Thiocyanate concentration in saliva of cystic fibrosis patients

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Abstract: Thiocyanates (SCN⁻) are ubiquitous in nature. There are indispensable part of host defense system that act as a substrate for lactoperoxidase (LPO). In our study we present initial data on SCN⁻ concentration in saliva of CF patients in comparison to healthy non-smokers and healthy smokers. 5 ml of saliva was collected from each subject to a sterile tube and thiocyanate concentration was measured in each sample. The results of the measurements are presented on Fig. 1. Mean concentration of SCN⁻ in saliva of CF patients was 0.031 ± 0.0052 g/l, in healthy non-smokers 0.039 ± 0.0048 g/l and in healthy smokers 0.048 ± 0.0161 g/l. The differences between each group were statistically significant. Studies on larger group of patients and probably on different material (BALF or induced sputum) should present interesting data complementing the in vitro studies.

Key words: Cystic fibrosis - Thiocyanate - Saliva

Thiocyanates (SCN⁻) are ubiquitous in nature. There are indispensable part of host defense system that act as a substrate for lactoperoxidase (LPO). In our study we present initial data on SCN⁻ concentration in saliva of CF patients in comparison to healthy non-smokers and healthy smokers. 5 ml of saliva was collected from each subject to a sterile tube and thiocyanate concentration was measured in each sample. The results of the measurements are presented on Fig. 1. Mean concentration of SCN⁻ in saliva of CF patients was 0.031 ± 0.0052 g/l, in healthy non-smokers 0.039 ± 0.0048 g/l and in healthy smokers 0.048 ± 0.0161 g/l. The differences between each group were statistically significant. Studies on larger group of patients and probably on different material (BALF or induced sputum) should present interesting data complementing the in vitro studies.

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Materials and methods

Patients. The study was conducted in three groups of patients CF patients, healthy non-smokers and healthy smokers. The groups were sex and age matched. In CF patients delF508 was present in 13 (65%) alleles. Other mutations were G542X - 2 alleles (10%), R553X - 2 alleles (10%), 2134delT - 1 allele (5%), 3849+10kb C-T - 1 allele (5%), one mutation was undefined.

Saliva samples. 5 ml of saliva was collected from each subject to a sterile tube and the SCN⁻ concentration was measured within 2 h after collection.

Thiocyanate designation. To 1 ml of whole saliva 0.03 ml of 2 M HCl and 0.03 ml of 5% FeCl₃ was added. Each sample was thoroughly mixed and estimated towards to control samples (1 ml H₂O, 0.03 ml of 2 M HCl and 0.03 ml 5% FeCl₃) at spectrophotometer at wave length of λ=570 nm. Thiocyanate concentration was estimated according to calibration plot prepared using standard solutions of NH₄SCN. The data from obtained from the calibration plot were calculated according to the equation:

\[
\text{SCN}^- [\text{g} / \text{l}] = \frac{[\text{concentration from the plot}] 
\times \text{[SCN}] molar mass = 58g / mol}}{[\text{NH}_4] molar mass = 17g / mol} (NH_4SCN)
\]

Statistical analysis. The differences between mean were calculated using student t-test.
Results and discussion

The results of the measurements are presented on Fig. 1. Mean concentration of SCN\(^-\) in saliva of CF patients was 0.031 ± 0.00052 g/l, in healthy non-smokers 0.039 ± 0.00048 g/l and in healthy smokers 0.048 ± 0.00161 g/l. The differences between groups were statistically significant (Fig. 1) although the studied groups may be considered to small. The saliva was chosen as study material as it is one on the major sites of active LPO and is fairly easy to obtain [6].

The impaired LPO function and differed thiocyanate concentration was described by Azen [7] and this finding were confirmed in several recent studies [8]. Childers at al. reviewed a problem of impaired glutathione transport and its thiocyanate conjugates in cystic fibrosis patients [9]. SCN\(^-\) ions were used as probe of Cl\(^-\) channel pores since 1960s. It was shown that CFTR channel is permeable to thiocyanates [9,10]. In vivo studies are necessary to estimate exact lack of thiocyanates in cystic fibrosis patients where LPO is active. Here we present preliminary results of the study on SCN\(^-\) concentration in a small group of cystic fibrosis patients. Studies on larger group of patients and probably on different material (BALF or induced sputum) should present interesting data complementing the in vitro studies.

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References


