

염산 Tetracycline으로 처리된 치근면에 대한 섬유아세포의 부착효과

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Tetracycline-HCl 처리된 치근면에 대한 섬유아세포의 부착효과를 평가하기 위해 중증치주질환으로 발치된 치아에 전체 치근면활택술을 시행한 뒤 이환된 치근면만 포함하는 총 100개의 절편을 제작하여 치근면활택술만 시행한 군과 구연산용액에 3분간 침수시킨 구연산처리군을 대조군으로 하였고 tetracycline-HCl 50mg/ml와 teracycline-HCl 100mg/ml수용액에 각각 5분간 침수시킨 두 군을 실험군으로 하였다.

모든 절편은 UV radiation으로 멸균한 뒤 사람의 섬유아세포가 든 배양액과 함께 탄산가스배양기(37°C, 5% CO₂)에서 배양한 후 12시간, 1일, 2일, 4일, 7일후에 치근면에 부착된 섬유아세포수를 chamber counting method에 의해 측정하여 다음의 결과를 얻었다.

1. 각 군간의 비교에서 TC-HCl 100mg/ml처리군이 2일후부터 치근활택군보다 세포부착이 더 증가되었고(P<0.05), 7일후에는 다른 전체군보다 세포부착이 더 증가되어 나타났으며(P<0.05), TC-HCl 50mg/ml처리군은 4일후에 치근활택군에 비해 세포부착이 증가되는 것으로 나타났다(P<0.05).
2. 시간별 비교에서 치근활택군만 제외한 전체군에서 4일후에 그 이전에 비해 세포부착이 증진되어 나타났고 7일후에는 전체군에서 그 이전보다 더 증가된 세포부착양상을 타나냈다(P<0.05).
3. 전반적으로 치근활택처리군보다는 화학적처리군이, 모든 화학적처리군 중에서도 TC-HCl 100 mg/ml처리군에서 더 좋은 세포부착효과를 얻을 수 있었다.

이상의 결과에서 볼때, TC-HCl처리된 치근면에 섬유아세포의 부착 및 증식이 크게 증진됨으로써 치주조직의 치유과정중 결체조직의 신부착에 크게 기여할 것으로 추정된다.

● 치근면에 도포된 Tetracycline의 유리양상에 관한 연구

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치근면에 국소도포된 tetracycline의 흡착과 유리양상을 연구하기 위해 발거한 치아에서 치근면 평활술을 시행하고, 50mg/ml와 100mg/ml의 tetracycline-HCl을 5분간 국소도포한 후, 1ml 증류수 내로 유리되는 tetracycline양을 12시간 간격으로 UV Spectrophotometer에서 측정하였고, 치주질환 환자 2명에서 치주관막술중 50mg/ml와 100mg/ml tetracycline-HCl을 5분간 치근면에 도포한 후 각각 1, 2, 4, 8, 24, 32, 48, 56, 72, 96, 120, 144시간 간격으로 paper strip을 이용하여 치은열구액을 채취한 후 Bacillus cereus와 함께 균배양하여 inhibition diameter를 측정한후 tetracycline 유리량을 계산하여 다음과 같은 결론을 얻었다.

1. 시험관내 연구결과

50mg/ml와 100mg/ml tetracycline-HCl 도포시 48시간후에 각각 7.32µg/ml와 6.18µg/ml가 유리되었으며, 7일후에도 각각 1.3µg/ml와 1.42µg/ml가 유리되었으나 도포수용액의 농도에 따른

차이는 없었다. 7일간의 치근절편당 총유리량은 각각 145.6 $\mu\text{g}/\text{ml}$ 와 155.1 $\mu\text{g}/\text{ml}$ 였으며, 치근단 위면적당 유리량은 5.04 $\mu\text{g}/\text{mm}^2$ 와 5.49 $\mu\text{g}/\text{mm}^2$ 이었다.

2. 생체내 연구결과

50mg/ml와 100mg/ml tetracycline-HCl을 도포시술후 4일에는 각각 5.79 $\mu\text{g}/\text{ml}$ 와 6.54 $\mu\text{g}/\text{ml}$ 가 치은열구액내로 유리되어 대부분의 치주병인성 세균에 대해 유효농도를 유지했으며, 술후 6일에도 50mg/ml tetracycline 도포부위에서는 2부위에서, 100mg/ml tetracycline 도포부위에서는 3부위에서 4 $\mu\text{g}/\text{ml}$ 이상이 유리되었고, 두 도포수용액의 농도에 따른 차이는 술후 4시간까지는 100mg/ml 도포부위에서 측정치가 더 크게 나타났으며($p < 0.05$) 그 이후에는 차이가 없었다.

이상의 결과로 보아 tetracycline-HCl 수용액을 치근면에 국소도포시 치질내로 결합되어 장시간 유효항균농도를 유지하며 유리됨으로써, 전신적 항생제 투여없이도 외과적 치주치료시 결체조직의 신부착에 유용할 것으로 생각된다.

● 치주질환과 용해소체효소 : 치주질환 활성에 관한 실험적 연구

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실험적으로 치주염을 유발시킨 성견 4마리로부터 2주 간격으로 16주동안 소구치 협면에서 periotron unit, 치주낭 깊이(pocket depth), 치은 출혈지수(sulcus-bleeding index), 치태지수(plaque index)를 검사하였다. Brill 방법³⁾에 따라서 치은열구액을 채취하여 효소액을 용출시킨다음 Griffiths등의¹²⁾ 방법을 병행하여 arylsulfatase 활성을 비색법으로 측정하여 다음과 같은 결론을 얻었다.

1. arylsulfatase 활성치는 대조군에서 optical density의 평균값이 실험 16주에서 0.043 ± 0.015 , 0.22 ± 0.006 으로 통계적으로 유의한 차이를 나타내었다($P < 0.01$).
2. periotron unit, 치은출혈지수, 치태지수는 실험 2주부터 16주까지 계속적으로, 통계적으로 차이가 있었으나($P < 0.01$), 치주낭깊이는 실험 12주에서만 유의한 차이가 있었다($P < 0.01$).
3. 치주임상지수와 arylsulfatase 활성치간의 상관관계는 $SBI(r=0.291)$, $PI(r=0.240)$ 을 나타냈으나, 치주임상지수와 periotron unit와의 상관관계보다 $SBI(r=0.615)$, $PI(r=0.572)$ 는 낮은 상관계수로 나타났다($P < 0.01$).
4. 치주질환 활성은 arylsulfatase 활성치와 periotron unit를 측정한 결과 우발적인 양상을 나타냈다.

● 성견 치주질환시 치은 열구액내의 β -Glucuronidase에 관한 실험적 연구

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건강한 성견 4마리에 결찰사로 실험적 치주염을 야기한후, Brill의 방법에 따라 치은열구액을 채취하여 효소액을 용출시킨다음, dingle이 사용한 방법을 변형하여 β -glucuronidase의 활성을 비색법으로 측정하고, 각치아의 치주낭 깊이, 치은열구액 양, 치태지수 및 치은열구 출혈지수와

last attachment.

Periodontally diseased teeth were extracted, root planed and cut into dentin slabs.

As control group, only root planed dentin slabs and citric acid treated dentin slabs were included and as experimental with UV radiation, human gingival fibroblasts were seeded in each culture well containing prepared dentin slabs and incubated for 1/2, 1, 2, 4, and 7days at 37°C. At each time, number of attached fibroblasts was measured by chamber counting method.

The results were as follows :

1. In 100mg/ml tetracycline-HCl treated group, fibroblast attachment was enhanced compared to only root planed group after 2days' incubation and compared to other 3 group after 7days' incubation. In 50mg/ml tetracycline-HCl treated group, after 4days' incubation, fibroblast attachment was significantly enhanced compared to only root planed group.
2. Fibroblast attachment, after 7days' incubation in only root planed group and after 4days' incubation in other 3 groups, was more than before in each group.
3. As a whole, fibroblast attachment and growth was enhanced in chemically treated slabs compared to only root planed slabs : in descending order of tetracycline-HCl 100mg/ml treated group, tetracycline-HCl 50mg/ml treated group, and citric acid treated group.

This result suggests the topical application of tetracycline-HCl on root in periodontal therapy could contribute to connective tissue new attachment.

Desorption kinetics of tetracycline topically applied to root surface

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This study was performed to observe the desorption pattern of tetracycline-HCl topically applied to root surface.

Periodontally diseased human teeth were extracted and root planed thoroughly. Dentin slabs were prepared from roots and applied with 50mg/ml and 100mg/ml tetracycline-HCl solution for 5 minutes and immersed in 1ml of distilled water.

The aliquot of distilled water was exchanged and assayed for tetracycline by measuring the absorption peak at 276nm on UV Spectrophotometer every 12 hours.

For in vivo study, two individuals diagnosed as moderate to severe periodontitis were selected and 50mg/ml and 100mg/ml solution of tetracycline-HCl were applied topically to root surfaces during flap surgery. Gingival fluid was sample from 10 sites per patient using paper strip at 1, 2, 4, 8, 24, 32, 48, 56, 72, 96, 120 and 144 hours.

The absorbed paper strips were placed on Mueller-Hinton agar plate containing *Bacillus cereus* and incubated aerobically in 37°C, 12 hours and the inhibition diameters were measured.

The results were follows :

1. In vitro study

From dentin slabs treated with 50mg/ml and 100mg/ml tetracycline solution, concentration of tetrac-

ycline released in distilled water was 7.32 μ g/ml and 6.18 μ g/ml at 48 hours and 13 μ g/ml and 1.42 μ g/ml at 7 days, respectively. The amount of desorption of tetracycline was 5.04 μ g/mm² respectively.

2. In vivo study

The concentration of tetracycline in gingival fluid was 5.79 μ g/ml and 6.54 μ g/ml at 4 days in 50mg/ml and 100mg/ml tetracycline sites respectively. In two sites of 50mg/ml tetracycline treated area and three sites of 100mg/ml tetracycline treated area. 4 μ g/ml of tetracycline treated area and three sites of 100mg/ml tetracycline area, 4 μ g/ml tetracycline treated area and three sites of 100mg/ml tetracycline treated area, 4 μ g/ml of tetracycline was desorbed still at 6 days.

This study indicates that the topical application of tetracycline-HCl results in substantial binding to tooth substance and slow release of effective tetracycline concentration for several days, and the effects of tetracycline may contribute to new attachment of connective tissue.

Lysosomal acid hydrolases and periodontal disease : experimental study on the activity of periodontal disease

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This study was undertaken to investigate the periodontal disease activity on 4 dogs which was induced experimental periodontitis by ligation the 3rd and 4th premolars of maxillas and mandible with wire. It is a meaningful approach to measure biochemical status as an indicator of periodontal disease activity. Arylsulfatase, a marker associated with tissue breakdown, was analysed from gingival crevicular fluid of dogs.

By the modification of the method of Griffiths, arylsulfatase was assayed spectro-photometrically and compared with clinical parameters such as periotron unit, PI, SBI, or PD.

The results of this study were as follows :

1. Average values of arylsulfatase activity (optical density) were statistically significant between the experimental (0.003 ± 0.015) and control (0.022 ± 0.006) site on the 16th week. ($P < 0.01$)
2. Periotron units, SBI and PI were statistically significant between experimental and control site from the 2nd week to the 16th week. ($P < 0.01$)
3. Correlation coefficients between arylsulfatase and clinical index was statistically significant, but less significant than that of PU clinical index.
4. It is suggested that the periodontal disease activity is episodic pattern according to arylsulfatase and periotron unit.