uni-edit
English Editing & Translation

Sample of Level 3 English Editing

Field of research: Medicine

Mean gain distribution at the first and second bends of the human external auditory canal

1. INTRODUCTION

The ear canal, or external auditory canal (EAC), ~~The~~ has a mean length ~~of ear canal for~~in adults of~~is~~ 22.5 mm [1]. ~~The ear canal~~ Consisting of an outer cartilaginous portion, in which~~includ~~ the~~ing~~ first ~~bend,~~and second ear canal bends are located, and ~~tympanum (the~~an inner bony portion that runs through the temporal bone and terminates at the tympanic membrane (TM)~~)~~, ~~for auditory function,~~the EAC plays an important role in sound transmission by amplifying incoming sounds at certain frequencies. Despite this important role, h~~H~~owever, the ~~amplified gain distribution~~ influence of~~d by~~ the first bend and second bend of the ~~*in vivo*~~ human ear canal on amplified gain distribution i~~was~~ still underrepresented in current literature.

Sound pressure transmission is approximately uniform throughout the ~~external auditory canal (~~EAC~~)~~ ~~for~~ at low frequencies. ~~For~~ At high frequencies, ~~however,~~ sound pressure transmission can vary longitudinally along the ear canal towards the ~~tympanic membrane (~~TM [2]~~)~~. For the purposes of ~~the analysis~~analyzing ~~of~~ standing waves [2], it is convenient to consider the ear canal as a

Comment [NiC1]: CHECK: 'amplified gain distribution' does not seem to be a phrase that is commonly used in the literature. Could this be better written as 'sound pressure gain' or 'sound pressure distribution' (as in the Ravicz article)?

Comment [NiC2]: CHECK: it's not clear exactly what you mean by 'was still underrepresented'. Do you mean that not enough attention has been paid to the amplifying influence of the first and second bends? If so, then perhaps this might be better phrased as: '...has not been given sufficient attention in the literature'.

uniform cylindrical tube of length *L* and diameter *d*. Sound pressure variations along the ear canal length *L* can become significant ~~at some frequencies. Once~~ when the sound wavelength (λ) is $< 10L$~~, spatial variations in sound pressure within the ear canal are big~~. ~~However, at higher frequencies, sound pressures vary substantially longitudinally along the ear canal [2].~~ Variations ~~across~~ in the ear canal diameter *d* can become significant ~~near~~with changes in ear canal cross-section or mechanical properties, ~~that close to~~such as near the TM [3]. The first mode that creates these transverse variations can propagate along the ear canal at frequencies where λ $< d/0.59$ [4, 5]. T~~However, t~~he ear canal is not a uniform tube, however, and its noncircular nature lowers the frequency at which~~.~~ sSpatial variations can influence ~~the~~ sound pressure in the EAC. This spatial variation in sound pressure occurs at audible frequencies.

Three approaches have been used to measure the outer ear transfer function. One approach use~~s~~ing a mathematical model of the ear canal [6, 7]~~ is~~ to ~~measure~~ estimate the sound pressure at the TM~~.~~ ~~having~~after first measuring~~ed~~ the sound pressure at~~within~~ a convenient location ~~from~~ relatively distant to the TM. The second approach that has been used in~~for~~ studies of human hearing ~~is to~~ calibrates the earphone output in an "artificial ear" that mimics the essential dimensions of the ear canal. Such an approach has also been used to calibrate audiometric earphones [8]. ~~However,~~ Ravicz et al. (2007) have shown, however, that an artificial ear technique might underestimate the *in situ* sound pressure by 5 to 15 dB

Comment [BeK3]: CHECK: By 'near', did you mean 'with'?

Comment [NiC4]: CHECK: is this a correct interpretation of what you intended to say?

Comment [BeK5]: CHECK: The use of 'convenient location' here does not seem to be very scientific. I would either rephrase this or specify exactly as to what this location.

between 4 and 6 kHz. The resonance of the ear canal should be measured based on different depths within theof ear canals. The third most common approach [1, 9] is throughо utilizes real ear measurement (REM) by means of , which utilizesith a probe-tube microphone to measure the sound pressure at a point near the TM. REM used inIn the clinical contextuse, REM is focusedwasmore commonly used emphasized on the to record resonance measurements close to the tympanic membrane instead of discussingrather than to mapping the distribution of sound pressuresfield and the resonance withinof the unilateral ear canal. However, theIt does not measure resonance was not measured at the other depths within the EAC, such as at the including first and bend and second bends of the canal, for example. in EAC.

Comment [NiC6]: CHECK: do you mean 40 and 60 instead of 4 and 6? The Ravicz article quotes 'between 40 and 60 kHz'.

Comment [NiC7]: CHECK: do you mean the resonance should be measured at different depths within the ear canal, or that it should be measured in multiple canals of different lengths? The second half of this sentence should be rewritten to clarify this point.

Comment [NiC8]: CHECK: 'third most common' means that it is third on a list of the most popularly used approaches. Is this what you mean? If you just mean that it is the third approach you will discuss in your paper, then 'most' is unnecessary and can be deleted.

Comment [NiC9]: CHECK: is this interpretation consistent with what you intended to say?