

# Comparison Of Biocompatibility And Biodegradability Of Poly(Lactic-Co-Glycolic Acid) (PLGA) Combined With Autologous Fibrin Versus PLGA For Intra-Articular Screw Fixation; An In-Vivo Study With New Zealand White Rabbits – The Microradiograph, Histology And Histomorphometry Outcomes

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## INTRODUCTION:

One of the challenging aspects of orthopaedic surgery with regards to the long term functional outcome is intra-articular fixation. A variety of indications among others include intra-articular fracture, osteotomy, ligament reconstruction, meniscal and cartilage repair. The great potential of biodegradable polymers in the above-mentioned cases are gradually being recognized.

## MATERIALS & METHODS:

**Objectives :** 1) To compare biocompatibility and biodegradability of polymer (PLGA+fibrin) with PLGA for intra-articular screw fixation

2) to study the imaging (microradiograph), histology and histomorphometry features

## METHODS:

We used fabricated PLGA scaffolds in combination with autologous fibrin for an in-vivo prospective research. Total of 9 New Zealand White Rabbits (NZWR) were operated and the scaffolds were placed at both medial and lateral femoral condyles of the right knee and those with fibrin at the left knee. Post implantation, evaluation was done at 6,12 and 24 weeks (3 NZWR in each group). For microradiological assessment, micro CT (Skyscan 1176) was used. Specimens were stained with Masson-Goldner trichrome method for histology and histomorphometry evaluation

## RESULTS:

The combination of PLGA and fibrin has better biocompatibility, showed faster biodegradation and more quantitative integration of osseous tissues. (refer table 1)

## DISCUSSION:

A major intent of biodegradable implants is complete osseous replacement at the former implant site. The duration of the degradation

of the polymer is an important factor in influencing new bone formation. The first reaction at the implant site consists of bone resorption stimulated by the byproducts released during the degradation, then followed by fibrous tissue formation and completed by gradual increase in trabecular bone volume plus osteoid surface fraction, all of which can be demonstrated by computed tomography (CT) scans and histomorphometry slides.

**TABLE 1**

Bone Analysis Reading	Unit	C	6 wks (%)	12 wks (%)	24 wks (%)
Bone Surface/ Volume Ratio(Bs/Bv)	1/mm	11.20	42	57	67
Bone Surface Density	1/mm	0.469	43	55	60
Trabecular Thickness (Tb.Th)	mm	0.332	45	53	65
Trabecular Number (Tb.N)	1/mm	0.126	46	58	72

## CONCLUSION:

Biodegradable polymer PLGA with incorporation of fibrin results in superior outcome compared to usage of other current biodegradable polymers.

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