TAS according metal appliances in patients with chronic periodontal disease

The periodontal status of 34 patients with chronic periodontitis, aged 32 to 60 years was evaluated. Analyses of acute phase proteins and the total antioxidant status (TAS) in correlation with metal were performed by the Laurell and Randox tests. The results suggest that the metal presence is significant factor in status of periodontal disease. AGP and ACT concentrations were highest for group with just filling, whereas crowns or dentures did not show elevated acute phase proteins concentrations. TAS level increased with the amount of metal present, whereas ochratoxin A concentration was not affected by metal at all.

Additional key words:
periodontitis
ochratoxin A
acute phase proteins
TAS
metals

Introduction
Periodontal status is believed to have a significant influence on general health in man [6]. During the periodontal disease teeth movement and lost of them is present, as a result of chronic inflammation. It’s important in periodontal treatment to reduce this process and restore the function and esthetics of occlusion. Orthodontic and prosthetic therapy which are necessary, are connected with using some metal appliances. Coexisting different metal elements in oral cavity environment could be the reason of galvanic battery and tissue injury. It has been documented in vitro and in vivo that metal dental appliances release metal ions due to corrosion. Dentists must choose among many dental casting alloys available, often without knowledge of their biological properties and effect on oral mucosa [1].

Divalent metal ions like iron (Fe), zinc (Zn), manganese (Mn), copper (Cu) and cobalt (Co) are essential cofactors in a number of biological processes, including oxidative phosphorylation, gene regulation and free-radical homeostasis. Deficiency disorders will develop in the wake of inadequate intakes, while a lack of homeostasis, leading to accumulation in the body of these metals, is hereditary haemochromatosis and certain neurodegenerative diseases, may be also periodontopathy [9].

Tissue injury, infection, inflammation, smoking, trauma or neoplasia activate several homeostatic defensive mechanisms, such a changing in detected levels of numerous serum proteins, which are therefore called acute phase proteins (APP) [5]. Some of the APPs participate in limiting the inflammatory activity and in clearance of its products, facilitate phagocytosis, and participate in repair processes by influencing fibroblasts and the reorganization of newly developed connective tissue in the healing wound (CRP, AGP). It is suggested that oxidative cell injury caused by reactive oxygen species (ROS) contributes to the development of inflammatory changes in the oral mucosa too [4]. Than total antioxidant status is postulated to be increased in patients with periodontitis and oral mucosa diseases.

The aim of this study was the biochemical analysis selected inflammation indicators in patients with chronic periodontitis, according to metal appliances presence in oral cavity.

Materials and Methods
The biochemical analysis was carried out on a group

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Additional Polish text:
Stan przyzębia 34 pacjentów, z przewlekłą chorobą przyzębia, w wieku 32-60 lat został określony na podstawie wybranych wskaźników. Dokonano analiz krwi w kierunku białek ostrej fazy i potencjału oksydoredukcynego w powiązaniu z obecnością w jamie ustnej elementów metalowych, a także palenia tytoniu: wypełnień, uzupełnień protetycznych lub elementów aparatów ortodontycznych. Analizę przeprowadzono z użyciem testów Laurell i Randox. Z przeprowadzonych badań wynika, że obecność metalu w jamie ustnej nie pozostaje bez wpływu na jej stan. Poziom TAS był wyższy, gdy różnego typu elementów metalowych w jamie ustnej było więcej. Między wszystkimi analizowanymi składnikami wynikało statystycznie istotne zależności (p<0,05).

Additional Polish key words:
periodontyty
ochratoxin A
AKS
TAS
metale

Dodatkowe słowa kluczowe:
palenie tytoniu
TAS
choroba przyzębia
metale w środowisku jamy ustnej

The biochemical analysis was carried out on a group of 34 patients with chronic periodontitis, aged 32 to 60 years. The periodontal status of these patients was evaluated using acute phase proteins and the total antioxidant status (TAS) in correlation with metal. The results suggest that the presence of metal is a significant factor in the status of periodontal disease. AGP and ACT concentrations were highest for patients with just filling, whereas crowns or dentures did not show elevated acute phase proteins concentrations. TAS level increased with the amount of metal present, whereas ochratoxin A concentration was not affected by metal at all.

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of 34 patients, aged 24-62 with chronic periodontitis, treated in the Periodontology Clinic of Poznań University of Medical Sciences. All of them have metal appliances in the oral cavity. Only eight persons smokes.

Patients were divided into 3 groups; 1 - filings, 2 - crowns or bridges, 3 - denture or orthodontic elements. Along with selected clinical parameters namely: probing pocket depths (PPD) and attachment loss (CAL), bleeding index (SBI) and hygiene index (HI) - percentage simplified indices according to O’Larry [7] the markers of acute phase reaction and TAS [4,5] were investigated. Concentrations of following proteins were measured using immunoelectrophoresis according to Laurell: C-reactive protein (CRP), alpha1-acid glycoprotein (AGP), alpha1-antichymotrypsin (ACT), transferrin (Tf), ceruloplasmin (Cp), alfa 2 -macroglobulin and the glycosylations pro-}

**Results**

On the basis of acute phase protein analysis the existence of a chronic inflammatory state with a considerably high total concentration of AGP and ACP was observed. The mean value for ACT was 431.2 (350-450), for AGP 937.0 (700-900), for Tf 3.2 (2.2-3.0), for Cp 425.1 (150-380). It could be shown that AGP and ACT concentrations were highest for group with just filling - group 1, whereas 2 or 3 groups did not show elevated acute phase proteins concentrations. TAS level increased clearly and significantly with the amount of metal present, whereas ochratoxin A concentration was not affected by metal at all; it may be even stated that presence of metal in any shape was associated with lower ochratoxin A concentration. All differences were statistically significant (p<0.05). Correlations between main parameters were shown on figures 1 to 4.

**Discussion**

There are many reports about influence nickel and mercuric ions into oral cavity environment and their alternatives [3,10,12]. Although an increasing number of new or altered dental materials are used for restoration and dentures, hypersensitivity responses in the oral cavity are rare [11]. The nature of the oral tissue renders is less susceptible to sensitivity responses than other tissue. Metals are this group of dental materials which is often used for stabilization effects of periodontal treatment. The biochemical study confirms a tendency to decreased intensity of the inflammatory disease after treatment. The low TAS level found in the blood serum of the subjects in our study may suggest that the antioxidant defence of blood in patients with chronic periodontitis is lower [8]. It is interesting that TAS has tendency to increase in group were patients used dentures or have orthodontic elements. Equal the level of acute phase proteins (AGP, ACT) was lower in this group comparing with results of group, were patients have only fillings in their own teeth, but the inflammation was present.

There is increasing evidence that nutrition can modulate the kinetics and toxicity of heavy metals and thus modulate health and disease outcomes associated with exposure to such elements. The protective effect of balanced diet has been demonstrated for lead (Pb), mercury (Hg) and cadmium (Cd). Furthermore, essential and toxic metals and trace elements may modulate each others absorption or metabolism. The data about smokers and nonsmokers with metal appliances should be provided in future.
Figure 4
Correlation between the investigated parameters: Ochratoxin A and metal.
Korelacja pomiędzy badanymi parametrami: ochratoksyyna A - metal

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