Stuttering is a very sad problem for people affected by this speech impediment. We can mention that the evidence of this handicap has been known for more than 4 millennia. This is an important reference for following connections and links associated with stuttering on time axis backward. The second interest is the information that localizes areal occurrence of the various names for stammering. Richard Kitchen and Van Riper (1) in their work The Nature of Stuttering (1982) gathered up the marks for stammer virtually all over the world:

- in Europe near 21 nationalities,
- in the East near 15 state formations, from which entirely of 11 languages at Indians,
- in Africa near 10 nationalities,
- on American continent in 4 regions, from which only at original inhabitants – at 11 American-Indian tribes and
- in Pacific in 3 insular territories.

From the etymological point of view are all these expressions synonyms of the substantive stuttering (that is in a quantity of 75) of miscellaneous onomatopoeic appellations. For instance: Czech word koktat (to stammer) means to pronounce ko-ko-ko, as a comparison to kohout (a cock). (Kohout – in old Czech kohút – has Slavonic onomatopoeic basis ko-ko, which means cock that is gathering his hens.) (2).

Altogether they are primitive imitations of iterative utterance when the speech fluency is disturbed by stammer.

Stammer is a noticeable speech and communication impediment that occurs in time and place and that is so general that there is an assumption that the cause of this disorder could be also one of the most general. Proportionally to the previous supposition, there is a possible general biophysical interpretation (3) that was later presented at neurological forum (4) and afterward even at The Department of Respiratory Diseases and Tuberculosis, Teaching Hospital in Olomouc (5). Hypothetical etymology of the word stuttering was published in Medical Hypotheses (6). Subsequently, other reports were published (7,8,9).

On the basis of the Paediatric clinic seminar with the main topic called „children and teenage stammering”, there...
was a block of the lectures about children speech disorders on XXIst Days of Clinical and Practical Paediatrics, part of which was an information about stuttering (10). In presented note and in the following performances there were reports about the first experience with stammer therapy (11,12).

On the basis of previous findings, a clinical trial was proposed and approved by the Ethics Committee of the Teaching Hospital and the Faculty of Medicine, Palacký University, Olomouc (13). The company ZAK-PharmaServices s.r.o. prepared the final protocol of the study evaluating the effectiveness and safety of a sympathomimetic agent formoterol in the alleviation of speech non-fluency (14).

The aim of the present contribution is to refer on the clinical study project and methods; the results, both preliminary and final ones, will be reported later.

Present description of therapy with the assistance of bronchodilatation after more than one year of usage of formoterol in the case of the same female subject (13 years) as in previous citations (10,11) is given in reports (15) and (16).

**Material and methods**

Protocol (14) defines the Teaching Hospital in Olomouc as the central specialized facility. Evaluation of the treatment will involve initial biochemical test, neurological tests EEG and EMG. Further on, test of heart rate variability VSF by the VarCor PF-5 instrument and the speech records of chosen subjects, and spirometric tests with the assistance of instrument MasterScreen IOS (specific functional parameters of lung – rate of flow volume and peripheral limitations of small airways) will be performed. The program of impulse oscillometry IOS provides a reliable analysis of pulmonary distribution disorders, including impairment of the mechanics of breathing. Graphic presentation modelling the lungs gives a rapid overview of the level of pulmonary functions. The respiratory flow is superposed by short-term test impulses. Accurate measuring of flow signal together with resulting response of pulmothoracic pressure brings about the respiratory impedance. Impulse oscillometry is a most useful tool for differential diagnostics of diseases of pulmothoracic system. It is highly sensitive in registering peripheral limitation of respiratory tract, instability.

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**Fig. 1.** Detailed view of spirometric investigation.

**Fig. 2.** Entry of the instance of discharge measurement of the volume in a stutterer.

**Fig. 3.** Entry of the instance of resistance in upper airways of a stuttering subject.

**Fig. 4.** Entry of the instance of registration of obstructions in airways.
of bronchial tract (air trapping) as well as in determination and differentiation of extrathoracic stenosis. Its sensitivity makes it able to register even the changes considered as physiological from the respiratory point of view, but typical for subjects suffering from the speech fluency disorders.

Figure 1 presents a detailed view of spirometric investigation. Above mouthpiece in top part above trapezoidal tesseractae, outer generator equipment Master Screen IOS is fixed. Following figures show examples of investigation records. Fig. 2 a flow volume, Fig. 3 retrained, incarcerates air in small airways, and Fig. 4 an illustrative entry of obstructions in airways.

Number of experimental centres finally stabilized at 6. They are localized in six Moravian towns from Břeclav to Ostrava. The first test was realized on November 11th and on February 25th we decided to finish entrance test with the number of 42 surveyed subjects. New centres were opened after above mentioned entrance tests in experimental centres number of 42 surveyed subjects. One patient (female, 21 years) had to be excluded from the study due to increased parameters THS (8.128 mU/l – physiol. range 3.54–5.5) and T3 (FT3) (7.06 pmol/l – physiol. range 3.54–6.47).

### Conclusion

Pathological findings at monitored inspiratory functions were registered in 43 observed stuttering subjects. One patient (female, 21 years) had to be excluded from the study due to increased parameters THS (8.128 mU/l – physiol. range 3.54–5.5) and T3 (FT3) (7.06 pmol/l – physiol. range 3.54–6.47).

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