MONDAY 5th JULY 1999

09.00–09.45 **KEYNOTE LECTURE** (Corn Exchange)
Chairman: The Master Mr J. N. G. Evans

The evolution of the treatment of paediatric laryngotracheal stenosis.

Professor R. T. Cotton.

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Paediatric laryngotracheal stenosis (PLTS) became a clinical problem in the early 1970s, following the adoption in the 1960s of long-term endotracheal intubation and ventilatory support for premature infants. The Master of this conference, Mr J. N. G. Evans, spearheaded the management of PLTS in the United Kingdom, publishing his first reports of expansion laryngotracheoplasty in 1974. Other surgeons pioneered different methods of expansion surgery, including long-term stenting, cartilage grafts to the anterior and posterior larynx, or a combination of these methods. Concurrently, a variety of endoscopic methods of managing PLTS were explored, and the carbon dioxide laser emerged as the most successful modality.

The management of PLTS continued to evolve with the development of single stage reconstruction, in which the tracheotomy is removed at the time of surgical repair, and the application of cricotracheal resection with primary cricotracheal anastomosis.

At the same time as efforts were being made to correct PLTS, thoughts turned to avoiding the development of PLTS. The use of smaller endotracheal tubes has decreased the incidence of PLTS in this premature population.

What of the future? Efforts must be directed at preventing injury to the laryngeal mucosa. A better understanding of the intracellular biochemical and enzymatic changes associated with injury to the epithelial cells and chondrocytes could lead to the use of pharmacological agents directed at reducing injury.

10.30–12.30 **PLENARY SESSION 1** (St John's College)

PHONOSURGERY
Chairmen: Mr K. MacKenzie (UK),
Mr J. Rubin (UK)

Surgical and medical approaches to benign vocal fold pathology.

M. Bouchayer, G. Cornut

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The work presented here is the fruit of almost 30 years' collaboration between phoniatrician and phonosurgeon.
In treating benign vocal fold lesions, it is first necessary to arrive at as precise a diagnosis as possible by means of videostroboscopy, which is the fundamental examination, and of meticulous subjective and objective examination for the vocal signs. Speech-therapy is in all cases required: it may obviate the need for an acquired lesion to be operated, and constitutes an indispensable back-up treatment for every kind of laryngeal microsurgery.

The suspension microlaryngoscopy technique is done under general anaesthesia, optimal for safety and ease of surgery. The surgical actions are simple and guided by three basic principles: maximum conservation of healthy mucosa; avoidance of damage to the underlying vocal ligament; maintenance of healthy anterior commissure mucosa.

Some supplementary procedures are frequently employed: dabbing with vasoconstrictor, cauterization of dilated capillaries, fibrin glue to hold dissected mucosa in place and intracordal cortisone injection.

Conclusion: In functionally oriented surgery, where the aim is first and foremost to restore the laryngeal function to as nearly perfect as possible, a close collaboration between phoniatrician and surgeon seems to us to be absolutely essential. Unfortunately, this ideal combination is not always easy to assemble and therefore is rarely achieved in practice.

Update on vocal fold palsy: framework surgery and injection techniques.

M. S. Benninger
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Vocal fold immobility may be due to loss of innervation (paralysis) of the vocal fold or fixation of the fold, usually fixation of the joint, although immobility and paralysis are often used interchangeably. In a review of 240 cases of unilateral vocal fold immobility (UVFI) at Henry Ford Hospital, it was found that extralaryngeal malignancies and surgical, iatrogenic injury are the most common causes. This is in contrast to the traditional reports that have shown that thyroid surgery was the most common aetiology. Idiopathic paralyses that have been identified are not likely to recover, although it is likely that many cases of idiopathic VFP recover spontaneously and are never diagnosed. The work up of UVFI should include an evaluation to rule out a non-laryngeal malignancy in the chest, neck or at the skull base.

The level of patient disability guides the treatment of UVFI. Using objective outcomes tools, such as the voice handicap inventory (VHI), the physical, social and emotional impact of VFP can be assessed. Almost all patients benefit from a course of voice therapy to maximize voice production and limit compensatory, hyperfunctional behaviour. Many patients will accommodate sufficiently for their social and occupational needs. However, a large group of patients have persistent dysfunction, which can limit their voice efficiency. In such cases, laryngeal electromyography can help determine the likelihood of recovery or the timing of intervention. If by six months post-injury, there is no evidence of re-innervation or if there is no recruitment on phonation, clinically relevant function would not be expected to occur and a formal procedure can be undertaken. If an EMG is not available, then 12 months is the preferred time frame since recovery can occur for up to 12 months or longer after injury. If intervention is required prior to six months, gelfoam or adipose injection, and in some selective cases medialization laryngoplasty with silastic can be considered.

The specific surgical treatment of UVFI depends on a number of factors including the voice needs of the patients, concomitant medical disorders and anaesthetic risk. I reserve Teflon® injections for individuals with relatively imminently terminal disease such as lung cancer or those with significant anaesthetic risk. Silastic medialization is the most reliable method to medialize the paralyzed vocal

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fold. It is easy to perform and predictable in experienced hands. In most cases, an adequate posterior reduction can be made without arytenoid adduction (AA). AA can be used in some cases independently. There are other biocompatible materials available that can also be used for medialization. For small glottic chinks, patients may benefit from vocal fold injection with autologous fat or collagen. These materials are also helpful in minor revisions of patients who have had either medialization laryngoplasty, or in some cases, Teflon® injection. Most patients benefit from some additional voice therapy after surgery. Fortunately, almost all patients can be returned to near normal speech and social function following therapy.

Voice outcomes: role of assessment techniques.

K. MacKenzie
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Surgical or therapeutic intervention in the treatment of dysphonia, is extremely common with more than 50,000 interventions/year in the UK. There is an increasing desire from both the clinical and lay communities for assessment of these treatments with particular regard to clinical governance, self regulation and cost benefit analysis. The outcomes used in this assessment can be either generic (e.g. health-related quality of life issues) or condition/organ specific (performance-related or self report). Dysphonia is an extremely complex combination of complaints which includes a wide spectrum of voice impairments and may be associated with other conditions such as psychological morbidity. These in turn have a large psychosocial effect with subsequent quality of life issues.

To date many groups involved in the assessment of voice have understandably concentrated on the condition or organ specific aspects with the aim of achieving a universal measure of voice, somewhat analogous to that of the pure tone audiogram in audiology. This has been exemplified by the exploration of the various acoustical parameters and attempting to correlate them with reported dysphonia. However, to date there has been little correlation between acoustical objective measures and patient or observer-rated dysphonia. Given the complexity of voice and any associated dysfunction, it would seem likely, therefore, that rather than a few single objective measures assessing voice disturbance, it may have to be a combination of various components of voice assessments and their inter-relationship which need to be addressed.

Panel: **Challenging cases in voice surgery**

Moderator. J. Rubin, Royal National Throat Nose and Ear Hospital, Gray's Inn Road, London, WC1X 8DA, UK.
Panel members:
M. Benninger, ENT Surgeon (USA)
M. Bouchayer, ENT Surgeon (France)
P. Carding, Speech and Language Therapist (UK)
G. Cornut, Phoniatrician (France)
T. Harris, ENT Surgeon (UK)
J. McGlashan, ENT Surgeon (UK)

The purpose of this panel is to provide the audience with the opportunity to challenge themselves, while the experts are diagnosing and suggesting management for complicated case studies of laryngeal pathology.

The members of the panel include internationally acclaimed specialists in the field of voice disorders. This panel will review individual case histories complete with stroboscopic videotapes. The stroboscopic findings will be analysed in detail and then compared with operative findings (when available). A multidisciplinary approach to management, emphasizing avoidance of pitfalls, will be presented.

10.30–12.30 **PLENARY SESSION 2** (Queen's College)

NASAL POLYPS
Chairmen: Professor Valerie Lund (UK), Mr A. Drake-Lee (UK)
Introduction Mr A. Drake-Lee (UK)

Update on the molecular biology and electrophysiology of nasal polyposis.

J. M. Bernstein
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In nasal polyps, increased recruitment, activation and survival of eosinophils leads to increased production of basic granule proteins which in turn can have an effect on mucus production as well as ion flux. The movement of sodium and water from the lumen into the cell and then into the lamina propria may account for the oedema that is seen in nasal polyps. A second potential model for the development of nasal polyps is related to remodelling of surface epithelium. Damage to surface epithelium by inflammatory mediators from eosinophils and other inflammatory cells leads to regeneration of new epithelia characterized by goblet cell hyperplasia, squamous metaplasia or basal cell hyperplasia. It has been shown that in these altered epithelia, CFTR protein which is necessary for chloride secretion and normal sodium absorption, is not located in the correct position at the apex of the respiratory cell. This defect causes an imbalance of sodium channels so that there may be more open channels allowing increased sodium absorption and water retention. Thus, there are two arms of the model for the development of nasal polyposis.

One caused by cytokine upregulation, leading to increased eosinophil degranulation and the other mechanism is one of injury to the airway epithelium induced by allergen, virus, trauma, leading to defective CFTR. Both eosinophilic degranulation and defective CFTR migration lead to alteration of the sodium chloride flux in the epithelial cell lining, the nasal mucosa in the lateral wall of the nose resulting in the major pathological finding in nasal polyps, namely oedema.

Conclusion: Nasal polyposis represents the ultimate example of chronic inflammation with eosinophilia. The eosinophilia is the result of upregulation of multiple cytokines and chemokines that affect the sodium and chloride flux of the respiratory epithelium leading to water retention or oedema.

The relationship of polyps to infection and inflammation.

P. Stierna, T. Norlander, G. Henriksson
Department of Otorhinolaryngology, Huddinge University Hospital, Karolinska Institutet, Stockholm, Sweden. Fax: 46 8 774 7907.

Clinical and experimental studies show that infectious or non-infectious inflammation, as in asthma, cystic fibrosis and dental sinusitis may trigger nasal polyp formation. In experimental models bacteria and agents inducing inflammation, display differences in polyp formation capacity. The initial polyp formation sequence involves multiple

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epithelial disruption with proliferation of protruding granulation tissue. Epithelial branches spreading into the underlying connective tissue and the formation of intraepithelial microcavities appear to play an important role. Further growth of the already-formed polyp occurs if an inflammatory state is maintained. Regional differences in nasal polyp formation within the nasal cavity are evident as the result of local differences in epithelial matrix interactions. Experimental induction of local glucocorticoid resistance will also induce the development of polyps.

Conclusion: Medical and surgical therapy have to be directed towards the inflammatory process, type of underlying infection together with specific tissue pathology. The use of steroids, antibiotics or surgery have to be geared towards effects on specific events in polyp development.

Medical therapy for nasal polyposis.

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The objectives of medical management of nasal polyposis are to (1) eliminate nasal polyps and rhinitis symptoms; (2) re-establish nasal breathing and olfaction; (3) prevent recurrence of nasal polyps. Corticosteroids are the only type of drugs having a proven effect on symptoms and signs of nasal polyposis. Topically applied steroids have been studied in controlled clinical trials. These drugs can be used alone in mild cases as basic long-term therapy, and in combination with systemic steroids and/or surgery in severe cases. Systemic steroids have been less studied but they reduce all types of symptoms and pathology, the sense of smell included. This type of treatment, which can serve as 'medical polypectomy', is only used for short periods due to risk of adverse events. In order to reach the objectives of medical management, treatment should be tailored to the individual patient. Review of the literature as well as experience from our research group recommend a stepwise strategy, employing long-term topical and short-term systemic steroids in medical therapy for nasal polyposis.

The surgical treatment of nasal polyps.

I. S. Mackay
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Nasal polyps result from inflammation of the mucous membrane lining the nose and paranasal sinuses. The prevalence may be as high as 42 per cent of the population but they cause symptoms in less than two per cent. Found in association with a variety of underlying conditions they may be antrochoanal, single, or diffuse. Allergy, infection and mechanical factors have all been suggested as possible causes, but the aetiology remains obscure, though it is likely that more than one mechanism is involved.

Since the aetiology is both unknown and may be variable, it is not surprising that there is no consensus on treatment. There is an increasing trend to use medical treatment in the first instance. Surgery, however, should be the first line of treatment for any unilateral nasal polyp or when any sinister pathology is suspected. Surgical treatment can vary from simple nasal polypectomy, to extensive surgical exenteration of the sinuses ('nasalization'). Functional endoscopic sinus surgery (FESS) aims at being maximally effective, but minimally invasive. It is claimed that recurrence is less with extensive surgery but those in favour of simple polypectomy point to a lower complication rate, an important factor when treating a benign condition. Endoscopes, surgical debriders and lasers all have their advocates but do they improve outcome? The recent literature will be reviewed.

10.30–12.30 **PLENARY SESSION 3** (Corn Exchange)

CONTROVERSIES IN OTOLOGY
Chairmen: Mr G. M. O'Donoghue (UK), Mr R. Mills (UK)

Open cavity mastoidectomy for cholesteatoma in children.

R. P. Mills
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The choice of technique in cholesteatoma surgery lies between a closed technique, usually intact canal wall mastoidectomy, and an open technique involving the creation of some form of cavity. In adults both approaches have their place, depending on the site and extent of the disease. In children, however, intact canal surgery has a number of disadvantages. The residual disease rate is higher than that for adults, even in the most expert hands. In 1991 it was reported that residual disease rate was twice as high following intact canal surgery as it was for open cavity operations. The extent of the disease tends to be greater in children, perhaps because of the greater degree of pneumatization of the mastoid process often seen in such cases. This makes intact canal wall surgery technically more difficult in such cases. In addition, a second stage operation is mandatory and this is not welcomed by most children

The potential advantages of intact canal wall surgery are a lower frequency of post-operative discharge and the potential for a better hearing outcome. However, good hearing results can be obtained following open cavity surgery, especially if an attempt is made to reconstruct the ossicular chain. Post-operative discharge may occur in intact canal wall cases and as many as 70 per cent of open cavities may be free of chronic drainage. However, analysis of prospectively collected data from 128 operations for cholesteatoma in adults and 30 in children indicates that 70 per cent of adults with open cavities had dry ears at one year as compared with only 33 per cent of children. Childhood cholesteatoma represents a formidable challenge to the otologist for which there is no universally satisfactory solution.

Endoscopes in otology.

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There are three routes for exploring the tubotympanic cavities using an endoscopic procedure: Firstly – via the external ear canal using rigid endoscope; secondly – via the mastoid cavity and through a posterior tympanotomy. This requires open surgery; thirdly – via the nose and the pharynx by cannulation of the pharyngeal opening of the Eustachian tube. This requires the use of a flexible fibrescope.

The main advantage of the endoscope is to confer the ability to see 'around the corner'. Its applications are examination of the incus-stapes joint retrotympanic recesses, osseous tube, attic area and complementary help in surgery in tympanic retraction pockets, cholesteatomas, second-look explorations and perilymphatic fistulas.

The major limitations of middle ear endoscopy are the following: bleeding; the lens is easily soiled; visual limitation to differentiate with certainty pathological findings, risk of damage to the ossicular chain.

Endoscopy in otology.

G. G. Browning
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The main role of an endoscope in otology is as an aid to teaching how to examine an ear. It has a secondary role in the examination of the nose in patients with nasal symptoms, in addition to their ear symptoms. For the average otological surgeon, the use of an endoscope to aid middle ear and mastoid surgery is to enhance their profile rather than improve their surgical results. Its potential role is in the detection of cholesteatoma in blind areas during surgery. However, recurrent cholesteatoma is not common in blind areas nor is a surgeon capable of recognizing metaplastic or keratinizing epithelium visually.

The value of intra-operative facial nerve monitoring in temporal bone surgery.

S. H. Selesnick
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Technological innovations that we now consider essential, such as the operating head light, were initially met with either delight or suspicion by groups of our otolaryngological predecessors. Similarly, there are now surgeons who consider intra-operative facial nerve monitoring (IOFNM) a poor substitution for knowledge of facial nerve anatomy, while others consider IOFNM an essential adjunct that, in conjunction with an understanding of the facial nerve, adds to the safety of temporal bone surgery. At this point, IOFNM is the accepted standard of care in neurotological skull base surgery. Its use has lead to improved facial nerve intra-operative identification and preservation, the ability to determine intra-operative thresholds that predict ultimate outcome, and superior ultimate post-operative facial function. But which otological surgery requires the use of IOFNM, and what type of IOFNM system is necessary, or practical, for a general otolaryngologist, an otologist or a neurotologist-skull base surgeon? A well informed surgeon may best decide on monitoring needs based upon surgical case selection, experience, operating theatre space, availability of monitoring personnel and cost. Clearly IOFNM is of benefit, but just as clearly, IOFNM is no substitute for a thorough understanding of facial nerve anatomy and diseases of the temporal bone.

Neuromonitoring in otology.

G. Brookes
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Surgical treatment of benign paroxysmal positional vertigo.

L. S. Parnes
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Benign paroxysmal positonal vertigo (BPPV) is the most common vestibular end organ disorder. Most patients present with typical histories, and a positive response to the Hallpike manoeuvre is almost diagnostic. Excluding the uncommon lateral canal variant, there is now compelling evidence that free-floating posterior semicircular canal endolymph particles underlie most, if not all, cases of typical BPPV. Recent invivo pathological findings suggest that these particles are otoconia, likely displaced from the utricle. They typically settle in the posterior canal, the most dependent part of the vestibular labyrinth, and render it sensitive to gravity.

The particle repositioning manoeuvre (PRM), designed to move the particles back into the utricle, effectively cures more than 95 per cent of patients. Although the PRM is highly efficacious, sporadic non-responders still occur. The highly symptomatic patient can be treated surgically using the transmastoid posterior semicircular canal occlusion procedure. Clinical experience with this technique in more than 40 cases demonstrates high efficacy, with few complications. To date, all occluded ears remain relieved of their BPPV with follow-up times as long as 10 years. The risk of sensorineural deafness remains less than five per cent, while some patients demonstrate prolonged motion sensitivity, not unlike other vestibular ablative procedures.

Treatment of benign paroxysmal positional vertigo.

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Positioning manoeuvres for the treatment of benign paroxysmal positional vertigo have become accepted treatment in recent years. Numerous procedures now exist Cooksey-Cawthorne, Brandtard Daroff, Epley's and Semont. The Epley and Semont aim is to move particulate matter from the posterior semicircular canal into the utricle. Particles have been seen in the posterior canal at surgery, in some cases of BPPV and much less frequently in non-vertigious patients. Reported results of treatment show cure rates are over 90 per cent irrespective of the manoeuvre used. Controlled trials using shown movements or drugs show that canal positioning procedures (CPP) are effective, although drugs had a 30 per cent success rate and there is a background of spontaneous cure controls.

The weight of evidence shows CPPs are effective, the mechanism(s) of how they work is still unclear, they have the advantage of being very effective, quick, non-invasive and cheap, and therefore should be considered as first-line treatment. Surgery for unresponsive cases may be an option but on what rational basis?

14.00–16.30 **MINI-SYMPOSIUM 1** (Corn Exchange)

SALIVARY GLAND DISEASE
Chairman: Mr P. D. Bull (UK)

Salivary gland tumour pathology.

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Salivary gland tumours can give rise to many problems in clinical management largely due to the following factors: the tumours are relatively uncommon, limiting clinical experience; there is a bewildering range of morphological subtypes making microscopical diagnosis and classification difficult; their behaviour is often unpredictable; they are surgically challenging, particularly when involving the major glands.

There is surprisingly little reliable information on the incidence of these tumours and the criteria used for inclusion of tumours in surveys is very variable for reasons which will be discussed. In addition, information regarding the aetiology is scarce, but factors which have been implicated include viruses, radiation, occupation, hormones and the presence of tumours in other sites.

Most of the classifications in current use are based on morphological rather than histogenetic criteria. Recently, a variety of studies on molecular biological and functional aspects of these tumours have been undertaken. However, there has been a rather patchy approach to these aspects of tumour pathology due, in part, to the relative scarcity of some of the tumour subtypes. The relative merits of both these approaches will be discussed, particularly their application to surgical pathology in a practical context.

Systemic disorders affecting salivary glands.

C. Scully
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The major systemic diseases affecting salivary glands include Sjögren's syndrome (SS), and HIV (HIV-SGD). Xerostomia (dry mouth) and/or swelling are the most obvious complaints.

Many patients suffer SS for years without a diagnosis. However, a subjective dry mouth is common, and often caused by drugs. Diagnosis is usually established by histopathology. Labial salivary gland (LSG) biopsy through a midline incision avoids mental nerve anaesthesia and gives more information than sialography and scintiscanning or sialometry. The changes correlate with those in the parotid and usually exclude other disorders. Immunohistological investigation can be useful since B cells predominate in lymphomas and T suppressor-cytotoxic cells predominate in chronic graft-versus-host disease and in HIV/AIDS.

Xerostomia, a sicca syndrome, cystic benign lymphoepithelial lesion, and occasionally malignant lymphomas may be seen, particularly in children and where CD4 counts are under 300 cells/mm^3. A sicca syndrome characterized typically by xerostomia, parotid enlargement, lymphadenopathy and pulmonary insufficiency (diffuse infiltrative lymphocytosis syndrome; DILS), presents initially with salivary swelling. Lungs, muscles, and liver are involved and some patients develop salivary lymphoma.

Conclusion: Xerostomia, particularly where there is salivary swelling, may indicate disease and, especially where these features persist, SS and HIV infection should be excluded.

Complications of salivary gland surgery – avoidance and management.

P. J. Bradley
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The most frequent indication for salivary gland surgery is in the management of a tumour mass. The majority of tumours that present are located in the parotid gland (90 per cent). However tumours may be located in the other sites and include the submandibular gland, sublingual gland and in a minor salivary gland most frequently encountered in the mouth. Fortunately the majority of salivary tumours are benign in nature, present as a discrete mass, whose pathological nature can be proven prior to embarking on surgery.

Conspicuous neck scars and soft tissue deformities are frequently the result of parotid and submandibular surgery. Through modifications of the parotid skin incision, coupled with primary soft tissue reconstruction, the typical post-parotidectomy defect can be safely eliminated in the appropriately selected patient population. The risk of developing the disabling Frey's syndrome can also be minimized by primary soft tissue reconstruction using the superiorly based sternomastoid muscle rotation into the surgical defect. The loss of sensation to the cheek and pinna is inevitable after division of the greater auricular nerve and the symptom may be minimized by the preservation of the posterior branch of the nerve – however this is not always possible.

Conclusion: All patients who undergo salivary gland tumour surgery must be forewarned of the possible complications: nerve weakness – temporary or permanent, skin anaesthesia, cosmetic deformity and gustatory sweating (Frey's syndrome).

Salivary gland infections.

P. Bull
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Salivary gland infection in the neonatal period is rare and most commonly affects the parotid gland. Ultrasound scan of the gland will help determine the optimal time for drainage. The superficial position of the facial nerve must be remembered.

Relapsing parotitis of childhood affects boys more commonly than girls, relapsing parotitis usually resolves at puberty. There may be underlying sialectasis. Acute suppurative parotitis is most common in elderly patients, it may be precipitated by dehydration. Mouth care and dental hygiene assist prevention. Surgical drainage is often needed. Parotitis may become established and irreversible. There is little or no response to antibiotics. Parotidectomy is curative.

Calculi most often occur in the submandibular gland and are radio-opaque. Ductal stones can be removed intra-orally, but glandular stones will need gland excision if symptomatic. Parotid calculi are usually radio-lucent and will show as filling defects on sialography.

In children under the age of 12, mycobacterial infection of the salivary glands is almost always non-tuberculous. There is little response to antibiotics, and surgical excision is curative.

While HIV infection does not involve the salivary glands directly, lympho-epithelial cysts within the parotid are a feature of AIDS in young males. Surgery is needed only if malignancy is suspected.

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14.00–16.30 **MINI-SYMPOSIUM 2** (Queen's College)

OLFACTION
Chairman: Dr Glenis Scadding (UK)

A new theory of olfaction.

L. Turin
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Current trends in the measurement of olfactory function.

P. J. Moberg, R. L. Doty
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Over the course of the last 100 years, a variety of procedures have been devised to evaluate the ability to smell. A majority of these procedures, however, have been too unreliable or time-consuming for practical use in the clinic. As a result, the objective assessment of olfaction is often overlooked. In the last decade, significant gains have been made in the development of reliable, valid, and clinically applicable psychophysical and physiological methods for assessing olfactory function. Objective assessment of the sense of smell can provide important information concerning the validity of a patient's complaint, characterization of the nature of the dysfunction, monitoring any pharmacological or surgical interventions, teaching the patient ways to compensate and assigning disability compensation. Notably, quantitative olfactory assessment can be useful in the diagnosis and monitoring of a number of neurological and neuropsychiatric disorders. The primary goal of this presentation is to provide an up-to-date overview of the quantitative methods available for assessing the sense of smell. Specific examples of the use of such methods in clinical populations and integration with structural and functional imaging techniques will also be presented.

Conclusions: A number of reliable and valid methods now exist to quantitatively assess olfactory functions. Psychophysical methods, in conjunction with newer structural and physiological approaches, offer unique opportunities to probe the peripheral and central components of the olfactory system.

Olfaction and neurodegenerative disease.

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Methods We studied olfaction in the following neurodegenerations were studied: idiopathic Parkinson's disease (IPD); progressive supranuclear palsy (PSP); multiple system atrophy (MSA); corticobasal degeneration (CBD); motor neuron disease (MND); Alzheimer's disease (AD). We used the University of Pennsylvania smell identification test (UPSIT) and obtained olfactory evoked potentials (OEPs) in response to H_2S gas. Pathological studies were performed on olfactory bulbs in IPD and MND.

Results IPD: 126 of 155 (81 per cent) patients had abnormal UPSIT scores which were significantly lower than those for controls: $p<0.0001$. 12 of 37 (32 per cent) had prolonged latency with normal amplitude measurement on OEP but 27 had absent or unclear readings. For MND nine out of 58 (16 per cent) were abnormal on UPSIT. OEPs were performed in 15 patients. In nine the responses were normal for latency and amplitude measurements. In AD UPSIT scores were abnormal in all eight patients examined. OEP was normal in the four subjects who could be tested. In the remaining conditions – PSP, MSA, CBD only UPSIT was performed. Olfaction was normal in all except for MSA group. All olfactory bulbs from IPD patients showed typical Lewy bodies. There was excess lipofuscin deposition in the MND olfactory bulb neurons.

Conclusion: Most neurodegenerative disease is associated with olfactory disorder. The significance of this is unclear but it might help our understanding of the disease mechanisms.

Olfaction in ENT surgery.

Valerie J. Lund
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Problems with olfaction are frequently encountered by the otorhinolaryngologist, either as a presenting symptom or one on which we have a positive or negative therapeutic impact. Whilst congenital loss is rare, acquired alteration of smell occurs with many sinonasal conditions but the differential diagnosis may include systemic disease, medication and trauma. It is possible using a range of investigative techniques to qualify and quantify olfaction and to assess patients both pre- and post-therapy, be it medical or surgical. Hyposmia in nasal polyposis and chronic rhinosinusitis may be objectively shown to improve in the short term with steroids or surgery but perhaps of more interest is the medicolegal implications of olfaction. Anecdotal reports of anosmia from steroid drops are not supported by cohort studies, though common procedures such as septoplasty, rhinoplasty and even UVPP may have an adverse effect on smell. This may have consequences for informed consent.

14.00–16.30 **MINI-SYMPOSIUM 3** (St John's College)

VERTIGO
Chairman: Professor Linda Luxon (UK)

Radiology of vestibular disorders.

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Today the vestibular system (semicircular canals, vestibule), the vestibular nerves, the vesibular nuclei, vestibular afferents and efferents, vestibulo-spinal and vestibulo-ocular system (oculomotor nuclei and their pathways) are best examined using magnetic resonance imaging (MRI). Computed tomography (CT) is only necessary when the osseous labyrinth must be studied and is still used to study the osseous labyrinth in patients with otodystrophy or dysplasia (fibrous dysplasia, otospongiosis, Paget's disease etc.) and in case of trauma. MRI became the method of choice to study the membranous labyrinth, internal auditory canal and cerebellopontine angle and the central vestibular pathways and therefore became the preferred technique to study patients presenting with vertigo, balance disorders and/or abnormal findings at vestibular testing. However the success of MR depends on the

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sequences which are used. A routine T2-weighted spin-echo sequence of the brain should always be performed. Then the radiologist must decide which anatomical region must be further examined in detail and which technique or sequence is best suited. The clinical signs are needed to make this choice. The vestibular signs (deviations, vestibulo-ocular nystagmus) are used to distinguish involvement of the peripheral vestibular system from an involvement of the central vestibular system. Axial unenhanced and Gd-enhanced T1-weighted spin-echo images and axial very thin gradient-echo images are needed to study the peripheral vestibular system. In patients with central vestibular disorders 4 mm thick or even special high contrast and high resolution selective T2-weighted spin-echo images are made through the brain stem to verify the oculomotor and vestibular nuclei and the medial longitudinal fasciculus. Additional MR-angiography images are used in case of tinnitus or when a neurovascular conflict is suspected. Finally CT is performed when vertigo is found in patients presenting with middle ear pathology.

Conclusion: Today MRI becomes the method of choice for studying the vestibular system, however the radiologist must dispose of all available clinical information in order to be able to perform a tailored radiological examination.

Vertigo in children.

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Vestibular dysfunction in children is manifested by the same symptoms as those in adults, namely vertigo, unsteadiness and sometimes loss of postural control. Unsteadiness and delayed motor development could be caused by severe hypofunction or vestibular areflexia. This is the case in 30 per cent of children suffering from severe hearing loss and deafness. Unsteadiness, vertigo and loss of postural control need evaluation to distinguish whether the problem is due to a dysfunction in the vestibular apparatus or caused by abnormalities in the visual, proprioceptive and somatosensory systems as well as central nervous deficiencies. The otoneurological evaluation rests to a large degree on case history and observation. The specific tests applied can be rotatory tests, smooth pursuit, saccade test, postural test and, at the age of four to five years, bithermal caloric test. The symptoms in bilateral vestibular areflexia, acute unilateral vestibular loss, benign paediatric vertigo (BPV), Ménière's syndrome, and central nervous disturbances will be discussed.

Recent trends in the diagnosis of vertigo.

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There have been numerous recent trends in the diagnosis of vertigo. This talk will highlight four of these trends, two of them pertaining to peripheral vestibular disorders and two of them pertaining to central vestibular disorders. Topics to be covered will include variants of benign paroxysmal positional vertigo (BPPV), assessment of otolith function in patients with bilateral vestibular loss, migraine-associated dizziness, and psychiatric dizziness. Whereas BPPV is considered to be caused by canalithiasis of the posterior semicircular canal, positionally provoked vertigo as a result of horizontal semicircular canal canalithiasis and horizontal semicircular canal cupulolithiasis have recently been described. Recently, patients with absent horizontal semicircular canal function have been found to exhibit preserved otolith-ocular responses suggesting that such patients may have more potential for vestibular rehabilitation than previously thought. Although reaching a definitive diagnosis of migraine-associated dizziness is difficult, migraine-associated dizziness is an under-recognized disorder that probably accounts for a large portion of patients who present with vertigo of unknown aetiology. Psychiatric dizziness is a complex class of disorders wherein vestibular abnormalities may be causally related to psychiatric illness or dizziness may interact with psychiatric conditions. Recent evidence suggests that patients with anxiety disorders may suffer from an underlying vestibular system disorder.

Conclusion: There have been several trends in the diagnosis of vertigo. Four of these trends will be discussed.

Developments in the management of vertigo.

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Successful management of recurrent vertigo requires accurate diagnosis i.e. distinguishing between poorly compensated peripheral vestibular dysfunction, benign positional vertigo of paroxysmal type, benign recurrent vertigo and bilateral vestibular failure, having first excluded a central vestibular disorder.

Customized exercises are the mainstay of treatment of vertigo due to unilateral peripheral vestibular dysfunction. Recent developments have involved the fine-tuning of service delivery i.e. Cawthorne-Cooksey exercises are taught in the class setting, with patients attending a single instruction session. Symptoms of vertigo are rated against each exercise and customized exercise programmes drawn up for home use, excluding exercises that do not provoke vertigo. Patients are monitored using both subjective outcome measures such as vertigo disability and handicap questionnaires, and also objective measures i.e. posturography, to redirect rehabilitative strategy if necessary. Accompanying symptoms of avoidance behaviour, panic and depression frequently need addressing and appropriate psychological expertise sought.

Particle re-positioning manoeuvres in the treatment of positional vertigo due to BPPV have aroused considerable interest. Although initial 'cure' rates look impressive, recent studies have addressed prognostic factors in outcome, and management of atypical presentations. A placebo controlled-trial of treatment of posterior-canal BPPV in a 3D flight simulator will be discussed.

Conclusion: Customized balance exercises and particle-repositioning manoeuvres in the treatment of PCPVD and BPPV respectively, improve outcome in the treatment of vertigo. Studies of the psychiatric morbidity of peripheral vestibular disorders suggest that secondary sequelae should not be overlooked in the management of vertigo.

14.00–16.30 **FREE PAPERS** (Queen's College)
Chairman: Professor N. Stafford (UK)

Results of planned combined regime of surgery and radiotherapy versus radical radiotherapy with, or without, surgical salvage in advanced cancers of the larynx.

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Objective: To evaluate survival results for advanced cancers of the larynx treated with radiotherapy alone (with surgical salvage in cases of residual/recurrent disease) versus patients treated with a planned combined regimen of surgery and radiotherapy.

Methods. The present study deals with retrospective analysis of biopsy-proven 494 cases of carcinoma of the larynx treated with curative intent between 1986–96. The mean age of patients was 54.2 years. Forty-five per cent of cases had supraglottic lesions, followed by glottic in 34.7 per cent, transglottic in 18 per cent and subglottic in 2.3 per cent of cases. Seventy-two per cent of cases had stage III and IV disease. Radical radiotherapy was employed as main treatment in 300 cases (60.7 per cent). Sixty-six of these underwent salvage surgery. A planned combined regimen of surgery and radiotherapy was used in 152 (28.7 per cent) patients.

Results: Actuarial four-year disease-free survival rates were significantly better with combined treatment than with radiotherapy with, or without, salvage surgery for radiation failure, both for stage III and IV disease. Overall, the survival results for stage III lesions treated with radiotherapy with salvage surgery were 66 per cent as opposed to 78.6 per cent obtained with combined surgery and radiotherapy. Similar results for stage IV lesions were 44.6 per cent and 72.7 per cent respectively.

Conclusions: A policy of a planned combined regimen of surgery and radiotherapy gives superior survival results with fewer recurrences than obtained in patients treated with radical radiotherapy even with salvage surgery for radiation failures in advanced resectable cancers.

Ultrasound-guided fine needle aspiration (US-FNA) for the assessment of cervical lymph nodal metastases in head and neck cancer.

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Objective: Accurate staging of regional metastases in head and neck tumours is important. Palpation alone is inaccurate while computed tomography, magnetic resonance imaging and ultrasound although more accurate, lack specificity. US-FNA has shown promising results in some previous reports.

Method: All head and neck patients seen in the ORL department are examined sonographically. Demonstrated lymph nodes are aspirated and the specimen examined cytologically. Patients undergoing surgery enter the study. The neck dissection or node specimen is examined histologically and the US-FNA cytology compared to the histology.

Results: Fifty-six patients have so far produced 181 lymph node aspirations. In 25 (13.8 per cent) the aspirations were reported 'non-representative'. Sensitivity of the method was 89.2 per cent, specificity 98.1 per cent, and accuracy 94.5 per cent. Using multiple level aspirations nodal disease was correctly staged in 92.8 per cent (60.7 per cent by palpation alone). Eighteen patients changed N-stage: 11 to a higher and seven to a lower stage.

Conclusion: This study has results which compare favourably to other reported studies. US-FNA enables accurate pre-operative staging, can reduce the need for elective neck dissection and is valuable in planning therapeutic neck dissections. It is the investigation of choice in assessing regional metastases in head and neck squamous carcinoma.

Fibrescopic, acoustic and electrophysiological observations in spasmodic dysphonia.

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Objective: To document the functional dymanics of the laryngeal structures in relation to the characteristics of the vocal output. An attempt was also made to provide an evidence of brainstem involvement in patients with spasmodic dysphonia.

Method: Ten patients with adductor spasmodic dysphonia were evaluated by standard history, auditory perceptual assessment, fibreoptic laryngovideostroboscopy, acoustic analysis (using a multidimensional voice programme) and auditory brainstem response.

Results: The fibrescopic laryngeal picture was characterized by rapid adductory movements of the vocal folds just before the onset of voice signal with tendency of ventricular folds approximation and forward arytenoids displacement. A purse-string like glottal constriction was noticed during the momentary abrupt voice arrests. The vocal tremors on sustained phonation were accompanied by oscillatory movements of vocal folds, ventricular folds and arytenoids with occasional vertical jerking of the larynx and abnormal velar activity. The acoustic analyses showed an abnormal high amplitude and frequency tremor intensity index and a high degree of unvoiced and subharmonic segments. At a high repetition rate, 50 per cent had abnormal ABR results in the form of prolonged I–V interpeak latency and an abnormal interaural latency difference of wave V.

Conclusion: Fibreoptic visualization and documentation of the vocal tract allows a more detailed observation of associated abnormal functional dynamics of laryngeal and pharyngeal structures in spasmodic dysphonia. The tremor measures seem to be sensitive acoustic parameters in describing the severity and follow-up of these patients. The ABR abnormalities may indicate brainstem pathology in the periaqueductal area of the midbrain which has a crucial role in the generation and integration of specific respiratory and laryngeal motor patterns essential for vocalization and emotional expression.

T3N0 cancer of the larynx – Is radical radiotherapy with surgical salvage adequate?

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Objective: To evaluate the survival results for T3N0 cancer of the larynx treated with radiotherapy alone (with surgical salvage if recurrence) versus a planned combined treatment regimen of surgery and radiotherapy.

Method: A retrospective analysis of the survival results of 119 cases of clinically staged T3N0 cancer larynx treated over a 14-year period at a single centre with either of the above two modalities.

Results: Actuarial four-year disease-free survival rates were significantly better with combined treatment (79.3 per cent) than with radical radiotherapy and surgical

salvage (65.3 per cent) – p value = 0.024. In the radical radiotherapy group, failure was almost always at the primary site and the probability of surviving with an intact larynx was approximately half of the total survival.

Conclusion: A policy of radical radiotherapy for T3N0 cancer larynx offers neither comparable cure rates nor satisfactory laryngeal preservation. In recent years the morbidity of surgery for such cancers has been greatly reduced by the evolution of the tracheo-oesophageal prosthesis and also the near-total laryngectomy. Combined treatment by a planned regimen of surgery and radiotherapy is therefore to be preferred to radiotherapy alone.

Chromosomal changes in squamous cell carcinoma of the head and neck and involved lymph nodes; identification of a metastatic phenotype.

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Objective: To compare chromosomal aberrations from matched carcinomas and lymph node metastases to identify regions that are important in tumour spread.

Method: Comparative genomic hybridization (CGH), a technique which identifies chromosomal regions that are amplified or deleted across the entire genome in a single experiment, we examined 14 squamous cell carcinomas of the head and neck region and their matched lymph node metastases.

Results: Amplification and deletion of various chromosomal regions were found in all samples. The pattern of changes seen in tumours was more diverse than that observed in the metastases. The most striking observation involved chromosome 3p, the most commonly occurring genetic aberration in tumours. Ten out of 14 tumours had lost part, or all, of 3p, but only one of 14 lymph node metastases showed this deletion. In contrast, amplification of 6q and 13q21 were more frequent in the metastases than the original tumour, seven vs three and six vs three respectively.

Conclusion: The results suggest that aberrations of chromosome 3 are important for tumour growth but relatively unimportant for the formation of metastases. Conversely, amplification of 6q and 13q21 appear less important in the primary tumour but are involved in the establishment of lymph node metastases.

Does voice therapy work? A randomized controlled trial of the efficacy of voice therapy for dysphonia.

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Objective: To assess the efficacy of voice therapy in dysphonic patients.

Methods: Two hundred and four outpatients aged 17–87 years who presented with a primary symptom of persistent hoarseness were studied. Laryngoscopic, demographic and social data were recorded. Baseline measures were of: voice quality – self-reported and blind expert rated; psychological distress self-reported and blind expert rated; quality of life – SF 36. Randomization was to either voice therapy or no treatment. Measures were repeated at the end of six weeks of therapy/no intervention, and again after another six to eight weeks. Analysis was conducted using SPSS (X).

Results: Voice therapy improved self-rated ($F = 12.2$, $p = 0.001$), and expert-rated voice quality ($F = 17.5$, $p<0.001$). Therapy also improved one acoustic analysis parameter - shimmer (amplitude perturbation - $F = 5.9$, $p<0.01$), but this effect was not sustained at follow-up. There were no differences between the groups in psychological distress or quality of life over time.

Conclusions: Voice therapy for dysphonia is an effective treatment in terms of the subjective report of both patients and a blinded expert listener. Most objective acoustic parameters, as predicted, showed poor correlation with these global reports of voice quality. Voice therapy had surprisingly little impact on psychological distress or general health status.

Function and quality of life following partial laryngeal surgery.

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Objective: Despite aggressive rehabilitation, some patients fail to regain acceptable aero-digestive function following partial laryngectomy. We undertook this study to ascertain how functional results impact on quality of life in this small but important group of patients.

Method: The case notes of 22 surviving patients who had undergone partial laryngeal surgery in our unit were reviewed. All patients were asked to complete both a detailed questionnaire addressing upper aero-digestive function and a head and neck quality of life questionnaire.

Results: Patients underwent either vertical partial (n = 7), supraglottic (n = 9) or Laccoureye-type (n = 6) procedures. Seventeen (77 per cent) patients returned completed questionnaires. Sixty-five per cent of patients were satisfied with their voice quality (three out of five or above). Twenty four per cent experienced occasional shortage of breath and 47 per cent still had varying degrees of aspiration although 65 per cent had few problems eating. Forty-seven per cent tolerated a completely normal diet.

Quality of life scores revealed that patients perceived functional well-being to be more valuable (33 per cent of total score) to them than social (28 per cent), emotional (20 per cent) or physical (19 per cent) well-being. Those patients tolerating near-normal or normal diet had significantly better scores than those with dysphagia (Chi-squared $p<0.01$) as did those with a good voice quality when compared to those with poor function ($p<0.01$). Scores from a group of age and sex-matched total laryngectomees are pending and data from the two groups will be compared.

Conclusions: Function of the residual upper aero-digestive tract weighs highly with regard to quality of life following partial laryngectomy. This re-emphasizes the need for meticulous patient selection for conservative laryngeal surgery.

Dysphonia associated with inhaled steroids.

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Objective: Dysphonia associated with inhaled steroids is poorly understood but is a problem in up to 50 per cent of patients taking regular medication. Previous studies have suggested that the problem is due to a steroid induced myopathy affecting the laryngeal adductors causing incomplete adduction or bowing. This hypothesis seemed unlikely, but worthy of further investigation.

Method: Twenty-two patients with this problem were investigated. Patients underwent videostrobolaryngoscopy, laryngography and computerized speech analysis. One patient also had laryngeal electromyography. Each patient completed a form enquiring into length of history, dose and frequency of inhaler and other potentially compounding factors such as smoking and vocal abuse.

Results: Dysphonia started, on average, one and a half years after starting steroid therapy. Incomplete vocal fold apposition was evident 12 patients (54 per cent). Clinical evidence of fungal infection was found in four patients (18 per cent). Jitter varied from a normal two per cent to a grossly abnormal 96 per cent.

Conclusion: In those five patients with the most severe dysphonia (jitter >50 per cent) only one had minor evidence of incomplete adduction. In those patients with most severe bowing the average jitter was less than 15 per cent. Therefore although incomplete adduction is a feature of inhaled steroid dysphonia it does not appear to be the sole cause.

The outcome after perinatal management of infants with potential airway obstruction.

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The combined Obwegeser/Fisch approach to the lateral skull base.

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Introduction: In 1978, Obwegeser described an approach to the infra-temporal fossa and retromaxillary region involving osteotomies of the zygomatic complex and proximal mandible. In 1979, Fisch reported three access procedures to the infra-temporal fossa. These combine a subtotal petrosectomy with a zygomatic osteotomy and resection or displacement of the mandibular condyle.

Objective: The senior authors attempted to develop an approach that offers an improved access to the infra-temporal fossa and retromaxillary region by combining the Obwegeser and Fisch approaches.

Methods: Over a two-year period, the combined approach has been used on eight patients (age range nine to 72 years). Six patients had malignant tumours and two had benign disease. Free tissue transfer has been used in three patients and facial nerve reconstruction in four.

Results: A wide surgical exposure was possible using the combined approach allowing an improved surgical access. To date, one patient has died; the others remain free of recurrence.

Conclusion: This multidisciplinary approach offers a wide surgical exposure that may optimize tumour resection.

The far lateral approach to the infra-temporal fossa and the jugular foramen.

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We will present an adaptation of a neurosurgical approach to the cranio-cervical junction. This involves removal of the transverse process of the atlas to obtain better exposure of the infratemporal fossa. This manoeuvre allows a wider angle of approach thus avoiding division of the mandible even for large tumours. It gives better control of the internal carotid artery along the skull base and can be combined with a mastoid approach to allow better exposure of the jugular foramen. This has meant that we rarely need to transpose the facial nerve in glomus jugulare tumour surgery.

This approach has also been successfully used for tumours of both the infratemporal fossa and parapharyngeal space including schwannomas and pleomorphic adenomas. It adds to the resection of tumours of the jugular foramen such as glomus vagale, glomus jugulare, hypoglossal and accessory neuromas.

We will present the surgical anatomy and technique and some clinical examples where the approach has been useful.

The genetic events in the evolution of thyroid cancer.

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Objective: To delineate the evolution of thyroid cancer using the Volgelstein model of cancer evolution and to demonstrate the genetic 'hits' in the development of undifferentiated cancer from normal thyroid cells.

Method: Immunohistochemical and molecular biological techniques were used to delineate the prevalence of (1) *Ras* oncogene, (2) Loss of heterozygosity, and (3). *Ret* PTC oncogene for p53 oncogene in the development of differentiated thyroid cancer from normal cells and hyperplasia. The evolution of differentiated thyroid cancer to the dedifferentiated or anaplastic type was also investigated. The methodology used was standard immunohistochemical staining techniques as well as polymerase chain reaction (PCR) technology for the elucidation of these various oncogenes and tumour suppressor genes.

Results: We have demonstrated that there is a prevalence of loss of heterozygosity in the evolution of papillary carcinoma from hyperplasia. There is also a high preponderance of *Ras* and *Ret* PTC oncogenes in the evolution of thyroid cancer. Further along on the continuum, p53 has been demonstrated to be prevalent in the development of dedifferentiated thyroid cancer, i.e. tall cell and insular variety as well as anaplastic cancer.

Conclusion: Several genetic hits have been demonstrated to be prevalent in the evolution of thyroid cancer. These are preliminary oncogenic maps and further work in this area will help to establish a definite biological pattern in the development of this malignancy.