The social-neurophysiological model of tinnitus: Theory and practice

Zhicheng Li a, Ruolei Gu b, Xiangli Zeng a,*

a Hearing and Balance Rehabilitation Centre, Department of Otolaryngology Head and Neck Surgery, The Third Affiliated Hospital of Sun Yat-sen University, Guangzhou 510630, China
b Key Laboratory of Behavioral Science, Institute of Psychology, Chinese Academy of Sciences, Beijing 100101, China

Received 2 May 2013; received in revised form 18 August 2013; accepted 2 September 2013

In recent years, more and more studies have been carried out to discover the bio-psycho-social pattern inside different kinds of neurological disorders by taking the social factor into account.1 Inspired by this research trend, this paper discusses the underlying mechanism of tinnitus from the perspective of social psychology, and proposes a new model of tinnitus, which combines Jastreboff’s traditional theory2 with the considerations of social factors. Empirical data that directly support this model are relatively few. However, we argue that future research on this model will yield valuable information with regard to the mechanisms of clinically severe tinnitus.

The neurophysiological model of tinnitus, which was proposed by Jastreboff,2 is widely recognized as an important theory in the field of otology, and helps in connecting the occurrence and development of tinnitus with abnormalities in cognitive, emotional, and behavioral systems.3,4 However, this model ignores the fact that human beings are social animals. Seeing that the social environment plays a crucial role in individual wellbeing, and that tinnitus patients’ experience of social contexts may be shaped by their disorder, the social factor should not be omitted when investigating the occurrence and development of tinnitus.

We found that several clinical problems, some of which have been reported in our previous studies,5,6 based on traditional clinical diagnosis and medical treatment cannot be explained from a medical or neurophysiological perspective. In our opinion, due to the lack of accurate understanding of tinnitus, which shares many heterogeneous symptoms with various ontological and medical disorders,7 patients may have difficulty in correctly understanding their issues and thus are likely to accept the folk understandings about tinnitus. Also, there are many social factors that are closely related to, and should be accounted for by patients, to evaluate the severity of tinnitus, such as conformity, confirmation bias, social learning, authority, attribution, social support, and emotional life events.

According to the discussion above, here we propose a new model, the Social-Neurophysiological Model of Tinnitus (see Fig. 1), which contains the descriptions of both the tinnitus patients’ neurophysiological system and the social information system.

The neurophysiological system describes the processing of tinnitus signal and the corresponding physiological-psychological-behavioral relationship in the human body. As Jastreboff2 highlighted, the neurophysiological system determines the physical, psychological, and behavioral responses to tinnitus. This system is in charge of the perception and cognitive processing of tinnitus, and the abnormality of this system leads to irregular responses to tinnitus and damaged behavioral regulation.

* Corresponding author. Department of Otolaryngology Head and Neck Surgery, The Third Affiliated Hospital of Sun Yat-sen University, 600 Tianhe Road, Tianhe District, Guangzhou 510630, China.
E-mail address: zengxl_2002@aliyun.com (X. Zeng).
Meanwhile, the social information system receives various information about tinnitus from a social environment, as well as other kinds of daily information, which influences the interpretation and mental representation of tinnitus experience. The emotional feelings elicited by tinnitus are also modulated by this system. The interactions between the neurophysiological system and the social information system are summarized as follows:

1. Social information mobilizes various parts of the cerebral cortex that are involved in the cognitive processing and evaluation of tinnitus.
2. Social information affects the assessment and emotional experience of tinnitus through the influence of many different social factors, including conformity, authority, and attributions, whereas this effect is based on the cerebral cortex and the limbic system.
3. The neural and behavioral responses to tinnitus are not solely intrinsic. Rather, they are largely derived through the social learning process from the environment, such as observation and imitation from other patients.
4. Due to the emotional congruence effect, daily information, whether or not about tinnitus, is also involved in the individual assessment of tinnitus and the generation of emotional feelings, the process of which is mainly based on the autonomic nervous system.

In conclusion, we suggest that although the neurophysiological system controls the perception and basic cognitive processing of tinnitus signals, the social information system is associated with the interpretation and emotional experience of this kind of signals on a higher level. The interaction between these two systems affects tinnitus patients' attitudes to their disorder by integrating perceptual and social information, and determines their emotional and behavioral responses to tinnitus accordingly. Furthermore, these responses could potentially become social information that modifies other peoples' attitudes towards tinnitus through social learning.

Accordingly, it is clear that future research of the potential influence of social information on individual experience of tinnitus will help with psychotherapy (e.g., cognitive–behavioral therapy) that conducts on tinnitus patients, which not only improves the effect of treatment, but also inhibits negative experience and feelings to tinnitus. Moreover, it is worth pointing out that "prevention is better than cure". That is to say, clinicians and researchers should try their best to provide trustworthy and reliable knowledge about tinnitus in our society. With this kind of social support, patients would be able to deal with the negative experience of tinnitus better and avoid unwanted suffering.

Acknowledgments

This paper was supported by the Science and Technology Program of Guangzhou (2013KP089) and the Scientific Foundation of Institute of Psychology, Chinese Academy of Sciences (Y2CQ013005).

References

The social-neurophysiological model of tinnitus


