuable indicators of the long-term biocompatibility *in vivo*.