

Biological Rhythmicity of Nasal Airway Patency: A Re-examination of the ‘Nasal Cycle’

AVERY NELSON GILBERT and ALAN M. ROSENWASSER¹

From the Monell Chemical Senses Center, Philadelphia, Pennsylvania, and

¹Department of Psychology, University of Maine, Orono, Maine, USA

Gilbert AN, Rosenwasser AM. Biological rhythmicity of nasal airway patency: A re-examination of the ‘nasal cycle’. *Acta Otolaryngol (Stockh)* 1987; 104: 180–186.

Rhinomanometric observations of nasal airway patency were obtained for each nasal passage every 10 min throughout an uninterrupted 8-h session. The 49 airflow observations for each nasal passage were subjected to autocorrelation analysis, a statistical technique for quantifying periodicities in a temporal sequence of observations. No significant periodicities were found in any of the 16 subjects when the autocorrelation functions were interpreted by conventional statistical criteria. However, when less stringent criteria were applied, we found suggestive evidence for rhythmicity in one (7 subjects) or both nasal passages (2 subjects). The relationship in patency between the two sides of the nose was characterized with correlation coefficients. These correlations were significantly negative in 7 subjects, indicating bilateral reciprocity of patency. In addition, the correlations were significantly positive in one, and nonsignificant in 8 subjects. Only a minority of subjects (13 %) displayed the classical nasal cycle, i.e., rhythmicity in both nasal passages as well as reciprocity of patency between passages. *Key words: ultradian rhythms, nasal airflow, rhinomanometry.*

A. N. Gilbert, Monell Chemical Senses Center, 3500 Market Street, Philadelphia, PA 19104, USA.

Since the observations of Kayser in 1895 (1) the otorhinolaryngological literature has frequently referred to a ‘nasal cycle’. This phenomenon is said to consist of rhythmic and bilaterally reciprocal alternations of nasal airway patency such that total airway resistance remains constant. The period of the nasal cycle has been reported to range from 0.8 to 5.5 h (Table I). The rhythmic changes in patency are due to dilation and constriction of the venous cavernous tissue in the mucosa of the conchae and septum. The nasal cycle is thought to occur in about 75 % of healthy adults (2, 3, 4).

Despite its general acceptance, the nasal cycle concept is a problematic one. In its strongest form it requires that each nasal passage exhibit rhythmic alterations in patency, and that these patency changes be reciprocal across the two sides of the nose. It is often emphasized that the reciprocal changes be of equal amplitude in the two air passages, thereby producing side to side alternations in the side of greatest airflow, with total flow remaining constant (2, 5). Thus, in the idealized cycle, the left and right sides have identical periods, are 180° out of phase, and have similar mean airflow and amplitude. In practice, however, many subjects fail to show all three characteristics. For example, patency changes can be rhythmic in the absence of reciprocal bilateral alternation (e.g., Stoksted (6), Fig. 4, subject 17). Such subjects create a dilemma. They can be disregarded in order to consider only ‘pure’ nasal cycles, or they can be incorporated, but at the cost of blurring the classic nasal cycle definition.

This dilemma has been exacerbated by differing definitions and methods of quantifying rhythmicity. Some investigators measure cycle length as the interval between recurring points within a single nasal airway (7) while others take it to be the interval between graphical crossings of the two airway functions (8). A common practice is to estimate period

