

## ● Lipopolysaccharide가 파골세포의 활성화에 미치는 영향에 관한 연구

함일성 · 김세원 · 이재현

단국대학교 치과대학 치주과학교실

LPS가 골흡수 기전에 미치는 영향을 연구하기 위하여 특정 골조직 세포군을 분리하여 골세포군의 acid phosphatase 및 alkaline phosphatase 활성도에 미치는 영향을 관찰하였으며 LPS가 골조직 장기배양시 골흡수에 미치는 영향과 LPS에 의해 유도된 골흡수에 미치는 탄산 탈수 효소 억제제들의 영향을 관찰하였다.

태령 19일째의 백서태자 두개관을 무균적으로 적출하여 0.1% collagenase, 0.05% trypsin 및 0.5mM EDTA로 구성된 효소용액으로 10, 10, 20 및 20분간씩 연속적으로 처리하여 5군의 골세포군을 분리한 다음 각 세포군의 acid phosphatase와 alkaline phosphatase 활성도를 측정하여 각군의 생화학적 특성을 평가하였으며 골세포 배양시 배양액내에 1 $\mu$ g/ml 또는 10 $\mu$ g/ml의 LPS를 첨가하여 배양한 후 각 세포군에서의 acid phosphatase 활성도와 alkaline phosphatase 활성도의 변화를 측정하였다. 또한 임신 17일째의 백서에 200 $\mu$ Ci의  $^{45}$ CaCl<sub>2</sub>를 피하주사한 후 태령 19일째의 백서태자 칩골과 요골을 무균적으로 적출하여 장기배양을 시행하였으며 배양시 배양액내에 1 $\mu$ g/ml 및 10 $\mu$ g/ml의 LPS를 첨가하여 배양한 후 LPS에 의한 골흡수 정도를 측정하였고 배양액내에 LPS와 10mM의 dichlorphenamide를 단독 혹은 복합첨가하여 배양한 후 LPS에 의해 유도된 골흡수에 미치는 탄산 탈수 효소 억제제들의 영향을 관찰한 결과 다음과 같은 결과를 얻었다.

1. 연속효소처리 방법에 의해 분리된 골세포군 중 I 군, II 군 및 III군은 acid phosphatase 활성도가 높은 반면 alkaline phosphatase 활성도는 높은 값을 나타내었다.
2. 배양액내에 1 $\mu$ g/ml의 LPS를 첨가하여 배양한 경우 acid phosphatase 활성도는 I 군과 II 군에서 유의하게 증가하였으며 IV 군과 V 군에서 감소하는 양상을 나타내었다.
3. 배양액내에 1 $\mu$ g/ml 또는 10 $\mu$ g/ml의 LPS를 첨가하여 배양한 경우 alkaline phosphatase 활성도는 모든 세포군에서 감소되는 양상을 나타내었으며 특히 IV 군과 V 군에서 유의하게 감소되었다.
4. 골조직 장기배양시 배양액내에 1 $\mu$ g/ml 및 10 $\mu$ g/ml의 LPS를 첨가하여 배양한 경우 배양 48시간 및 72시간에 유의한 골흡수 촉진효과를 나타내었다.
5. 골조직 장기배양시 배양액내에 10 $\mu$ g/ml의 LPS와 10mM의 sulfanilamide를 단독 혹은 복합 첨가하여 배양한 경우 배양 72시간에 LPS에 의해 유도된 골흡수가 sulfanilamide에 의해 유의하게 억제되었다.
6. 골조직 장기배양시 배양액내에 10 $\mu$ g/ml의 LPS와 1mM의 dichlorphenamide를 단독 혹은 복합 첨가하여 배양한 경우 배양 48시간 및 72시간에 LPS에 의해 유도된 골흡수가 dichlorphenamide에 의해 유의하게 억제됨을 관찰할 수 있었다.

## The frequency of upper labial frenum type and interrelationships between type of frenum and periodontal health

H. K. Choi, et al.

Dept. of Periodontology, College of Dentistry, Kyung Hee University

The purpose of this study was to investigate the frequency of type of labial frenum and frenum attachment and the interrelationships between labial frenum and periodontal health.

For this study, 955 patient(433 males, 522 females ; fro 6 years to 80 years) were selected from the patient, who visited to periodontal department in Kyung Hee Dental School, Were measured plaque index, gingival index, amount of gingival recession and pocket depth in the mesial protion of upper central incisor with periodontal probe.

In this study, the frenum types were classified according to the Sewerin's classification method, and the frenum attachment types were classified according to the Placek's classification method. And examined the presence of diastema.

Resulting values of indices were evaluated by mean of Student t-test and Normal distribution test.

The results were as follows :

1. The frequency of labial frenum per types was normal type 65.24% , tectolabial type 9.01% , appendix type 4.92% , nodular type 16.44% , duplication type 0.73% , reces type 3.14% and bifid type 0.52% .
2. With aging tectolabial type was reduced, but others was not changed.
3. The frequency of attachment type were mucosal type 81.15% , gingival type 5.76% , papillary type 9.95% , papillary penetrating type 3.14% .
4. The frequency of distema was 21.26% and higher frequency of diastema occured in tectolabial type, papillary penetrating type, and papillary type( $p < 0.01$ ).
5. Nodular type was higher in amount of gingival recession and pocket depth. Gingival type was higher in plaque index, gingival index, the amount of gingival recession than other attachment type ( $p < 0.01$ ) and was higher in amount of pocket depth( $p < 0.05$ ).

## Effects of lipopolysaccharide on the activity of osteoclast

Ham Yil - Sung(Advisor : Prof., Lee Jae - Hyun)

Dept. of Periodontology Graduate School, Dankook University

To study the effect of lipopolysaccharide(LPS) on the activity of osteoclast, five bone cell populations were isolated by sequential enzyme digestion of fetal rat calvaria and effect of LPS on the acid and alkaline phosphatase activity was studied. And also, effect of LPS on the  $^{45}\text{Ca}$  release from fetal rat ulnae and radii, and effects of carbonic anhydrase inhibitors on the LPS-induced bone resorption in organ culture were studied.

Calvaria from rat fetus at 19th day of gestation, were sequentially digested by enzyme solution(colla-

genase, trypsin and EDTA) for 10, 10, 10, 20 and 20 min.(population I - V). Effect of LPS on the acid and alkaline phosphatase activity of each bone cell population was determined after 24 hr-incubation with 1 $\mu$ g/ml or 10 $\mu$ g/ml LPS. Ulnae and radii were removed from 19-day old fetal rats, prelabelled by subcutaneous injection of 300 $\mu$ Ci  $^{45}$ CaCl $_2$  into their mother on the 17th day of gestation. After 24 hours, media was changed with media containing LPS(1 $\mu$ g/ml or 10 $\mu$ g/ml) or LPS + carbonic anhydrase inhibitors(10mM sulfanilamide or 1mM dichlorphenamide) and cultured for 72 hours. Radioactivities of  $^{45}$ Ca released into media were determined after 24, 48 and 72 hours. Effects of LPS and carbonic anhydrase inhibitors were observed by the ratio of %-release of  $^{45}$ Ca between paired control and experimental group.

The observed results were as follows :

1. Basal activities of acid phosphatase were higher in early released cell populations than late populations and basal level of alkaline phosphatase was reversed.
2. LPS(1 $\mu$ g/ml and 10 $\mu$ g/ml) increased the acid phosphatase activity in populations I and II significantly.
3. LPS(1 $\mu$ g/ml and 10 $\mu$ g/ml) decreased the alkaline phosphatase activity of all bone cell populations and significantly inhibited the enzyme activity in populations II, III, IV and V.
4. LPS supplemented in media for 72 hours increased the  $^{45}$ Ca release significantly after 48 and 72 hours of culture.
5. LPS-induced  $^{45}$ Ca release was inhibited significantly by 10mM sulfanilamide after 72 hours of culture.
6. LPS-induced  $^{45}$ Ca release was inhibited significantly by 1mM dichlorphenamide after 48 and 72 hours of culture.