

Abstract Selection

Trends in medical visits and surgery for otitis media among children. Croteau, N., Hai, V., Pless, I. B., Infante-Rivard, C. Department of Community Health, Sainte-Justine Hospital, Montreal, Quebec, Canada. *American Journal of Diseases of Children* (1990) May, Vol. 144 (5), pp. 535-8.

We conducted a population-based descriptive study of medical visits and surgical interventions for otitis media among 3- and 7-year-old children from the Montreal, Canada, area over the period 1981 to 1983. The number of children seen annually for otitis media increased over that time. An increase in the event rate of otitis media was observed; there was also an increase in the rate of myringotomy with ventilatory tube insertion. The rate of surgery reached a level, among 3-year-old children in particular (25.0 per 1000 cases of otitis among boys, 23.9 per 1000 cases of otitis among girls), that some authors have termed 'epidemic'. Comparison of the trends in the rates of surgical interventions and the rates of medical consultations for otitis suggest that most of this so-called surgical epidemic for middle ear effusion is related to a higher frequency of the underlying condition and not to more aggressive patterns of therapy during the years studies. Author.

The effect of 100% oxygen on the propagation of tracheobronchial injury during high-frequency and conventional mechanical ventilation. Wiswell, T. E., Wiswell, S. H. Department of the Army, Walter Reed Army Medical Center, Washington, DC 20307-5001. *American Journal of Diseases of Children* (1990) May, Vol. 144 (5), pp. 560-4.

We compared the histologic alterations in the tracheae and bronchi of 30 premature baboons that were ventilated with either 100% or prn (as needed) oxygen (the fraction of inspired oxygen necessary to maintain the PaO₂ between 50 and 80 mm Hg). The baboons were treated with either conventional positive-pressure ventilation (seven were treated with 100%; seven, prn) or high-frequency oscillatory ventilation (eight were treated with 100%; eight, prn). We used a semiquantitative scoring system to grade tissue changes in the trachea, carina, and main-stem bronchi. The fraction of inspired oxygen for all prn animals fell to a plateau of approximately 0.28 after 36 hours, where it remained for the duration of the study. The 15 100% baboons were ventilated for a mean of 139 hours, while the 15 prn baboons were ventilated for a mean of 151 hours. The findings in all conventional and oscillator-ventilated animals were similar and characterized by squamous metaplasia, cilia loss, and goblet cell loss. For both methods of ventilation, there were no differences in the injury scores between 100% and prn oxygen-treated animals. We concluded that there were no additional tracheobronchial histologic changes with 100% oxygen compared with prn oxygen. Author.

Postoperative sore throat. A comparison after premedication with papaveretum/hyoscine or temazepam. Valentine, S., McVey, F. K., Coc, A. Department of Anaesthetics, Bristol Royal Infirmary. *Anaesthesia* (1990) Apr, Vol. 45 (4), pp. 306-8.

A randomised double-blind trial was conducted to study the use of two commonly used premedication regimens and the subsequent incidence of sore throat. Fifty adult patients who underwent routine surgery were anaesthetised in a standard fashion after premedication with papaveretum and scopolamine or temazepam, and interviewed after operation to assess the presence of sore throat. A significantly higher incidence of sore throat was associated with the use of papaveretum and scopolamine. Author.

Adverse respiratory events in anesthesia: a closed claims analysis. Caplan, R. A., Posner, K. L., Ward, R. J., Cheney, F. W. Department of Anesthesiology, University of Washington School of Medicine, Seattle. *Anesthesiology* (1990) May, Vol. 42 (5), pp. 828-33. Adverse outcomes associated with respiratory events constitute the single largest class of injury in the American Society of Anesthesiology Closed Claims Study (522 of 1541 cases; 34%). Death or brain damage occurred in 85% of cases. The median cost of settlement or jury award was +200,000. Most outcomes (72%) were considered preventable with better monitoring. Three mechanisms of injury accounted for three-fourths of the adverse respiratory events: inadequate ventilation (196; 38%), esophageal intubation (94; 18%), and difficult tracheal intubation (87; 17%). Inadequate ventilation was used to describe claims in which it was evident that insufficient gas exchange had produced the adverse outcome, but it

was not possible to identify the exact cause. This group was characterized by the highest proportion of cases in which care was considered substandard (90%). The esophageal intubation group was notable for a recurring diagnostic failure: in 48% of cases where auscultation of breath sounds was performed and documented, this test led to the erroneous conclusion that the endotracheal tube was correctly located in the trachea. Claims for difficult tracheal intubation were distinguished by a comparatively small proportion of cases (36%) in which the outcome was considered preventable with better monitoring. A better understanding of respiratory risks may require investigative protocols that initiate data collection immediately upon the recognition of a critical incident or adverse outcome. Author.

Mechanism of thiopental-induced constriction of guinea pig trachea. Lenox, W. C., Mitzner, W., Hirshman, C. A. Department of Anesthesia Johns Hopkins Medical Institutions, Baltimore, Maryland. *Anesthesiology* (1990) May, Vol. 72 (5), pp. 921-5.

The authors studied the effects of thiopental on baseline airway tone in intact guinea pig tracheas using a preparation where the epithelial (inside) and serosal (outside) surfaces were isolated. Whole tracheas were excised, cannulated, and mounted in 50-ml tissue baths. The serosal and epithelial surfaces were perfused via separate circuits with Krebs-Henseleit solution. All data were expressed as a percent of constriction produced by 2×10^{-6} M carbachol (a concentration that elicited a 90 + % of maximal constriction). Thiopental elicited a dose-dependent constriction in all 25 tracheas. Increases in tone were first seen at 10^{-5} M (14.3 +/ - 1.84%; mean +/ - SEM) and reached a peak at 10^{-3} M (29 +/ - 3.16%; P less than .0001). Responses to thiopental were similar when the epithelium was removed, when thiopental was added to the inner perfusate, and when tracheas were pretreated with 10^{-5} M pyrilamine. Constriction was entirely inhibited by pretreatment with indomethacin 10^{-5} M. The authors conclude that thiopental, at concentrations in the clinical range, causes a reproducible dose-dependent constriction of guinea pig trachea. This effect is mediated by constrictor prostaglandins. Author.

Postoperative sore throat: effect of oropharyngeal airway in orotracheally intubated patients. Monroe, M. C., Gravenstein N., Saga-Rumley, S. Department of Anesthesiology, University of Florida College of Medicine, Gainesville. *Anesthesia and Analgesia*, (1990) May, Vol. 70 (5), pp. 512-6.

The incidence of postoperative sore throat was evaluated prospectively in 203 orotracheally intubated patients undergoing general anesthesia for surgical procedures. Patients were randomly assigned to have either a plastic oropharyngeal airway or a gauze bite-block in place during the operation and were evaluated for the occurrence of postoperative sore throat by questionnaire the day after surgery. The incidence of postoperative sore throat was 35.2% in the oropharyngeal airway group and 42.5% in the gauze bite-block group, not a statistically significant difference (P greater than 0.05). The incidence of postoperative sore throat was significantly higher when blood was noted on the airway instruments (64.5%) than when it was not (30.9%) (P less than 0.01). There was an association, although not statistically significant, between the incidence of postoperative sore throat and intubation by an anesthesia resident with less than 1 yr experience (P = 0.064). The data from this study indicate that the intraoperative use of hard plastic oropharyngeal airways, compared with the use of soft gauze bite-blocks, does not increase the incidence of postoperative sore throat. These data also suggest that pharyngeal trauma may contribute significantly to the development of postoperative sore throat. We suggest that aggressive oropharyngeal suctioning may contribute to this pharyngeal trauma. Author.

Hearing loss after spinal anesthesia is related to needle size. Fog, J., Wang, L. P., Sundberg, A., Mucchiano, C. Department of Anesthesia, Eksjo-Nassjo Hospital, Sweden. *Anesthesia and Analgesia* (1990) May, Vol. 70 (5), pp. 517-22.

Audiograms were performed preoperatively and two days postoperatively in 28 patients given spinal anesthesia for transurethral resection of the prostate. In 14 patients 22-gauge and in 14 patients 26-gauge spinal needles were used. Hearing loss of 10 dB or more at any frequency was observed in 13 of 14 patients in the 22-gauge group and in 4 of 14 patients in the 26-gauge group. There was a

statistically significant reduction in hearing level in the low-frequency range in patients in whom the 22-gauge needle was used. Hearing loss was unilateral at five frequencies and bilateral at one frequency. No cases of postspinal headache occurred. Audiometry may be a more sensitive indication of cerebrospinal fluid leak than postspinal headache. Author.

The pathobiology of ozone-induced damage. Steinberg, J. J., Gleason, J. L., Gil, D. Department of Pathology, Albert Einstein College of Medicine, Bronx, New York. *Archives of Environmental Health* (1990) Mar-Apr, Vol. 45 (2), pp. 80-7. Ozone remains one of the three most important air pollutants worldwide, yet little direct documented evidence of its genotoxicity exists. The interest in the pathology of ozone exposure and the molecular events that underlie its course stems from DNA damage caused by oxygen stress including hydroxyl radicals, superoxide, singlet oxygen, and hydrogen peroxide. Although the tissue damage associated with ozone inhalation occurs at both the conducting airway and the alveolus, the cellular and mechanistic processes underlying these events are less well understood. Ozone leads to the oxidative decomposition of polyunsaturated fatty acids. Ozone also depresses DNA replication in V79 Chinese hamster lung fibroblasts in a dose-dependent fashion (concentration, 1-10 ppm), which indicates that ozone or its reaction products may interact directly with DNA and inhibit replication. Ozone also linearizes circular DNA and induces ozone-sensitive mutant and pneumocytes to repair its DNA. DNA adducts have been implicated in aging, cellular transformation, mutagenesis, carcinogenesis, and cell death: DNA adducts are products of free radical damage. These events are all common in ozone exposure. Finally, DNA-binding proteins are potent positive and negative regulators, enhancers, or silencers of gene expression. Part of their action may be related to their ability to initiate the binding sequence of DNA transcription proteins and thus form complexes. Alteration of DNA-binding sites by ozone adducts may effect mRNA transcription due to altered binding by DNA-binding proteins. This altered transcription has been shown to effect growth factors involved in collagen and matrix regulation. The present review will address some of the complexities involved in ozone exposure. Author.

Acupressure and motion sickness. Bruce, D. G., Golding, J. F., Hockenull, N., Pethybridge, R. J. Institute of Naval Medicine, Gosport, Hants, England. *Aviation Space and Environmental Medicine* (1990) Apr, Vol. 61 (4), pp. 361-5. The effectiveness of the 'Sea Band' acupressure band compared with placebo and hyoscine (0.6 mg), also known as scopolamine, to increase tolerance to a laboratory nauseogenic cross-coupled motion challenge was assessed using 18 subjects. The results showed that the subjects had a significant increase in tolerance with hyoscine but had no increase in tolerance with the 'Sea Band' or placebo. Possible reasons for the failure to show any significant protection from the use of these acupressure bands are insufficient movement of the wrist to provide continuous stimulation, and/or the likelihood that only a minority of the population would show non-negligible benefit as experience with medical acupressure would suggest. The application of transcutaneous electrical nerve stimulation may be worthy of study. Author.

Angiotensin II inhibits acetylcholine release from human temporal cortex: implications for cognition. Barnes, J. M., Barnes, N. M., Costall, B., Horovitz, Z. P., Ironside, J. W., Naylor, R. J., Williams, T. J. Postgraduate Studies in Pharmacology, School of Pharmacy, University of Bradford, U.K. *Brain Research* (1990) Jan 22, Vol. 507 (2), pp. 341-3. Angiotensin II was shown to inhibit potassium-stimulated release of (3H) acetylcholine from slices of fresh human temporal cortex, obtained at surgery, and subsequently loaded with (3H)choline for the biochemical analyses. The inhibitory effect of angiotensin II was antagonised by the specific angiotensin II receptor antagonist (1-sarcosine, 8-threonine)-angiotensin II. High affinity binding sites were identified in the human temporal cortex using (125I) angiotensin II, and may provide the functional site of action of angiotensin II to modify (3H) acetylcholine release. Author.

Dynamic temporal properties of effective connections in rat dorsal cochlear nucleus. Gochin, P. M., Gerstein, G. L., Kaltenbach, J. A. Department of Psychology, Princeton University, NJ 08540. *Brain Research* (1990) Mar 5, Vol. 510 (2), pp. 195-202. In a prior report we presented evidence that functionally connected dorsal cochlear nucleus (DCN) neurons in close proximity can show differing peristimulus time histograms (PSTHs) in response to the same stimulus. We wished to further investigate how interconnections between such neurons might participate in the PSTH patterns. Methodology has recently been developed which permits measurement of rapid changes in effective connectivity between

neuron pairs: the normalized joint PSTH. Using this technique we have observed that rapid changes in effective connectivity do occur in the DCN. These observations demonstrate that the effect of one DCN neuron on another cannot necessarily be understood by sequential recordings from single units, even if anatomical connectivity can be established. Author.

The role of pharyngoplasty in congenital neurogenic speech disorders. Davison, P. M., Razzell, R. E., Watson, A. C. Royal Hospital for Sick Children, Edinburgh. *British Journal of Plastic Surgery* (1990) Mar, Vol. 43 (2), pp. 187-96. Children with dysarthria are often seriously handicapped by their inability to communicate. Velopharyngeal incompetence may contribute to their speech difficulties but the indications for pharyngoplasty are poorly defined. The speech of 41 children, thought to have a defect of neurological origin and referred for possible pharyngoplasty, was assessed by a speech therapist, by nasopharyngoscopy and by multiview videofluoroscopy. These investigations revealed that 16 had velopharyngeal incompetence, with a neurological aetiology, and might be expected to benefit from pharyngoplasty. Independent assessment of the intelligibility of these 16 children before and after pharyngoplasty has been related to their preoperative oropharyngeal function. The majority benefited from surgery, some substantially. In particular, good lip and tongue function are shown to be necessary to achieve improved intelligibility. The roles of age, intelligence and aetiology in the success of pharyngoplasty are discussed. Author.

Final report of the general clinical results of the British Institute of Radiology fractionation study of 3F/wk versus 5F/wk in radiotherapy of carcinoma of the laryngo-pharynx. Wiernik, G., Bates, T. D., Bleehen, N. M., Brindle, J. M., Bullimore, J., Fowler, J. F., Haybittle, J. L., Howard, N., Laing, A. H., Lindup, R. *et al.* British Institute of Radiology, London. *British Journal of Radiology* (1990) Mar, Vol. 63 (747), pp. 169-80. The 10-year follow-up of a clinical trial involving the comparison of 3F/wk versus 5F/wk in radiotherapy of squamous cell carcinoma of the larynx and hypopharynx has now been completed. The trial involved an intake of 734 patients between 1966 and 1975. The classification of all patients has been revised to conform with the latest TNM publication. A reduction in total dose was made for 3F/wk compared with 5F/wk. This varied between 13% and 11% in centres treating over three weeks and six weeks, respectively. No statistically significant differences have been found between the two arms (3F/wk versus 5F/wk) of the trial in any of the main group analyses. A number of sub-group analyses relating to survival, tumour-free and laryngectomy-free rates and to the comparison of acute or late normal-tissue radiation damage have also been performed. No differences have been found that could be considered to be statistically significant in relation to the particular sub-group. Previous interim reports suggested minor differences in sub-group analyses between the 3F/wk and 5F/wk regimes in this trial; these have diminished now that the full follow-up data are available. This trial has provided evidence on which clinicians may base their choice between either a 3F/wk fractionation regime or a conventional 5F/wk treatment protocol in the treatment of carcinoma of the laryngo-pharynx. Author.

Nasopharyngeal carcinoma: pattern of skeletal metastases. Sham, J. S., Cheung, Y. K., Chan, F. L., Choy, D. Department of Radiotherapy and Oncology, Queen Mary Hospital, Hong Kong. *British Journal of Radiology* (1990) Mar, Vol. 63 (747), pp. 202-5. The records of 153 nasopharyngeal carcinoma patients with skeletal metastases were reviewed. The skeletal system was the most common site of distant metastases. The patients who developed skeletal metastases were significantly younger than those without skeletal metastases, although there was no difference between sexes. The pattern of skeletal involvement conforms to the general pattern, the spine and pelvis being the common sites. The first region of involvement was lumbar spine (28.4%), then dorsal spine (27.7%), sacrum and pelvis (16.3%), femur (9.9%), rib and sternum (7.8%), humerus (5.0%), cervical spine (3.5%) and skull vault (1.4%). Radiologically, the lesions were lytic in 66.0%, mixed lytic and sclerotic in 12.8% and sclerotic in 21.2%. The time to development of symptomatic skeletal metastases of mixed or sclerotic nature was significantly longer than lytic lesions, and patients with mixed or sclerotic metastases also had better survival. Author.

Survival analysis of 378 surgically treated cases of laryngeal carcinoma in south Sardinia. Barra, S., Talamini, R., Proto, E., Bidoli, E., Puxeddu, P., Franceschi, S. Epidemiology Unit, Aviano Cancer Center, Italy. *Cancer* (1990) Jun 1, Vol. 65 (11), pp. 2521-7. The effect of various patient and tumor characteristics were evaluated in 378 laryngeal carcinomas treated only surgically between

November 1974 and December 1987 at the Ear, Nose and Throat Clinic of Cagliari Medical University in South Sardinia. The overall three-year survival rate was 68%, the five-year survival rate was 61% (approximate 95% confidence interval (CI), 54–68%), and then a plateau seemed to emerge, with the ten-year survival rate being 51%. Tumor ulceration exerted a strong influence on survival: patients with ulcerated tumors had a twofold (95% CI, 1.4–2.9%) higher death rates. Conversely, the influence of tumor site and type of operation was not statistically significant in the multivariate analysis. A median delay in diagnosis of four months was found, with 30% of patients reporting an interval longer than six months between first symptoms and referral to a physician; overall, however, the influence of delay in diagnosis on survival rate was not significant. Dysphonia seemed to be the symptom less promptly recognized by the patients. Author.

The otologic significance of cleft palate in a Sri Lankan population. Albert, D. M., Garrett, J., Specker, B., Ho, M. Department of Otolaryngology, Hospital for Sick Children, London, England. *Cleft Palate Journal* (1990) Apr, Vol. 27 (2), pp. 155–61; discussion 174–5.

The otologic findings from 197 subjects with repaired and unrepaired clefts and 121 noncleft controls are presented. All data were collected in Sri Lanka during a 3-week period attached to the Sri Lanka Project in 1986. Subjects were examined otoscopically and also tested audiometrically if they were able to perform a pure-tone audiogram, a performance test, or a distraction test. Subjects with clefts of the palate were found to have fewer otoscopically normal ears than the controls. A comparison between subjects with unrepaired and repaired palates revealed a similar rate of otoscopically normal ears in subjects older than 10 years of age. Comparisons for younger ages could not be performed because of a lack of subjects less than 10 years of age who had repaired palates. The impedance data were used to verify the accuracy of otoscopy in detecting effusion. Author.

Otoacoustic emissions in human ears: normative findings. Martin, G. K., Probst, R., Lonsbury-Martin, B. L. Department of Otorhinolaryngology and Communicative Sciences, Baylor College of Medicine, Houston, Texas. *Ear and Hearing* (1990) Apr, Vol. 11 (2), pp. 106–20.

Otoacoustic emissions can be separated into two interrelated classes according to the type of eliciting stimulus. On the basis of this categorization, four discrete subtypes can be recognized that include spontaneous, transiently evoked, stimulus-frequency, and distortion-product otoacoustic emissions. Methods of recording and findings in the ears of normally hearing humans are reviewed for each emission type. Author.

Evoked otoacoustic emissions in normal-hearing infants and children: emerging data and issues. Norton, S. J., Widen, J. E. Department of Hearing and Speech, University of Kansas Medical Center, Kansas City 66103. *Ear and Hearing* (1990) Apr, Vol. 11 (2), pp. 121–7.

Evoked otoacoustic emissions (EOAEs) are a promising tool for evaluating cochlear status in children. Preliminary data from normal-hearing subjects ranging from birth to 29.9 years old are discussed. EOAEs are present and robust in infant ears. However, there is a statistically significant decrease in EOAE amplitude for a fixed stimulus level with increasing age even in a carefully screened sample. At the present time it is unclear if these age-associated changes are due to normal developmental changes in the external and/or middle ear acoustics, normal developmental changes in cochlear mechanics and/or everyday cochlear wear and tear. Issues related to further application of evoked emissions to pediatric populations are discussed. Author.

Click evoked otoacoustic emissions in neonatal screening. Stevens, J. C., Webb, H. D., Hutchinson, J., Connell, J., Smith, M. F., Biffin, J. T. Department of Medical Physics and Clinical Engineering, Royal Hallamshire Hospital, Sheffield, UK. *Ear and Hearing* (1990) Apr, Vol. 11 (2), pp. 128–33.

Seven hundred and twenty-three neonates under intensive care have been tested by evoked otoacoustic emissions (EOAE) and the auditory brain stem response (ABR) to investigate the use of EOAE as a test for hearing impairment. Three hundred and thirty-one have had follow-up tests to the age of at least two years. The EOAE test has been found to be practical and quick to perform. The proportion of NICU infants producing a recordable EOAE is 80%, and the sensitivity and selectivity to the ABR result in the period up to three months post due date is 93 and 84%, respectively. These figures are high enough and the reduction in time compared to ABR is sufficient for the EOAE to be considered as the primary screen. The follow-up data show mixed results with both false positives and false negatives present. The incidence of severe hearing impairment is close to that expected from retrospec-

tive studies at two in 331 (1 bilateral, 1 unilateral). Firm conclusions on the sensitivity of EOAE to long-term hearing impairment await the results from larger numbers of infants and further follow up data. Author.

Evoked otoacoustic emissions in sensorineural hearing impairment: its clinical implications. Tanaka, Y., Suzuki, M., Inoue, T. Department of Otolaryngology, Dokkyo University, School of Medicine Koshigaya Hospital, Saitama, Japan. *Ear and Hearing* (1990) Apr, Vol. 11 (2), pp. 134–43.

This study was performed for the purpose of determining whether or not evoked otoacoustic emissions are useful as a clinical test. Two hundred and twenty-six sequences of the emission in response to stimulus tone bursts were averaged. The detection threshold of the emission was elevated in ears of inner ear impairment with profound sensorineural hearing loss, such as inner ear anomaly, mumps deafness, or sudden deafness, but it was not observed in ears of functional deafness. The mean interaural differences of emission threshold were near 35 dB in unilateral inner ear impairments with profound hearing loss. There was a positive correlation between the interaural difference of audiometric threshold and that of emission threshold in sudden deafness ears with various degrees of hearing loss. The incidence of continuous emission, whose duration was longer than six msec, was 30% in normal hearing ears and it was close to 90% in ears with bilateral or unilateral dip type hearing loss. The result was verified in a survey of a junior high school brass band. The conclusion is that there is clinical usefulness for the evoked otoacoustic emissions in evaluating cochlear function and in predicting noise susceptibility. Author.

The clinical utility of distortion-product otoacoustic emissions. Lonsbury-Martin, B. L., Martin, G. K. Department of Otorhinolaryngology and Communicative Sciences, Baylor College of Medicine, Houston, Texas. *Ear and Hearing* (1990) Apr, Vol. 11 (2), pp. 144–54.

Otoacoustic emissions permit, for the first time, an unbiased means of examining the preneural elements of the peripheral auditory pathway that make the initial contribution to the perception of acoustic stimuli. Distortion-product otoacoustic emissions (DPOAEs) represent one type of evoked emission that has significant potential for becoming an important test in the audiometric evaluation of hearing capacity. In the present review, selected examples of several forms of sensorineural hearing loss demonstrate that DPOAEs have the ability to act as objective indicators of the frequency/level configuration of the conventional audiogram in cases in which hearing impairment results primarily from damage to the outer hair cells. In contrast, normal DPOAE functioning, in the presence of a significant hearing loss, indicates a locus of damage central to the region of the outer hair cells. Like the other emitted responses, DPOAEs can be measured noninvasively, are highly repeatable, under test-retest conditions, and are simple and rapid to detect using microcomputer-based instrumentation. Further, DPOAEs test both the 'threshold' and suprathreshold levels of outer hair-cell activity in the form of response/growth functions, over a 30- to 40-dB stimulus range. In combination, these attributes indicate that DPOAEs can provide an objective and comprehensive assessment of the cochlear reserve of a given ear. Author.

Outer hair cell electromotility and otoacoustic emissions. Brownell, W. E. Department of Otolaryngology-Head and Neck Surgery, Johns Hopkins University School of Medicine, Baltimore, Maryland 21205-2195. *Ear and Hearing* (1990) Apr, Vol. 11 (2), pp. 82–92.

Outer hair cell electromotility is a rapid, force generating, length change in response to electrical stimulation. DC electrical pulses either elongate or shorten the cell and sinusoidal electrical stimulation results in mechanical oscillations at acoustic frequencies. The mechanism underlying outer hair cell electromotility is thought to be the origin of spontaneous otoacoustic emissions. The ability of the cell to change its length requires that it be mechanically flexible. At the same time the structural integrity of the organ of Corti requires that the cell possess considerable compressive rigidity along its major axis. Evolution appears to have arrived at novel solutions to the mechanical requirements imposed on the outer hair cell. Segregation of cytoskeletal elements in specific intracellular domains facilitates the rapid movements. Compressive strength is provided by a unique hydraulic skeleton in which a positive hydrostatic pressure in the cytoplasm stabilizes a flexible elastic cortex with circumferential tensile strength. Cell turgor is required in order that the pressure gradients associated with the electromotile response can be communicated to the ends of the cell. A loss in turgor leads to loss of outer hair cell electromotility. Concentrations of salicylate equivalent to those that abolish spontaneous otoacoustic emissions in patients weaken the outer hair cell's hydraulic skeleton. There is a significant diminution in the electromotile response associated with the loss in cell turgor. Aspi-

rin's effect on outer hair cell electromotility attests to the role of the outer hair cell in generating otoacoustic emissions and demonstrates how their physiology can influence the propagation of otoacoustic emissions. Author.

Current management of choanal atresia. Morgan, D. W., Bailey, C. M. Hospital for Sick Children, London, U.K. *International Journal of Pediatric Oto-Rhinolaryngology* (1990) Mar, Vol. 19 (1), pp. 1–13.

Recent advances in the management of choanal atresia are outlined in the context of our experience at the Hospital for Sick Children, Great Ormond Street, London. Fifty cases were treated over the 6-year period 1982–1988. There was a 72% incidence of other associated congenital anomalies and 30% of patients had the CHARGE association. The advantages and pitfalls of pre-operative computerised axial tomography are illustrated. The surgical results and complications following the trans-nasal approach are discussed. Eighty-four percent of patients had their atresias successfully corrected 12% restenosed to some extent, and 4% obliterated. The most significant complications were palatal fistulae (8%) and columella ulceration from the Portex tube stents (8%). Author.

A comparison of maximum length and Legendre sequences for the derivation of brain-stem auditory-evoked responses at rapid rates of stimulation. Burkard, R., Shi, Y., Hecox, K. E. Department of Communication Disorders, Boston University, Massachusetts 02215. *Journal of Acoustical Society of America* (1990) Apr, Vol. 87 (4), pp. 1656–64.

Experiments were performed in which brain-stem auditory-evoked responses (BAERs) were elicited by two types of pseudorandom pulse trains: maximum length sequences (MLS) and Legendre sequences (LGS). In experiment 1, each pulse sequence was presented at 50 dB nHL with minimum pulse intervals varying from 1 to 10 ms. Wave V latency increased and wave V amplitude decreased with decreasing minimum pulse intervals, with no significant effect of the type of sequence (MLS vs LGS), and no significant interaction between sequence and minimum pulse interval in terms of wave V amplitude or latency. In a second experiment, the minimum pulse interval was held constant at 4 ms, while MLS and LGS levels were varied from 20 to 60 dB nHL. With increasing click intensity, there is a decrease in wave V latency and an increase in wave V amplitude. There was no significant effect of type of sequence (LGS vs MLS) or interaction between type of sequence and stimulus intensity for wave V amplitude or latency. Despite the obvious violation of the assumptions (linearity and stationarity) underlying the application of maximum length sequence analysis and Legendre sequence analysis, both techniques produced reliable responses remarkably in morphology to evoked responses obtained by conventional averaging. The results of these experiments support the possibility that analysis methods based on pseudorandom pulse sequences may prove more efficient in data collection and provide a more thorough description of the electrophysiologic behavior of the auditory system compared to conventional averaging. Author.

Positional and positioning vertigo and nystagmus. Brandt, T. Neurologische Universitätsklinik, Klinikum Grosshadern, Munchen, F.R.G. *Journal of Neurosurgery* (1990) Jan, Vol. 95 (1), pp. 3–28. Positional and positioning vertigo and nystagmus syndromes can be attributed to either peripheral or central vestibular dysfunction. The most common form is benign paroxysmal positioning vertigo which is caused by cupulolithiasis into the posterior semicircular canal. Other labyrinthine manifestations such as positional alcohol nystagmus, positional nystagmus with macroglobulinaemia and 'heavy water' or glycerol ingestion occur because of a specific gravity differential between the cupula and the endolymph (buoyancy mechanism). Neurovascular compression of the vestibular nerve may be a causative factor for 'disabling positional vertigo' which is an insufficiently described entity. Hesitation is highly justifiable since retromastoid craniectomy for microvascular decompression is the recommended management. Central positional vertigo is either induced by head movements which result in a transient ischaemia of the pontomedullary brainstem, or by a change in head position relative to the gravitational vector. The latter is comprised of at least three forms: positional downbeat nystagmus (nodulus), positional nystagmus without concurrent vertigo, and positional vertigo with nystagmus. The site of the lesion is always near the fourth ventricle and the vestibular nuclei. The most probable explanation for the positional response is a vestibular tone imbalance caused by disinhibition of the vestibular reflexes on perception, eye, head and body position. Author.

A clinical study of joint sounds in subjects with restored occlusions. Sidelsky, H., Clayton, J. A. University of Michigan, School of Dentistry, Ann Arbor. *Journal of Prosthetic Dentistry* (1990) May, Vol. 63 (5), pp. 580–6.

It has been implied that temporomandibular joint sounds must be treated to eliminate the sounds before restorative treatments are attempted. This study explored the possibility that joint sounds do not present a problem when other symptoms are absent. A group of 35 subjects with restored occlusions were studied for the presence of temporomandibular joint dysfunction symptoms using clinical examination, questionnaires, and the pantographic reproducibility index. Forty-six per cent had some degree of temporomandibular joint dysfunction. Seventeen of 18 subjects (94%) with joint sounds were free of other symptoms. Therefore, the use of joint sounds as a symptom of temporomandibular joint dysfunction is questionable when not accompanied by other clinical symptoms. Subjects who had temporomandibular joint dysfunction symptoms were treated with occlusal splint therapy and occlusal adjustments. The period of time to eliminate the symptoms was two to 16 weeks with an average of seven weeks. This study concludes that the presence of only joint sounds does not seem to be a hindrance to restorative treatments. Author.

Hyperacusis and otitis media in individuals with Williams syndrome. Klein, A. J., Armstrong, B. L., Greer, M. K., Brown, F. R. Department of Otolaryngology and Communicative Sciences, Medical University of South Carolina, Charleston. *Journal of Speech and Hearing Disorders* (1990) May, Vol. 55 (2), pp. 339–44. Williams syndrome is characterized by cardiac defects, varying degrees of physical and developmental delay, stellate eye pattern, possible elevated serum calcium level, and elfin/pixie facial features. A problem perhaps unique to these children is hyperacusis that can be severe enough to disrupt many routine daily activities. Parental questionnaires were used to determine the prevalence of hyperacusis and otitis media in individuals with Williams syndrome. Prevalences of 95% for hyperacusis and 61% for otitis media were found. This was significantly higher than in the general population. Despite the prevalence of hyperacusis, parents of these children were not counselled about management of the problem. The audiologist may become involved with Williams syndrome patients through hearing assessment and management, parental counselling, and research. Author.

Acoustic reflex thresholds in normal and cochlear-impaired ears: effects of no-response rates on 90th percentiles in a large sample. Gelfand, S. A., Schwander, T., Silman, S. Queens College of the City University of New York, Flushing. *Journal of Speech and Hearing Disorders* (1990) May, Vol. 55 (2), pp. 198–205. Ninetieth percentile cutoffs for acoustic reflex thresholds (ARTs) were determined for a sample of 2,748 ears of 1,374 subjects with normal hearing and sensorineural loss of cochlear origin. All subjects had measurable hearing (less than or equal to 110 dB HL, ANSI-1969) at all three activator frequencies (500, 1000 and 2000 Hz). Cutoff values including 'no responses' ('absent' reflexes at 125 db HL) were higher than those excluding no responses when hearing losses were greater than about 55 dB. The 90th percentiles including the effects of no responses identified ears with retrocochlear involvement for hearing losses as great as about 756 dB. For greater hearing losses at the activator frequency, the no-response rate for both cochlear and retrocochlear cases is too high to enable them to be differentiated by acoustic reflex thresholds. The 90th percentiles are derived at each activator frequency collapsed across ears. It is therefore necessary to determine the probabilities that normal or cochlear impaired ears will have one, two, or three frequencies at which the ARTs exceed their respective 90th percentiles. It was found that among normal and cochlear-impaired ears, 12.2% have one ART elevated above the 90th percentile, but only 5.6% have two or three elevated ARTs. Clinical implications are discussed. Author.

Epistaxis due to traumatic intracavernous aneurysm: case report. Lee, J. P., Wang, A. D. Department of Surgery, Chang Gung Medical College, Taipei, Taiwan, R.O.C. *Journal of Trauma* (1990) May, Vol. 30 (5), pp. 619–22.

A patient who noted the onset of repetitive arterial epistaxis and progressive unilateral visual impairment two months after a blunt head injury was found to have a traumatic aneurysm of the cavernous portion of internal carotid artery (ICA). The epistaxis resolved and his vision recovered following a trapping procedure. This case and a review of previously reported cases emphasize the importance of early cerebral angiography in patients with post-traumatic epistaxis and visual failure. Author.

Growth of human schwannomas in the subrenal capsule of the nude mouse. Lee, J. K., Kim, T. S., Chiocca, E. A., Medhkour, A., Martuza, R. L. Department of Surgery, Massachusetts General Hospital, Boston. *Neurosurgery* (1990) Apr, Vol. 26 (4), pp. 598–605.

To develop a reproducible in vivo model for the growth of human schwannomas we implanted tumor specimens from 14 different

patients (13 acoustic neurinomas; one trigeminal schwannoma) into the subrenal capsule of 108 nude mice. In 11 experiments, the animals were implanted with only solid tumor from the surgical specimens. In two experiments, the tumor implants were made from solid tumors and cell clusters. In one experiment, the tumor implants were made from cell clusters alone. The size and neovascularization of these tumors were serially determined during a 1.5- to 3-month period. The percentages of tumors that survived or grew were 77.3% from solid tumors and 70% from cell clusters. Maximum tumor volume varied as did the time span to reach that volume. Tumor enlargement and stability correlated well with neovascularity: regressing tumor showed minimal or no neovascularity. Histological analysis of the implanted tumors showed spindle cells that are similar to the original tumor. Immunohistochemical staining for S100 demonstrated the Schwann cell nature of the implants. Analysis of genomic DNA from an acoustic neurinoma that had been implanted for three weeks was consistent with its human origin. There were no significant microscopic differences among groups receiving solid tumor implants or cell clusters. These studies suggest that implantation of human schwannomas into the subrenal capsule of the nude mouse is a reproducible method to study tumor growth that may be useful in testing potential therapeutic regimens or genetic modulation of schwannomas. Author.

Carcinoma of the lower lip with perineural extension to the middle cranial fossa. Anderson, C., Krutekoff, D., Ludwig, M. Laboratory Pathology, Hartford Hospital, Conn. *Oral Surgery, Oral Medicine, Oral Pathology* (1990) May, Vol. 69 (5), pp. 614-8.

An 81-year-old man had left labial paresthesia and a palpable mass adjacent to the left mental foramen six months after apparent adequate excision of a small (1.5 cm) primary squamous cell carcinoma of the left portion of the lower lip. Biopsy and clinical evaluation revealed recurrent squamous cell carcinoma. Subsequent left hemimandibulectomy confirmed perineural extension of tumor along the mandibular branch of the trigeminal nerve to the foramen ovale. Seven months later, the patient died of complications resulting from intracranial extension of tumor to the left cerebellopontine angle. This case illustrates the lethal potential of carcinoma of the lip due to contiguous perineural extension, even with a small primary tumor and absence of regional lymph node metastases. Author.

Spitz nevus of the palate. Report of a case. Nikai, H., Miyauchi, M., Ogawa, I., Takata, T., Hayashi, Y., Okazaki, H. Department of Oral Pathology, Hiroshima University School of Dentistry, Japan. *Oral Surgery, Oral Medicine, Oral Pathology* (1990) May, Vol. 69 (5), pp. 603-8.

A four-year-old Japanese girl with a nonpigmented nodule on the anterior portion of the palate since birth is described. The overall microscopic appearance of the lesion was very similar to that of Spitz nevus of the skin. Diagnosis of Spitz nevus (mixed epithelioid cell and spindle cell nevus) was made on the basis of the clinical and histologic criteria for differentiating this lesion from malignant melanomas and common compound nevi. Positive immunostaining of epithelioid and spindle cells for S-100 protein and neuron-specific enolase was also indicative of their nevocellular nature. Review of the cases of Spitz nevus from the literature revealed that the present case most probably represents the first reported instance of this type of nevus in the oral cavity. Author.

Prophylaxis of oropharyngeal candidiasis with fluconazole. Samonis, G., Rolston, K., Karl, C., Miller, P., Bodey, G. P. Department of Medical Specialties, University of Texas M. D. Anderson Cancer Center, Houston 77030. *Reviews of Infectious Diseases* (1990) Mar-Apr, Vol. 12, Suppl 3, pp. S369-73.

A total of 112 cancer patients who could ultimately be evaluated were randomly assigned in a double-blind study to receive either fluconazole or placebo as antifungal prophylaxis during hospitalization. Thrush, defined by appropriate lesions in the oropharynx and confirmed by scrapings and cultures positive for *Candida* species, occurred in 2% of the 58 patients given fluconazole and in 28% of the 54 patients given placebo ($P = .0003$). *Candida* species were cultured from initial throat specimens from 29 patients given fluconazole and from 26 patients given placebo. Oropharyngeal candidiasis was detected subsequently in 3% of the former patients and 54% of the latter patients ($P = .0001$). Adverse reactions that were probably due to or aggravated by fluconazole occurred in only four patients and consisted of transient liver function abnormalities in three instances and nausea and vomiting in one. Oral fluconazole is an effective agent for prophylaxis of oropharyngeal candidiasis in susceptible cancer patients. Author.

Therapy for oropharyngeal candidiasis in the immunocompromised host: a randomized double-blind study of fluconazole vs. ketoconazole. Meunier, F., Aoun, M., Gerard, M. Service de Medecine Interne, Institut Jules Bordet, Brussels, Belgium. *Reviews of Infectious Diseases* (1990) Mar-Apr, Vol. 12 Suppl 3, pp. S364-8.

Optimal therapy for oropharyngeal candidiasis, a common infection in immunocompromised patients, has yet to be clearly defined. Topical therapy is usually poorly tolerated; ketoconazole is effective but absorption is highly variable. New antifungal agents have been developed to increase the therapeutic options. Fluconazole is active against yeasts, is available in both oral and intravenous formulations, and has a pharmacokinetic profile different from that of ketoconazole. This randomized double-blind study evaluates systemic antifungal therapy with fluconazole (100 mg daily) or ketoconazole (400-mg daily) for oropharyngeal candidiasis in patients with cancer. Clinical cure was observed in 15 of 19 and 14 of 18 patients treated with fluconazole and ketoconazole, respectively. Eradication of pathogenic yeasts was documented for 10 patients in both groups. The rates of relapse were similar, but relapse occurred earlier in patients in the ketoconazole group. Overall, this study demonstrates the value of a dosage of 100 mg of fluconazole or of 400 mg of ketoconazole daily for the management of oropharyngeal candidiasis in patients with cancer. Author.

Overview of studies of fluconazole in oropharyngeal candidiasis.

Hay, R. J. Department of Clinical Sciences, London School of Hygiene and Tropical Medicine, United Kingdom. *Reviews of Infectious Diseases* (1990), Mar-Apr, Vol. 12 Suppl 3, pp. S334-7. Studies with fluconazole in oropharyngeal candidiasis have focused primarily on three groups of infections: chronic atrophic candidiasis, oropharyngeal infections associated with either neutropenia or AIDS, and chronic mucocutaneous candidiasis. In two studies of chronic atrophic candidiasis associated with dentures, 82 patients received seven or 14 days of therapy with fluconazole (50 mg daily). Clinical and mycologic cure rates ranged from 60% to 100%, with the best results occurring with 14 days of therapy in combination with the cleansing of dentures. Thirteen patients with oropharyngeal candidiasis associated with chronic mucocutaneous candidiasis were treated with 50 or 200 mg of fluconazole daily, and clinical and mycologic remissions were achieved in a mean period of 10 days. So far 95 patients have been treated with fluconazole for oropharyngeal candidiasis associated with malignancy, therapeutic immunosuppression, AIDS, or AIDS-related complex. Infection was cured by clinical criteria in 84% of those studied. While the majority of patients with clinical cure had significant reductions in the number of yeast colonies, only 48% had negative oral cultures at the end of therapy with courses of 50 mg of fluconazole daily for five days to eight weeks. Author.

Invasive external otitis caused by *Aspergillus*. Phillips, P., Bryce, G., Shepherd, J., Mintz, D. Department of Medicine, Vancouver General Hospital, British Columbia, Canada. *Reviews of Infectious Diseases* (1990) Mar-Apr, Vol. 12 (2), pp. 277-81.

Invasive external otitis occurs almost exclusively in patients with long-standing diabetes. Except for occasional cases, the etiologic agent has been *Pseudomonas aeruginosa*. We report a case caused by *Aspergillus* species in a diabetic patient with acute leukemia. Persistent infection was documented by culture and histology after a course of intravenous amphotericin B (total dose, 2 g). Clinical resolution occurred in association with a 3-month course of oral itraconazole. Four previously reported cases of invasive aspergillus otitis are reviewed. Author.

Malignant external otitis: report on therapy with ceftazidime and review of therapy and prognosis. Johnson, M. P., Ramphal, R. Department of Medicine, University of Florida School of Medicine, Gainesville. *Reviews of Infectious Diseases* (1990) Mar-Apr, Vol. 12 (2), pp. 173-80.

We report the treatment of 20 patients with malignant external otitis (MEO) since 1980. Ceftazidime was used in 15 patients, with cure achieved in 11 of 12 evaluable patients. An aminoglycoside and an antipseudomonal penicillin were used in five patients, four of whom were cured. The presentation, radiographic studies, therapy, outcome, and period of follow-up in the 20 patients are reported. The previously reported cases of MEO are also reviewed, with a focus on the changing therapy and prognosis. The frequencies of diabetes mellitus, cranial nerve deficits, and treatment failures in MEO have all declined significantly since 1985 from frequencies in earlier years. We conclude that there has been an overall improvement in the diagnosis and treatment of MEO and that monotherapy with ceftazidime shows promise against this potentially fatal pseudomonal infection. Author.

In-the-canal hearing aids. Their use by and benefit for the younger and elderly hearing-impaired. Parving, A., Boisen, G. Department of Audiology, Bispebjerg Hospital, Copenhagen, Denmark. *Scandinavian Audiology* (1990) Vol. 19 (1), pp. 25-30.

The present investigation was performed in order to evaluate the use and benefit of in-the-canal hearing aids (ITC-HAs; Dan 131) in a group of elderly and younger subjects. An extensive questionnaire was mailed to 256 hearing aid users. The responding group

comprised 220 subjects (86%) and consisted of 108 males and 112 females with a median age of 69 years, range 11–89. In order to compare between the elderly and the younger subjects, the material was subdivided into two groups: one less than 70 years ($n = 113$), and the other greater than or equal to 70 years ($n = 107$). The median values of the average threshold at 500, 1000, 2000, and 4000 Hz for the right and/or left ear (which was fitted with hearing aid(s)) was 43 dB HL, thus indicating a moderate hearing loss. The questionnaires demonstrated that 74% of the subjects used their ITC-HA every day, 28% used the aid very seldom and only 1% never used the hearing-aid. 74% of the total sample were satisfied or very satisfied with the ITC-HA, while 19% were not entirely satisfied or dissatisfied. No significant differences between the elderly and the younger groups were found concerning time-related use, situational use, self-assessed effect, or general satisfaction/dissatisfaction with the aid. The elderly found the aid significantly more troublesome to deal with. It is concluded that hearing-impaired subjects with moderate hearing losses use and benefit from ITC-HAs, regardless of age. However, an ITC-HA should be recommended for the elderly only if they can be offered thorough individual instruction. Author.

Effect of noise on word discrimination by subjects with impaired hearing, compared with those with normal hearing. Pekkarinen, E., Salmivalli, A., Suonpaa, J. Department of Otolaryngology, Turku University Central Hospital, Finland. *Scandinavian Audiology* (1990) Vol. 19 (1), pp. 31–6.

A comparison was made of the discrimination ability of different groups of hearing-impaired and normal-hearing subjects in noisy conditions. Four groups of subjects having a sensorineural hearing loss with various audiogram configurations, one group of subjects having a conductive hearing loss and one group of normal-hearing subjects were chosen. The submaster tapes were recorded in quiet and in pink noise with signal-to-noise ratios of -3 , -8 and -13 dB. The test subjects heard the test words monaurally via earphones. The best speech discrimination was achieved in quiet, anechoic conditions. As the noise level increased, speech discrimination decreased. Subjects with sensorineural hearing loss were more adversely affected by noise than subjects with normal hearing or with conductive hearing loss. However, at high noise levels, their speech discrimination was poorer than that of normal-hearing subjects. Persons with a high-frequency hearing loss, cut-off point 1 kHz, suffered in noise similarly to those with sloping or flat hearing losses. In quiet and in moderate noise, the speech discrimination of subjects with a conductive hearing loss and subjects with normal hearing was similar, while at high noise levels, subjects with conductive hearing losses achieved better discrimination than normal-hearing subjects. Author.

Effect of simulated bilateral cochlear distortion on speech discrimination in normal subjects. Hood, J. D., Prasher, D. K. Institute of Neurology, National Hospital, London, England. *Scandinavian Audiology* (1990) Vol. 19 (1), pp. 37–71.

Bilateral sensorineural hearing loss may introduce grossly dissimilar cochlear distortion at the two ears, causing abnormal demands to be made upon the cortical analytical centres which normally receive congruent information. As a result, the prescription of binaural hearing aids may be a handicap rather than a help. In order to explore this possibility, 10 normal subjects were presented with simulated, dissimilar cochlear distortion at the two ears. Discrimi-

nation scores with binaural presentation were poorer than the best monaural score and there were clear indications that in the former, subjects selectively attended to one ear and neglected the other. In contrast, binaural presentation of the same simulated distortion resulted in a significant improvement, compared with the monaural discrimination score. Inability of the cortex to contend with incongruent speech input from the two ears may be a factor contributing to the rejection of binaural hearing aids in some individuals. Author.

Harmonic distortion measurements in clinical hearing and fitting. Preliminary report. Nielsen, H. B., Nielsen, H., Parving, A.

Department of Audiology, Bispebjerg Hospital, Copenhagen, Denmark. *Scandinavian Audiology* (1990) Vol. 19 (1), pp. 55–8. Measurement of the distortion from hearing aids and its influence on their fitting has become practicable with the implementation of real ear measurement in the audiological clinic. Thus the harmonic distortion measured in the ear fitted with the hearing aid can be measured by means of a probe in the ear canal. The objective of the present investigation was to examine the value of harmonic distortion measurements in the fitting of hearing aids within a clinical setting. The material comprised 101 consecutive patients who had been prescribed different types of hearing aids based on the POGO formula, using insertion gain measurements. One hundred and sixty hearing aids were fitted and with the fitting strategy used, a distortion less than 10% was indicated in 122 fittings (76%), a distortion between 10 and 20% in 30 fittings (19%) and finally a distortion greater than 20% in eight fittings (5%). In the cases with the distortion greater than 10%, the hearing aid setting was maintained and the magnitude of the harmonic distortion was controlled with a 2-cc coupler. At the hearing aid fitting, the audiology technician can listen to the signal at the patient's drum and thus may hear distortion products. The relationship between the 'distortion' heard by the audiology technician and the 'distortion' heard by the patient was fairly good. Based on these preliminary findings it is concluded that harmonic distortion measurements may prove useful in the hearing aid fitting procedure. Author.

Homo- and anti-phasic stimulation in ABR. Rawool, V. W., Ballachanda, B. B. Department of Audiology and Speech Sciences, Purdue University, West Lafayette, Indiana. *Scandinavian Audiology* (1990) Vol. 19 (1), pp. 9–15.

Effects of homo-phasic and anti-phasic stimulation on the binaurally evoked auditory brain-stem responses (ABRs) were investigated in 10 normal subjects. Clicks were presented at 47 dB SL with two in-phase (binaural condensation and binaural rarefaction) and two out-of-phase (left ear condensation, right ear rarefaction and right ear condensation, left ear rarefaction) stimulus configurations. The earlier of the latencies obtained with homo-phasic stimulation were compared with the earlier of the latencies obtained with anti-phasic stimulation. Repeated measures ANOVAs on the peaks (P) and troughs (N) of each component, revealed significantly earlier latencies for the anti-phasic condition, for components II N (P less than 0.049), III P (P less than 0.012) and VIN (P less than 0.025). Similar trends were apparent for components IVP (P less than 0.075), VP (P less than 0.099) and VIP (P less than 0.12). The results are discussed in terms of the binaural-level difference phenomenon and possible clinical applications. Author.