

.

I.

가 ,

Hegesus⁷⁾가

가

1980

가
Schallhorn

1-5).

가
8-10).

가,

가

11),

12,13)

14,15)

16)

가

1).

Levin

가

17, 18).

6).

가

가

가

(demineralized freeze - dried bone allografts; DFDBA)

26). TGF -

5

. BMP

19).

27, 28).

가

가

가

가

, IL - 6

29).

가

30).

, IL - 1

PGE₂

31 - 34),

35 - 37).

가

(活血

가

BMP²⁰), PDGF²¹), TGF²⁴)

祛瘀藥)

1

IGF²²), FGF²³)

- carotene, adenosine,

tocopherol, cystine, lysine, methionine, arginine, linoleic acid

. BMP

38 - 40).

carotene

osteopontin sine bisphosphate

가

adeno -

25). PDGF

, IGF

. Lysine

arginine
synthesis

nitric oxide

Bio - Oss (Osteohealth Co., New
York, USA)

41 - 45).

2.

(1)

(ketamine,) 5 - 10
mg/kg (xylazine, Bayer Korea Ltd,
) 0.2 - 1 mg/kg

46).

adenosine

1

4

diphosphate

2% (1:100,000 epinephrine,

36,

)

2

37, 47).

4

2, 4

1/2

가

round bur

가 10 mm,

10 mm,

3 mm

Bio -

Oss (Osteohealth Co., New York, USA)

Bio - oss (Osteohealth Co., New
York, USA) 1 , 2

II.

1.

1 6

18 - 22 kg

(tibia)

가 10 mm, 20 mm,

(

5 mm

)

(Mighty

dog, Frisies Co., USA)

(2)

10 가

(Mighty dog, Frisies Co., USA)

100

2

2

가

(Kanamycin, Scientific Feed Co., Korea)

(80 - 90 g/kg body weight)

, 2% chlorhexidine

1

(3)

8

phosphate buffer
hyde

0.1 M
2.5% glutaralde -

3 가

, 4µm

toxyline - eosin

trichrome(Goldner 's method)

Tokyo, Japan)

, parrrffin

, hema -

modified Masson -

(Olympus BH - 2, Olympus Co.,

± (), + (), + + (),

+ + + () 5

Masson 's trichrome

Image Pro II

(Media Cybernetrics, USA)

3.

4.

formalic acid - sodium citrate

Table 1. Histologic finding of inflammatory response to the application of safflower seed extracts and Bio - Oss on artificial defects of Mongrel dog

	Control		Extract of safflower		Bio - Oss
	Mandible	Tibia	Mandible	Tibia	Mandible
Inflammatory cell	±	±	±	±	±
Angiogenesis	±	+	±	+	±
Fibrosis in defect	+	+	+++	++	±

- ; negative, ± ; rare, + ; mild, ++ ; moderate, +++ ; severe.

Mn/Ti; in mandible/tibia. Control; bone defects only.

Experimental; application of safflower seeds extract or Bio - Oss on bone defects.

Table 2. Histologic finding of bone remodeling according to the application of safflower seed extract and Bio - Oss on artificial defects of Mongrel dog

	Control		Extract of safflower		Bio - Oss
	Mandible	Tibia	Mandible	Tibia	Mandible
Osteoclastic activity	-	-	-	-	-
Osteoblastic activity	±	+	+	+++	±
Bone maturation	±	±	+	+	±
Bone induction	±	+	++	+++	±
Bone conduction	±	+	++	+++	±

- ; negative, ± ; rare, + ; mild, ++ ; moderate, +++ ; severe.

Mn/Ti; in mandible/tibia. Control; bone defects only.

Experimental; application of safflower seeds extract or Bio - Oss on bone defects.

Table 3. Effects of safflower seed extract and Bio - Oss on new bone formation in mandibular and tibial defects of Mongrel dog by histomorphometry (μm^2)(Mean \pm S.D.)

	Control		Extract of safflower		Bio - Oss
	Mandible	Tibia	Mandible	Tibia	Mandible
New bone area	182.5 \pm 71.4	121.7 \pm 48.1	348.0 \pm 104.7*	380.3 \pm 153.4#	201.5 \pm 72.3

* Significant difference compared to control group in mandible ($p < 0.05$).

Significant difference compared to control group in tibia ($p < 0.05$).

2).
 (one way ANOVA) t - test , 가 가
 $p < 0.05$.

(Table 2, 3, Figure 1 - 2).

III.

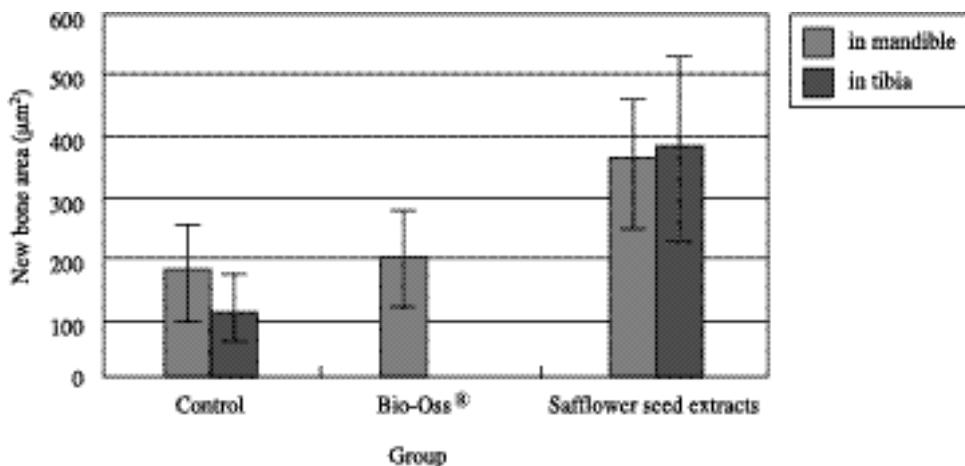
1.

(1)

(Table 1, 2, 3, Figure 1 - 3, 1 - 4).

(2)

(Table 1, 2, Figure 1 - 1, 1 -



1. Effects of safflower seed extract (SSE) and bone substitute (Bio - Oss) on new bone formation. Values represent new bone area (mean \pm S.D.). SSE groups were significantly different from

가 (Table 1, 2, Figure 2 - 1), (Bio - Oss) 201.52 ± 72.28 μm², 가 348.00 ± 104.66 μm², (Table 2, 3, Figure 2 - 2). 380.31 ± 153.40 μm² (3)

(Table 3, Fig. 1) (p<0.05).

IV.

가 (Table 2, 3, Figure 3 - 1, 3 - 2).

(Table 1, 2, Figure 3 - 3, 3 - 4).

가 (Table 2, 3, Figure 3 - 5).

(Figure 3 - 4)

가 (Figure 3 - 6).

2.

Image analyzer

BMP

가

가

48).

(Table 3,

1).

가

가

가

45 - 150 μm

가

가

가

가

가

가

가

49),

가

50).

(Figure 3 - 3, 3 - 4, 3 - 5).

Bio - Oss

182.50 ± 71.35 μm²,

121.73 ± 48.14 μm²

James Jeffrey 10% critical size defect(CSD) 56), CSD 8mm 가 4

Bio - Oss 가 (1997)⁵¹⁾ 가 57), 가 58-64), (1998)⁵²⁾ 65-67),

Richardson Bio - Oss DFDBA DFDBA 1mm , 1.2mm Zea may , 9% L. dexamethasone 68). McAllister Bio - Oss 1 6

53) 가 69). Bio - Oss 가 54) 가 Bio - Oss

TGF - osteonectin 가 (1999)⁵⁵⁾ 가

가

가

V.

가

가

가

가

bony callus

1.

가

가

6 - 12 가

2.

가

3.

가

4.

가

5.

가

가

가
($p < 0.05$).

가

가
가

가

VI.

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- Figure 1 - 1. Microphotography of bone remodeling at mandible in control groups (Goldner & Masson - trichrome stain $\times 40$). Arrow indicates dead space surrounded by mild new bone.
- Figure 1 - 2. Microphotography of bone remodeling at mandible in control groups (Goldner & Masson - trichrome stain $\times 100$). Arrow indicates hematopoietic bone marrows bounded in mild new bone.
- Figure 1 - 3. Microphotography of bone remodeling at tibia in control groups (Goldner & Masson - trichrome stain $\times 40$). Arrow indicates vascular loose connective tissues surrounded by strand - like new bone.
- Figure 1 - 4. Microphotography of bone remodeling at tibia in control groups (Goldner & Masson - trichrome stain $\times 100$). Arrow indicates newly formed bone.
- Figure 2 - 1. Microphotography of bone remodeling at mandible in Bio - Oss groups (Goldner & Masson - trichrome stain $\times 40$). Arrow indicates thin membrane - like new bone.
- Figure 2 - 2. Microphotography of bone remodeling at mandible in Bio - Oss groups (Goldner & Masson - trichrome stain $\times 100$). Arrow indicates newly formed bone.
- Figure 3 - 1. Microphotography of bone remodeling at mandible in safflower seed extract groups (Goldner & Masson - trichrome stain $\times 40$). Arrow indicates new bone (lower) and dense connective tissues (upper).
- Figure 3 - 2. Microphotography of bone remodeling at mandible in safflower seed extract groups (Goldner & Masson - trichrome stain $\times 100$). Arrow indicates new bone (lower) and well developed dense connective tissues (upper).
- Figure 3 - 3. Microphotography of bone remodeling at tibia in safflower seed extract groups (Goldner & Masson - trichrome stain $\times 40$). Arrow indicates new bone (left) and old bone (right).
- Figure 3 - 4. Microphotography of bone remodeling at tibia in safflower seed extract groups

(1)

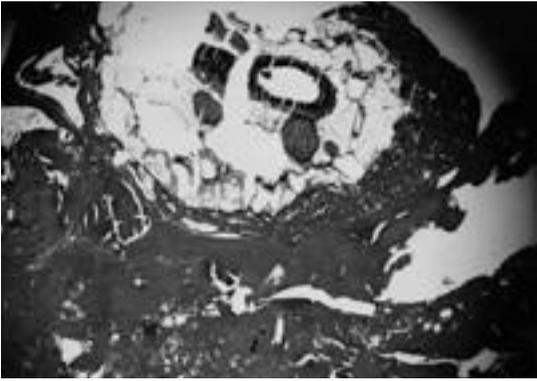


Figure 1 - 1

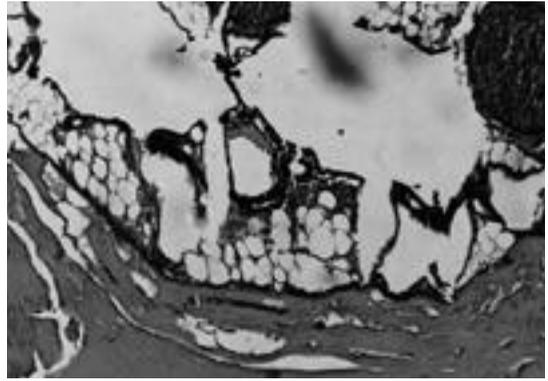


Figure 1 - 2

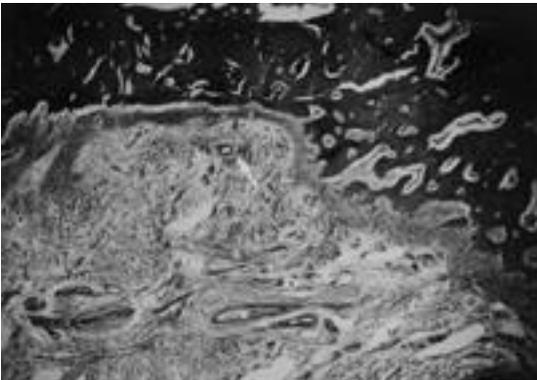


Figure 1 - 3

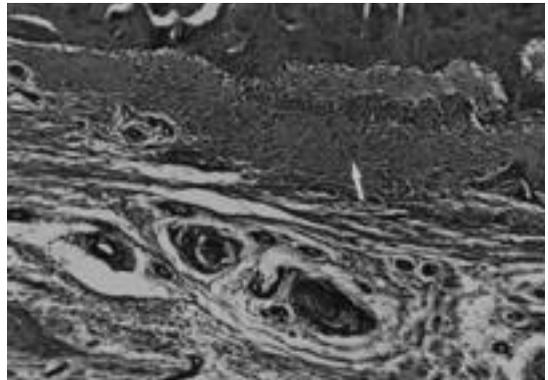


Figure 1 - 4

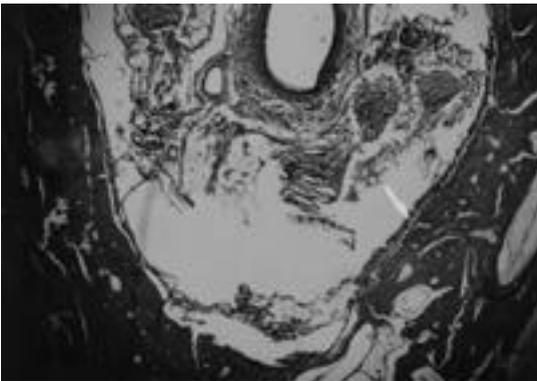


Figure 2 - 1

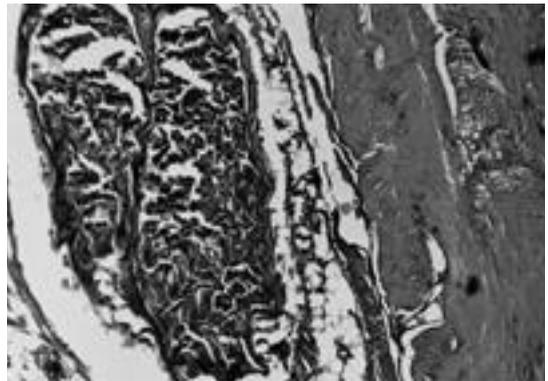


Figure 2 - 2

(II)

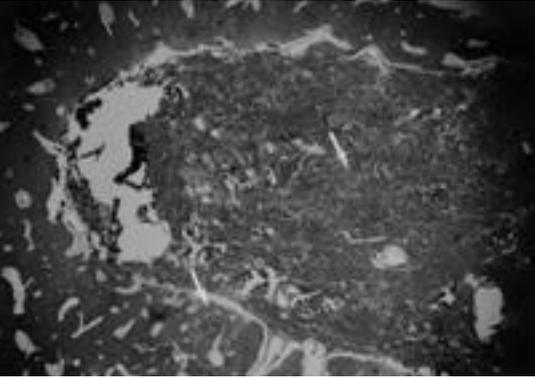


Figure 3 - 1

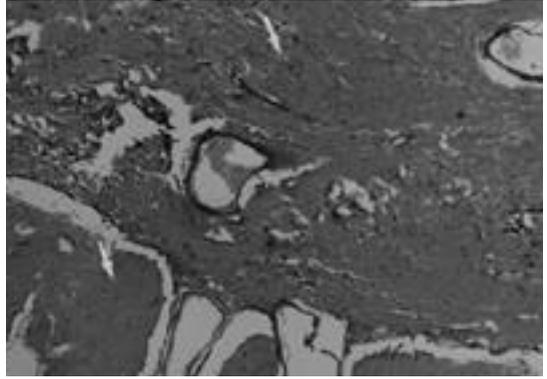


Figure 3 - 2

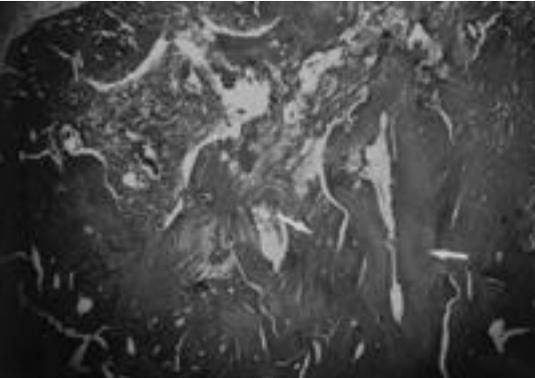


Figure 3 - 3

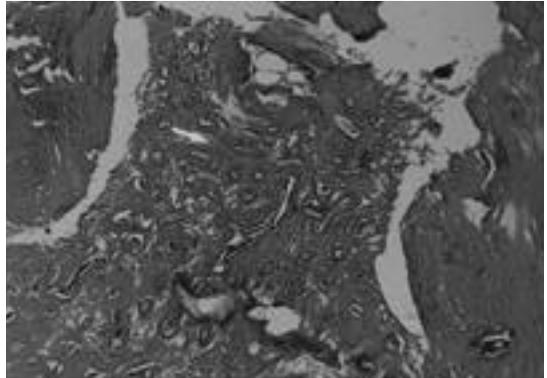


Figure 3 - 4

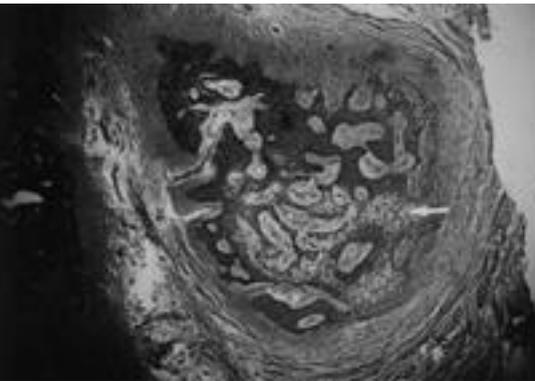


Figure 3 - 5

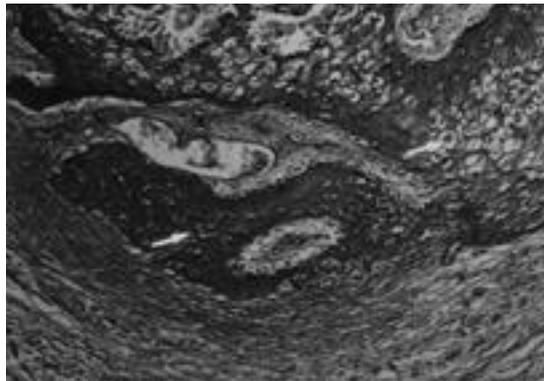


Figure 3 - 6

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Oral Impl Res 8:476 - 486, 1997.

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- Abstract -

Effects of Safflower Seed Extracts and Bovine Bone on Regeneration of Bone Defects in Mongrel Dogs

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Many natural medicines have been studied for their capacity and effects of anti - bacterial, anti - inflammatory and regenerative potential in periodontal tissues. Safflower seed has been traditionally used as a drug for treatment of bone fracture in oriental medicine.

The purpose of the present study was to compare the effects of safflower seed extract and bone substitute on bone formation and regeneration in artificial defects in mongrel dogs. The bony defects were made with round bur at mandible and tibia. Extracts of safflower seed and bovine bone were placed directly at each defect for experimental group, and the defect of control group was sutured without any other treatment. Experimental animals were sacrificed at 8 weeks. And then histopathologic reading and histomorphometric study was done.

There was not significant differences

between control and experimental groups in osteoclastic activity and infiltration of inflammatory cells. However, new capillary proliferation, fibrosis and new bone formation were prominent in safflower seed extract group. The mandibular defects of safflower seed extract group were healed with dense connective and bony tissues, and endochondral bone formation was observed in tibial defect of safflower seed extract group only. New bone area of safflower seed extract group was more significantly increased than that of control and that of bone substitute group.

These results indicate that direct local application of safflower seed extracts on bony defects seems to reduce the early inflammatory response and to promote the bone regeneration.