INTRODUCTION
Among the strategies to repair damaged or diseased articular cartilage is to cultivate in vitro, explanted chondrocytes on materials to be used as templates for tissue regeneration. Therefore, an elastomeric biodegradable copolymer (Polyactive™), composed of segmented blocks of poly(ethylene oxide-terephthalate) (PEO) and poly(butylene terephthalate) (PBT), is proposed as a scaffold for elastomeric tissue engineering. By varying the composition of the PEO/PBT copolymer, different mechanical, biological and physicochemical properties can be obtained. PEO/PBT copolymers have already been proven suitable for engineering of new tissues [1] as well as for repair of several other tissues such as the tympanic membrane [2]. The aim of the present study is firstly, to determine if PEO/PBT copolymers support attachment and proliferation of cartilage cells and secondly, if the synthesized tissue shows morphological and functional properties similar to natural tissue.

MATERIALS AND METHODS
Articular cartilage was harvested aseptically from the femoropatellar grooves of 2-4 week old bovine calves. Chondrocytes were isolated by overnight digestion with type II collagenase and transferred to a well defined culture medium (DMEM, FBS + supplements). The PEO/PBT scaffolds (Polyactive™) were immersed in ddH2O for 24 hours before seeding in order to achieve hydric swelling prior to innoculation with chondrocytes. Since there were differences in swelling for each of the different Polyactive™ compositions, the actual number of cells seeded on each material was different, in order to maintain the same cell number:surface area (2-dimensional study) and cell number:scaffold volume (3-dimensional study) ratios.

Two dimensional study: Dense cast Polyactive™ films (100 µm thick) were used, with the different formulations as indicated as: aPEObPBTc, in which a is the molecular weight of PEO, b is the weight % of PEO and c is the weight % of PBT. The formulations used are as shown in Figure 1. Chondrocytes were seeded on the films at a density of 10000 cells/cm². The cultures were then trypsinized and the number of cells counted after 2, 5 and 8 days.

Three dimensional seeding: Cells were seeded onto porous Polyactive™ 1000 70/30, 1000 60/40 and 300 55/45 scaffolds of 300 µm thickness at a cell density of 100000 cells/cm³. The cultures were then allowed to grow in 2-Dimensional and 3-Dimensional scaffolds. The number of cells is determined by Safranin-O staining after 5 days of cultivation (Figure 1).

RESULTS
The 2 dimensional study showed that compared to the numbers originally seeded, the chondrocytes proliferated on all Polyactive™ compositions by 5 days of culture (Figure 1). There was an initial drop in the number of cells during the first two days of culture compared to the amounts seeded. After 2 days however, the cells proliferated, and little difference was seen between most materials, although the 1000 60/40 did show a relative decrease between 5 and 8 days.

After seeding on 3-dimensional scaffolds, moderate increases in cell numbers on all 3 scaffold types were observed after 5 days in culture (Figure 2). The differences were more staggering after 12 days, when a significant increase in cell number was observed on the 1000 70/30. Cell proliferation was also seen on the 1000 60/40. On the contrary, the number of cells on 300 55/45 appeared to decrease from 3 to 12 days. From histological observations, cartilaginous tissue was found close to the surface of the scaffold. Chondrocytes were seen to be located in lacunae surrounded by extracellular matrix consisting of proteoglycans as determined by safranin-O staining. There was evidence of a fibrous capsule around the entire cross section, with the fiber orientation generally being tangential to the rotational flow of the culture medium in the mixed flask, used for cultivation [3].

REFERENCES

**Massachusetts Institute of Technology, Cambridge, MA.