**FIGURE 1**

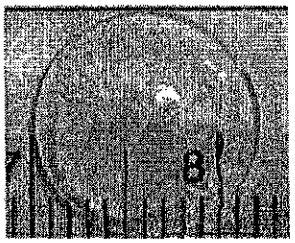


**FIGURE 2**

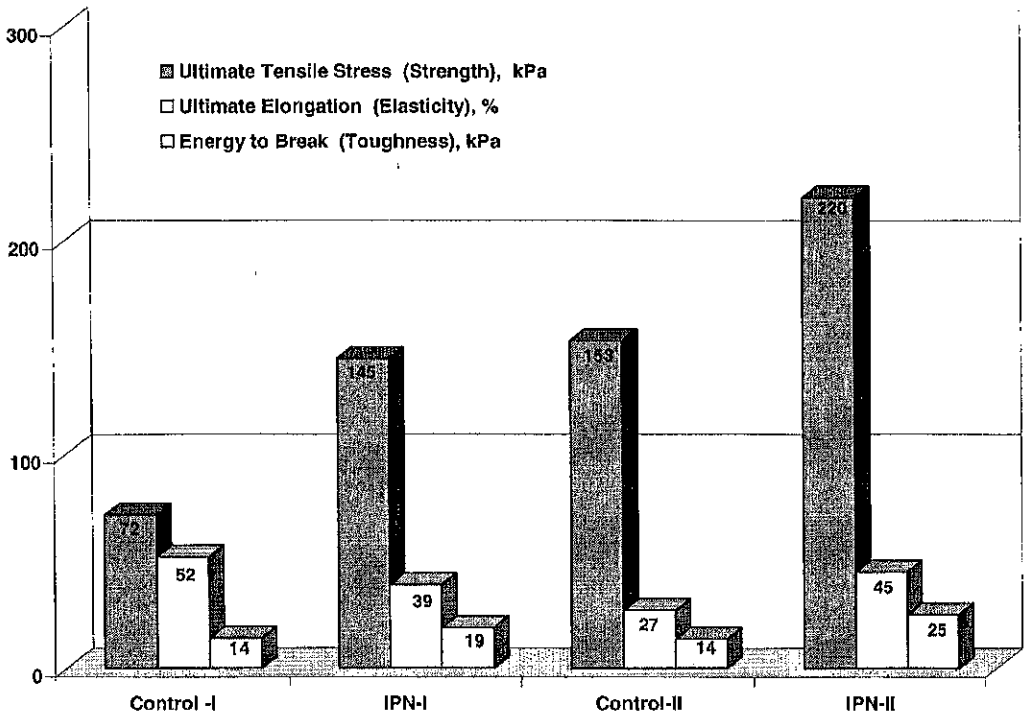
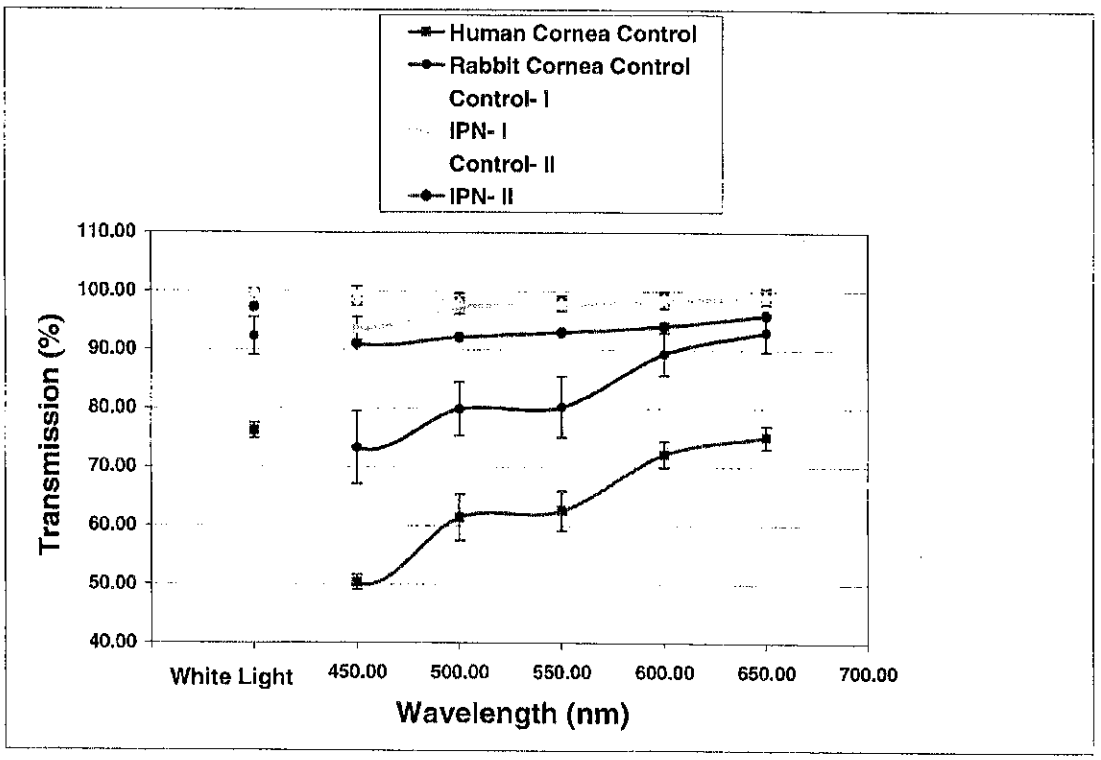
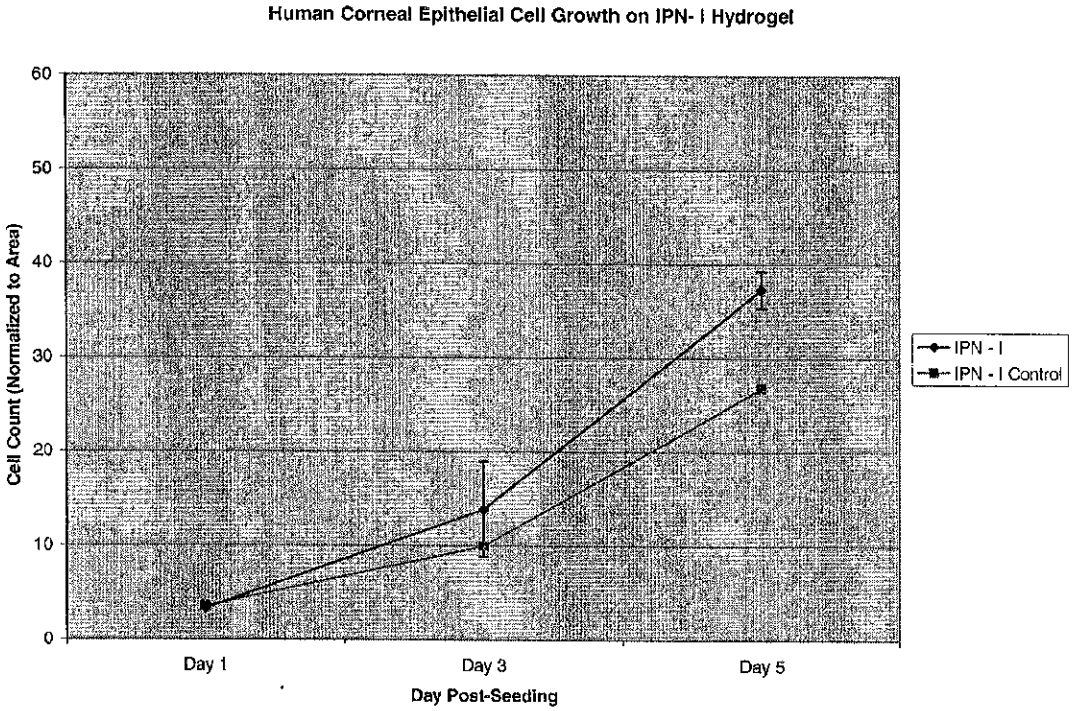

300
200
100
0
Ultimate Tensile Stress (Strength), kPa
Ultimate Elongation (Elasticity), %
Energy to Break (Toughness), kPa
72
52
14
145
39
19
153
27
14
220
45
25
Control -I
IPN-I
Control-II
IPN-II

FIGURE 3


Human Cornea Control
Rabbit Cornea Control
Control- I
IPN- I
Control- II
IPN- II
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
Transmission (%)
White Light
450.00
500.00
550.00
600.00
650.00
700.00
Wavelength (nm)

# FIGURE 4A


Human Corneal Epithelial Cell Growth on IPN- I Hydrogel
Cell Count (Normalized to Area)
60
50
40
30
20
10
0
Day 1
Day 3
Day 5
Day Post-Seeding
IPN - I
IPN - I Control

# FIGURE 4B

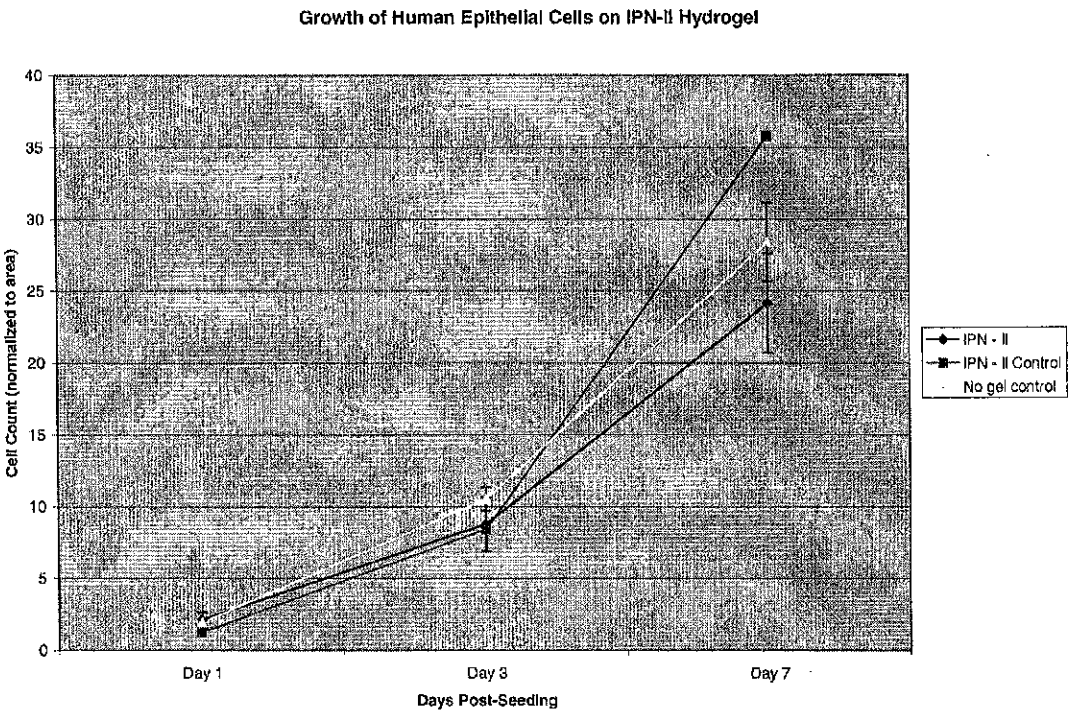

Growth of Human Epithelial Cells on IPN-II Hydrogel
Cell Count (normalized to area)
40
35
30
25
20
15
10
5
0
Day 1
Day 3
Day 7
Days Post-Seeding
IPN - II
IPN - II Control
No gel control

**FIGURE 5**

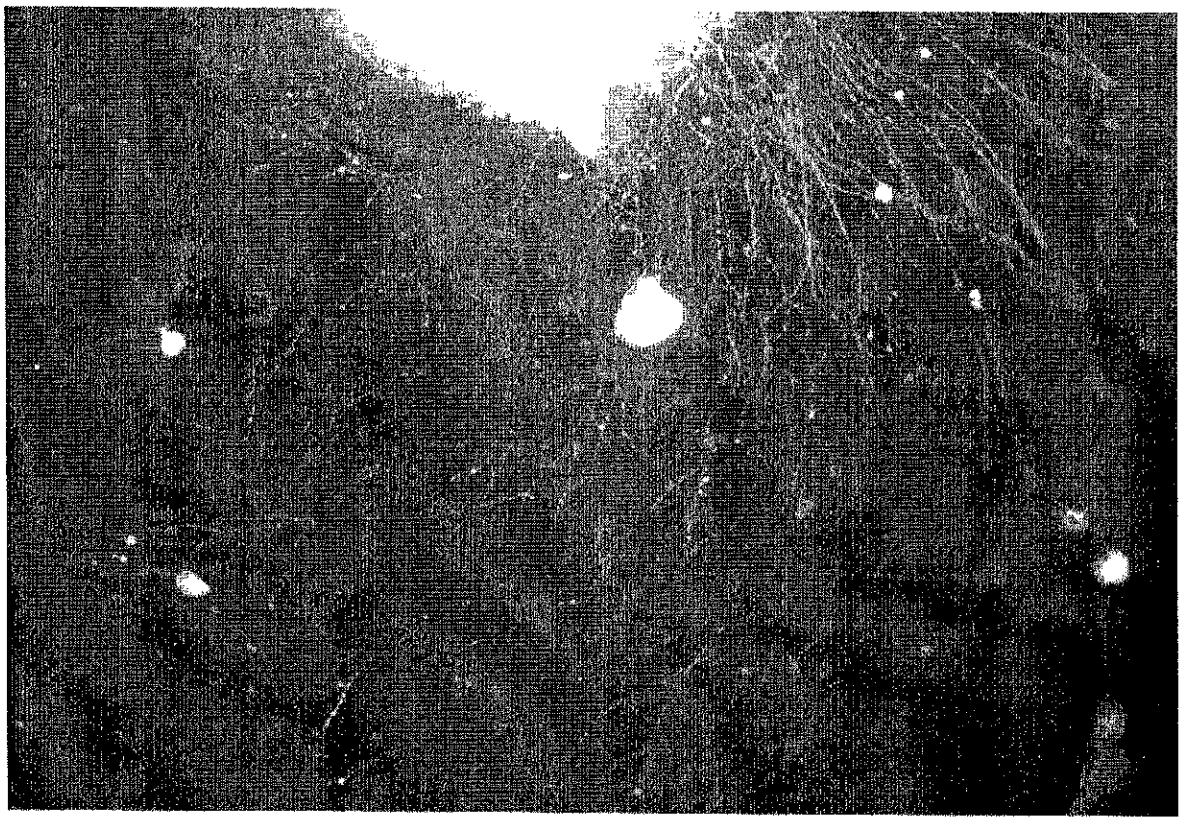


**FIGURE 6**

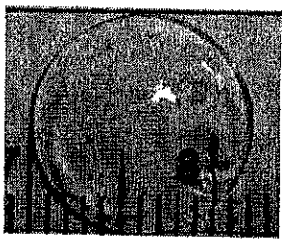
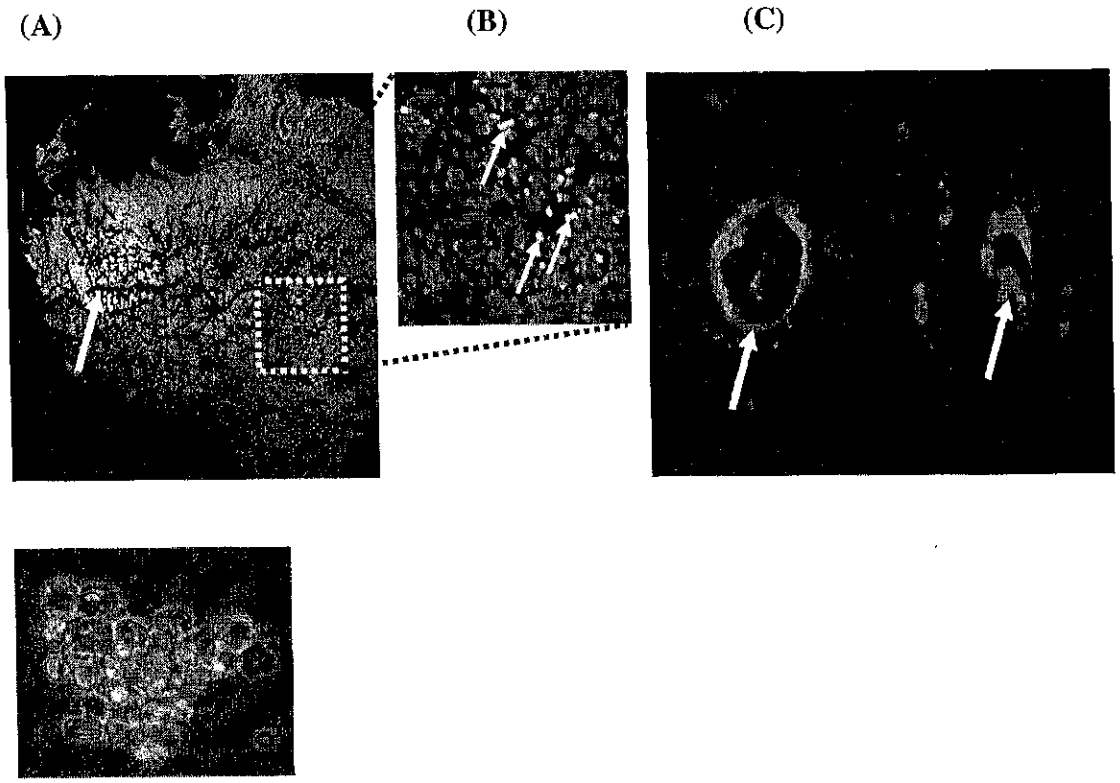


**FIGURE 7**

Top: unoperated cornea
Bottom: Cornea with implant



**FIGURE 8**



# FIGURE 9

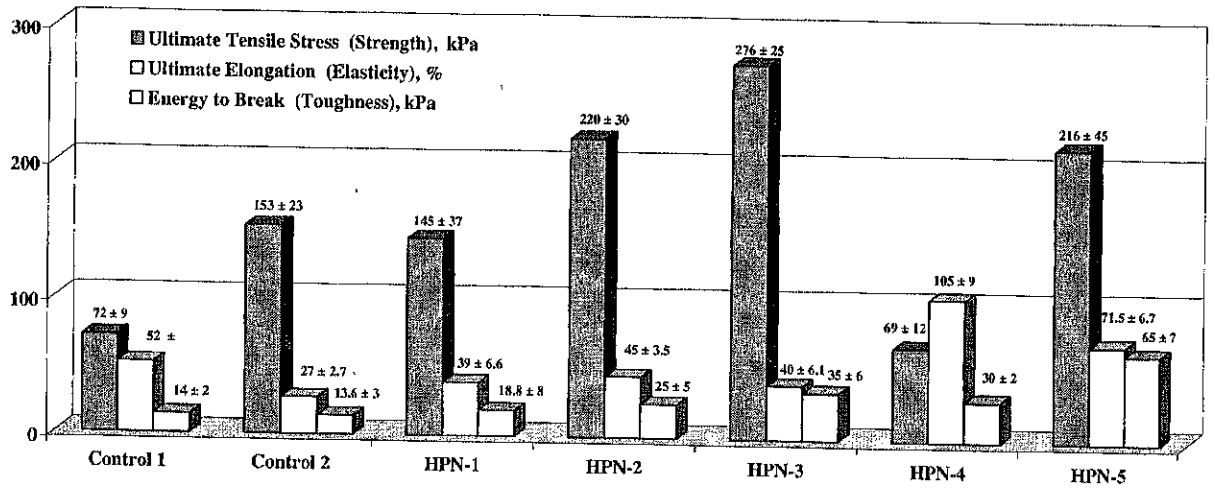

300
200
100
0
Ultimate Tensile Stress (Strength), kPa
Ultimate Elongation (Elasticity), %
Energy to Break (Toughness), kPa
72 ± 9
52 ±
14 ± 2
153 ± 23
27 ± 2.7
13.6 ± 3
145 ± 37
39 ± 6.6
18.8 ± 8
220 ± 30
45 ± 3.5
25 ± 5
276 ± 25
40 ± 6.1
35 ± 6
69 ± 12
105 ± 9
30 ± 2
216 ± 45
71.5 ± 6.7
65 ± 7
Control 1
Control 2
HPN-1
HPN-2
HPN-3
HPN-4
HPN-5

**FIGURE 10**

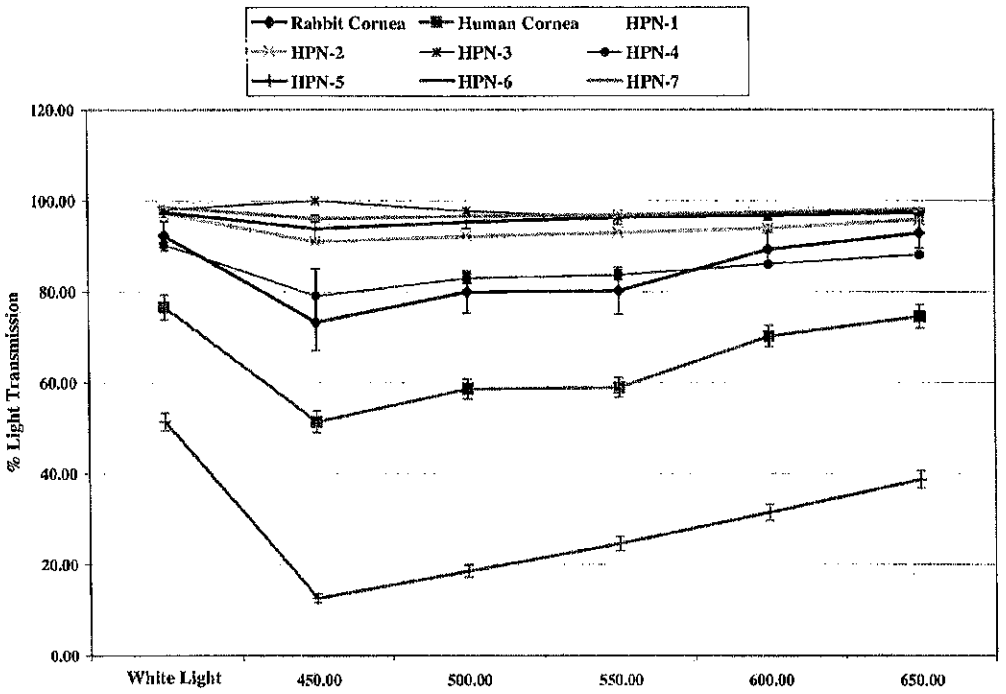

Rabbit Cornea
Human Cornea
HPN-1
HPN-2
HPN-3
HPN-4
HPN-5
HPN-6
HPN-7
120.00
100.00
80.00
60.00
40.00
20.00
0.00
% Light Transmission
White Light
450.00
500.00
550.00
600.00
650.00

**FIGURE 11**

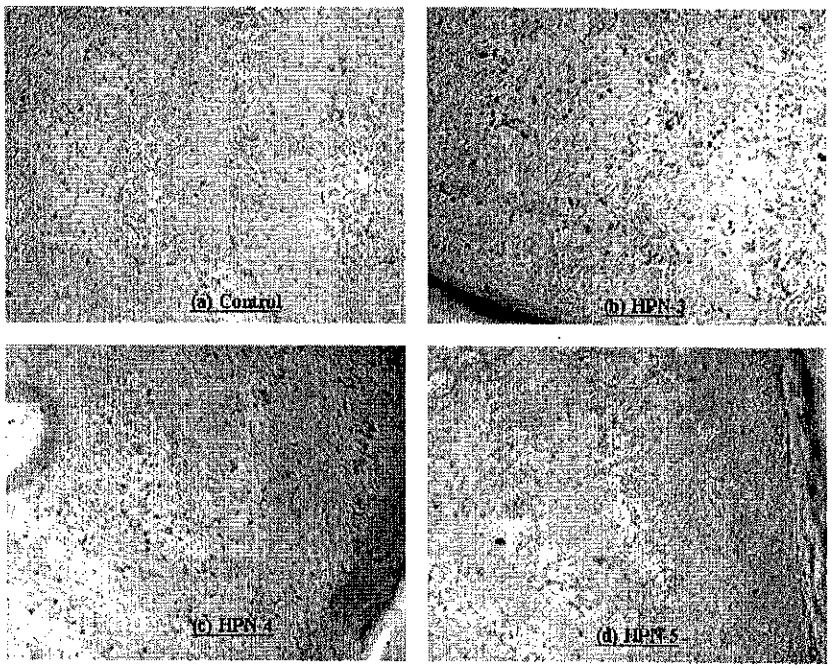


**FIGURE 12**

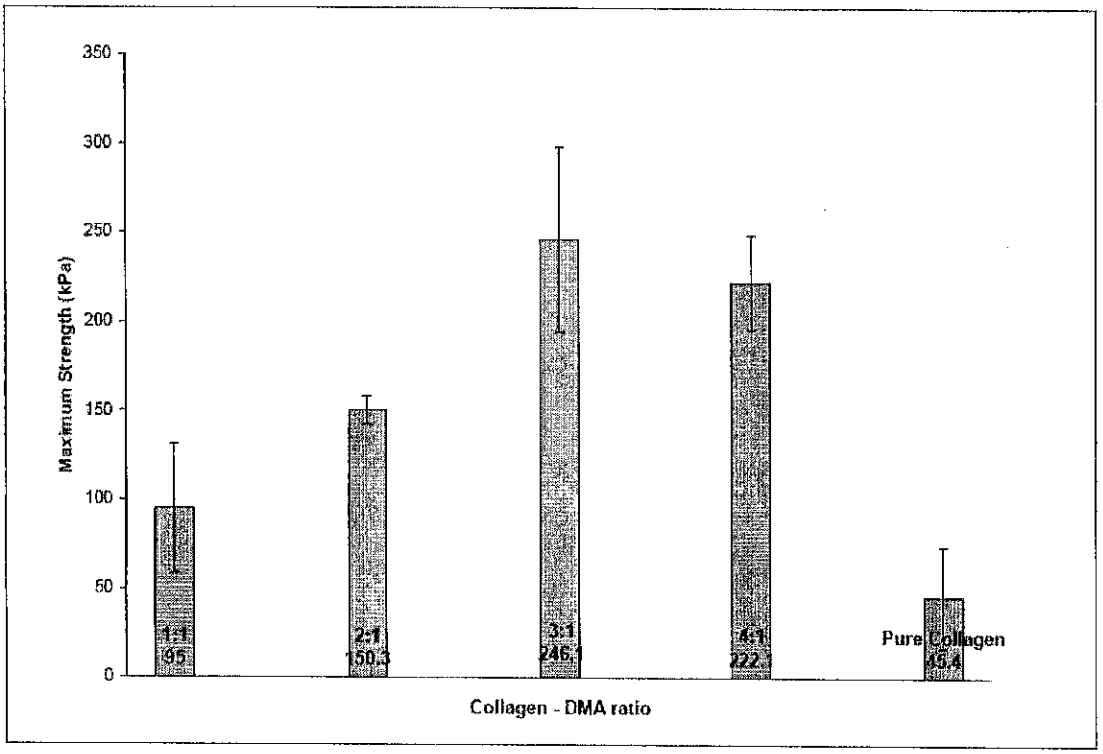

350
300
250
200
150
100
50
0
Maximum Strength (kPa)
1:1
95
2:1
150.3
3:1
246.1
4:1
222.1
Pure Collagen
45.4
Collagen - DMA ratio

**FIGURE 13**

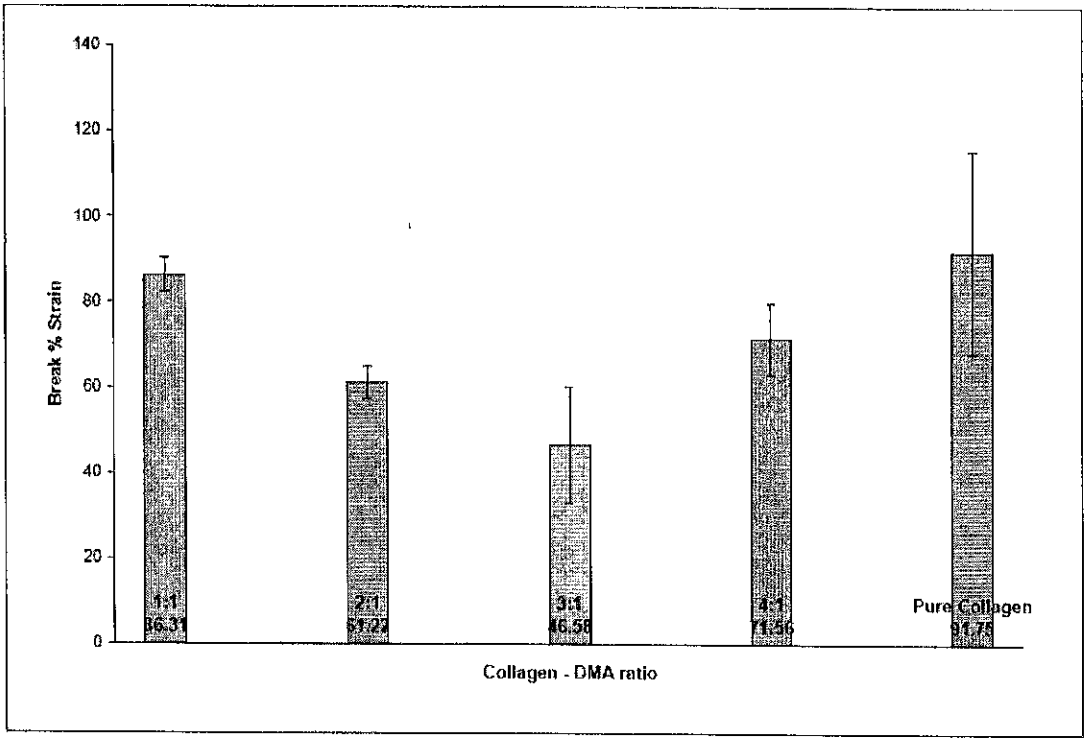

140
120
100
80
60
40
20
0
Break % Strain
1:1
86.31
2:1
61.22
3:1
46.58
4:1
71.56
Pure Collagen
91.75
Collagen - DMA ratio

**FIGURE 14**

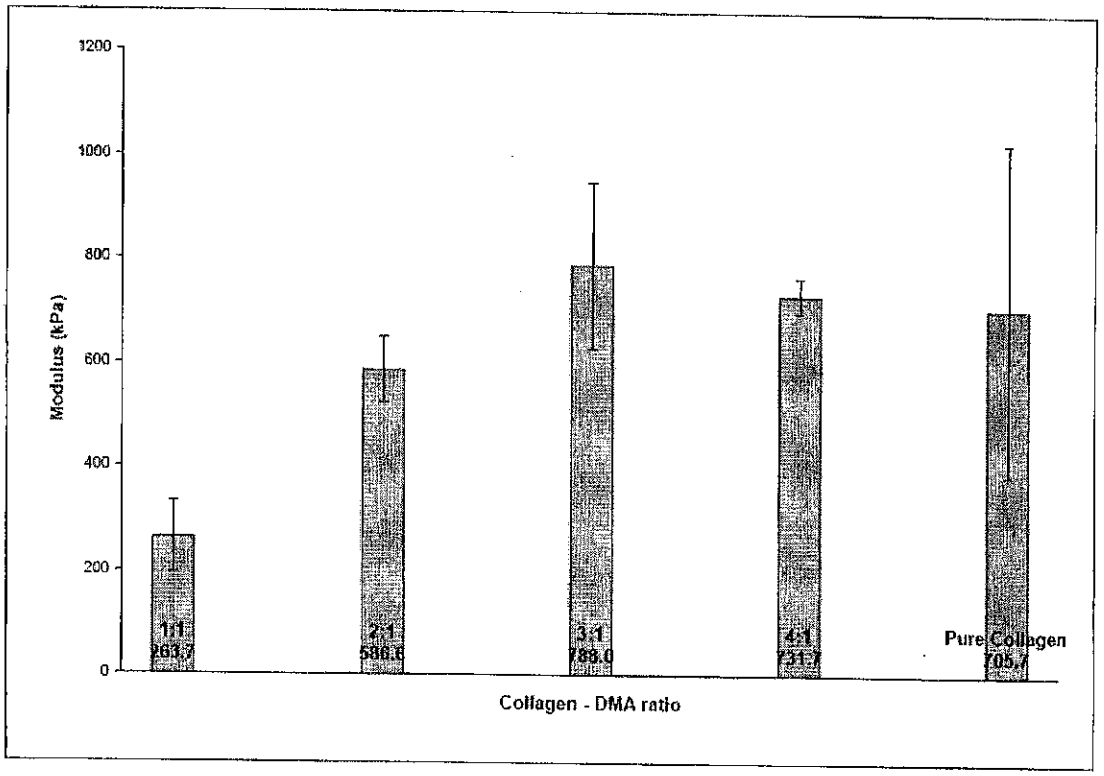

1200
1000
800
600
400
200
0
Modulus (kPa)
1:1
263.7
2:1
586.6
3:1
788.0
4:1
731.7
Pure Collagen
705.7
Collagen - DMA ratio

**FIGURE 15**

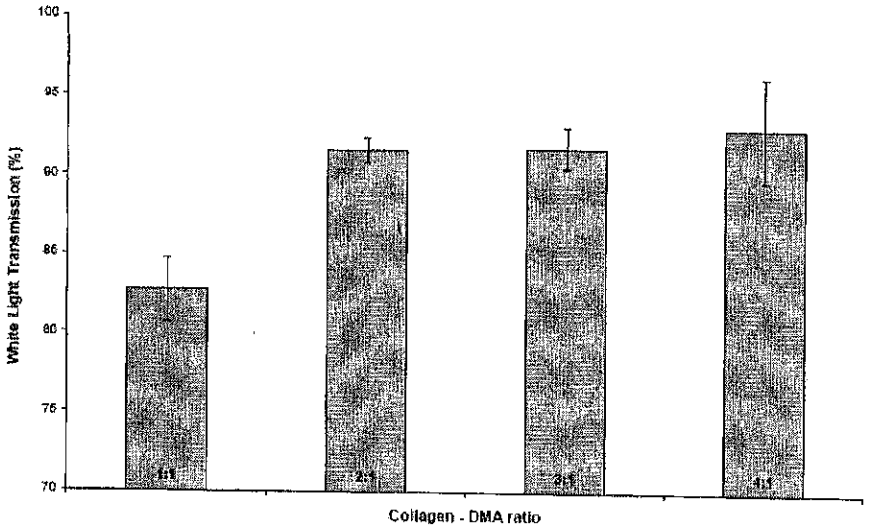

White Light Transmission (%)
100
95
90
85
80
75
70
Collagen - DMA ratio

**FIGURE 16**

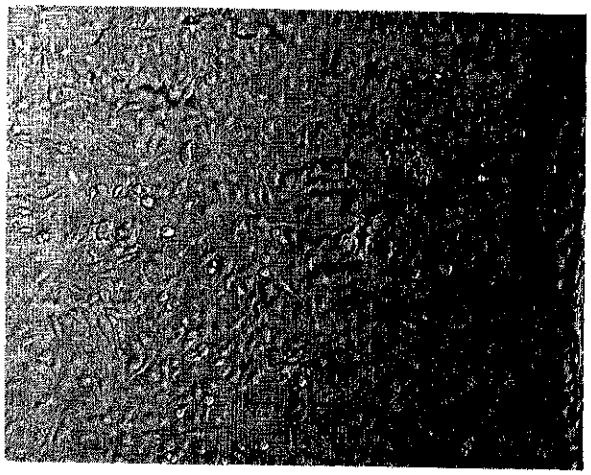


**FIGURE 17**

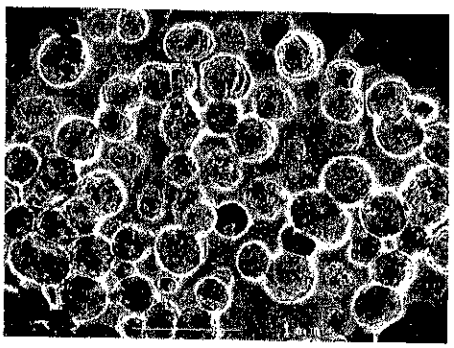


**FIGURE 18**

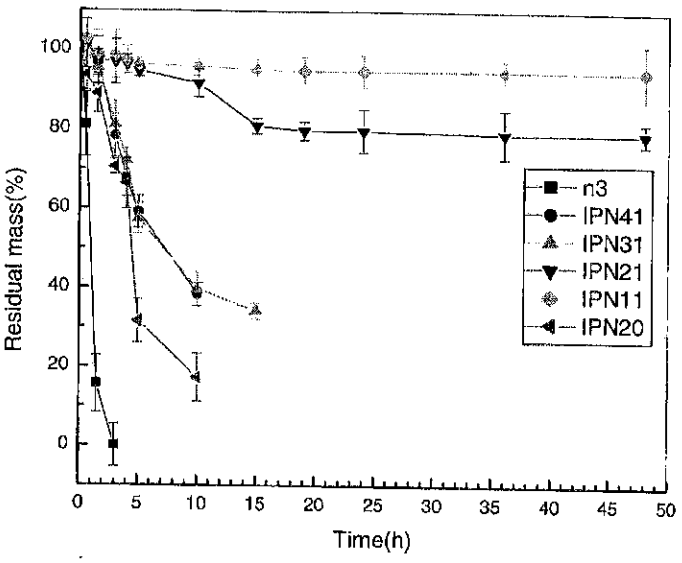


FIGURE 19

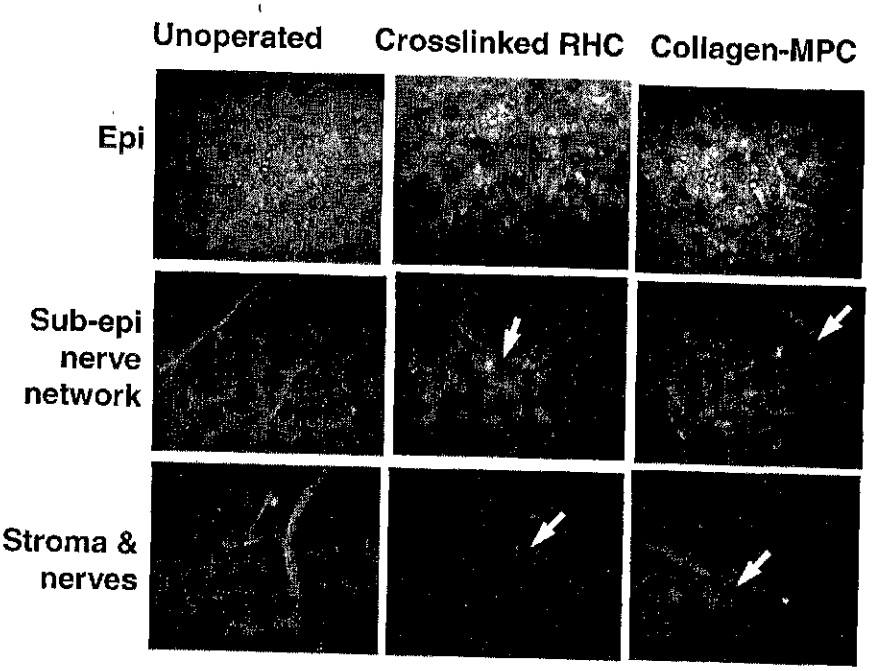
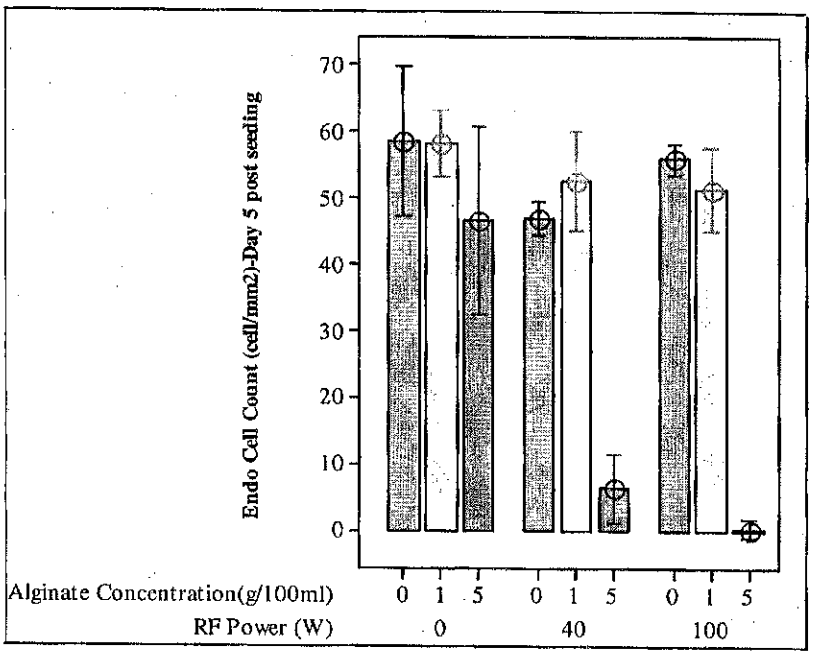

Unoperated
Crosslinked RHC
Collagen-MPC
Epi
Sub-epi nerve network
Stroma & nerves

**FIGURE 20**


Endo Cell Count (cell/mm2)-Day 5 post seeding
70
60
50
40
30
20
10
0
Alginate Concentration(g/100ml)
0 1 5 0 1 5 0 1 5
RF Power (W)
0
40
100