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Professor, Alfaisal University, College of Medicine

Director of ENT Medical Center, Riyadh
Founder of Saudi Society For Hearing Impairment (Saudi Hi)
Former Head, Otolaryngology, Head & Neck surgery, KFSH&RC

1-2 December 2018
PAST, PRESENT AND FUTURE OF OTORHINOLARYNGOLOGIC AND HEAD&NECK SURGERY
Pure air was implanted in the ear

EMPEDOCLES (c. 490-c.430)

Aristotle (384 B.C. to 322 B.C.)

Seeshell

(fire, air, earth and water),
Medicine in the medieval Islamic world

From Wikipedia, the free encyclopedia

In the *history of medicine*, **Islamic medicine** is the science of medicine developed in the *Islamic Golden Age*, and written in Arabic, the *lingua franca* of Islamic civilization. Islamic medicine preserved, systematized and developed the medical knowledge of *classical antiquity*, including the major traditions of Hippocrates, Galen and Dioscorides.

During the *post-classical era*, Islamic medicine was the most advanced in the world, integrating concepts of the ancient *Greek*, *Roman*, *Persian* as well as the ancient *Indian* traditions of Ayurveda. At the same time, the knowledge of the classical medicine was nearly lost to the medieval medicine of Western Europe, only to be regained by European physicians when they became familiar with Islamic medical authors during the Renaissance of the 12th century.

1- MEDICAL ETHEICS

2- HOSPITAL/ BIRIMISTAN

3- PHARMCY

4- WOMEN AND MEDICINE
Medicine in the medieval Islamic world

From Wikipedia, the free encyclopedia

by: Maria Do Sameiro Barroso

This article presents Abuṣ-Ḥasan Makhariḍa ibn Yāḥya ibn al-Zahrāwī, also known as Al-Zahrawi, the most remarkable Arab surgeon. His work had a strong impact in medieval ages. Greek-Roman surgery had almost ceased to be practiced in the Western world, after the fall of Bagdad (886/488 A.D.), the last Byzantine empire. Al-Zahrawi took for himself the task of making surgery an honourable art. He recovered ancient surgical texts from damaged scrolls, developed, expanded and refined Greek-Roman operations, adding his own pioneer techniques, procedures, and developing his own instruments. He drew and engraved drawings illustrating the foundations of accurate and safer surgical procedures that were adopted in the following centuries.

5 from the "Liber continens" by Al-Razi. Right image: "Liber continens", translated by Gerard of
Beside his admirable work as a doctor, he left us some remarkable instruments. We know Lucæ especially for his bayonet shaped Paracentese knife and one of the most valuable instruments for all ENT doctors: the "geknöpft Zerumenhákchen." (the buttoned Cerumen hook). Both are still in daily use by ENT doctors. The main work of Lucæ was hearing test with tuning forks.
Struycken’s instrument for Hearing 1950

Struycken, Hubert J. L. (1869-1950)

Struycken was a Dutch ENT physician who, with Julius Hegener (b. 1870) studied the direct way for the photography of the larynx. Interesting her is his mono chord instrument shown below.

Dr. Struycken’s mono cord hearing test instrument in action.
Otorhinolaryngology

Neil Weir

The specialty of otorhinolaryngology (or ear, nose and throat surgery (ENT)) is a product of the early 20th century, for it was then that the separate fields of otology and laryngology were joined together. Otologists were surgeons while laryngologists were physicians who also treated diseases of the nose and chest. The 20th century opened with brave attempts to perform skilful surgery under conditions of primitive anaesthesia and no antibiotics. The stimulus of two world wars led to significant advances in technology and greater opportunities to explore new and resurrect old surgical procedures. The discovery of antibiotics saw an end to acute mastoiditis and the complications of otitis media and sinusitis, as well as a decline in the number of tonsillectomy and adenoidectomy operations.

Over the last 30 years the specialty has undergone dramatic development and has taken advantage of new advances in endoscopy, microsurgery, the use of lasers, cytotoxic drugs, flap reconstruction and microsurgery technology. During the same period, although still calling themselves otorhinolaryngologists, individual surgeons have specialised in otology, otoneurosurgery and skill-based surgery, head and neck surgery, pharyngology, rhinology and paediatric surgery, and paediatric otorhinolaryngology. Each of these subspecialties has its own societies and specialist journals.

Keywords: otorhinolaryngology; history of medicine
Otorhinolaryngologists:

Individual surgeons have subspecialised in:

1. Otology, cochlear implant surgery,
2. Otoneurosurgery and skull-base surgery,
3. Head and Neck surgery,
4. Laryngology and Phonosurgery,
5. Rhinology,
6. Facioplastic surgery
7. Paediatric otorhinolaryngology
8. Sleep Medicine.

William House
John J. Conley
William Montgomery
Heinz Stemberger
Charles Bluestone
Robin Cotton
HOUSE EAR INSTITUTE
TEMPORAL BONE SURGICAL DISSECTION COURSE — March 17-29, 1985

(Back Row) Brian Blakley, MD, Gary Mizono, MD, Kenneth L. Balcombe, MD, Der-Chia Chen, MD, David Aroesty, MD, Mutawakel Hajjaj, MD, Richard Kang, MD, Khanh-Gien Hoang, MD
(2nd Row) Jeffrey Taffet, MD, Michael J. O’Leary, MD, Ossama Abdel Hamid, MD, Thomas A. Tami, MD, Kathleen Healey, MD, David R. Range, MD
King Faisal Specialist Hospital & Research Centre


• Head and Neck oncology surgery.

• Paediatric and Adult Laryngeal reconstruction surgery.

• Otology and Neurotology.

• General Otorhinolaryngology.
Otology and Neurotology

- First Cochlear Implant Program in the Kingdom of Saudi Arabia started at KFSH&RC in 1993.

- National Program for Early Detection of congenital hearing loss at (Saudi HI) 2001.

- First Bone Anchored Hearing Aid (BAHA) at KFSH&RC in 2006.

- Genetic study for Deaf Gene in Saudi Arabia population at KFSH&RC and ENT Medical Centre 2009.

- Middle Ear Implant Partial and Total experience at ENT Medical Centre 2010.

- Future of Gene and stem cell therapy.

- Future Implantable devices for hearing and balance.
نتائج برنامج فحص السمع المبكر للأطفال حديثي الولادة في الفترة:

- من 1/1/1429هـ إلى 30/12/1429هـ

الجمعية السعودية للإعاقة السمعية

Saudi HI

وزارة الصحة

Ministry of Health

Prof. Dr Seraj Zagzog

Prof. Dr Khalid Taibah
الجمعية السعودية للإعاقة السمعية

Saudi HI
نتائج برنامج فحص السمع المبكر للأطفال حديثي الولادة في الفترة:
من 1429/11/1  إلى 30/12/1429 هـ.

المقدمة:
أثبتت الدراسات مدى أهمية برنامج فحص السمع للأطفال حديثي الولادة قبل خروجهم من المستشفى، فمن دون هذه البرامج قد يتأخر كشف ضعف السمع لأكثر من 12 - 36 شهرًا أو أكثر في بعض الحالات.

عندما يتم اكتشاف ضعف السمع لدى الأطفال حديثي الولادة، فإن تأخر اكتشافه قد ينجم عن تأخر مشروط في تطور اللغة، حيث أن الأطفال الذين يتم الكشف عن ضعف السمع لديهم بمثابة صعوبة في فهم المحادثات وتعاطفهم مع أطراف العالم الآخرين.

المستشفيات المشاركة في مدينة الرياض:
1- مجمع الملك سعود الطبي: لديهم 4 ممرضات متفرقات لبرنامج فحص السمع المبكر.
2- مستشفى اليمامة: لديهم ممرضات متفرقات لبرنامج فحص السمع المبكر.

إجراءات البرنامج:
ينص برنامج فحص السمع المبكر للأطفال حديثي الولادة على فحص كل طفل حديث الولادة قبل خروجه من المستشفى، وفي حال لم تنجح أحدى الأذنين أو كلاهما في الفحص - ثلاث مرات متتالية - فتصبح نتائجه عبءاً لطبيب الطفل. وعندما يوصى الطبيب بفحص الطفل في عين من عين أخرى، يتم إجراء الفحص في عين أخر مرتين متتاليتين.

الجهاز المستخدم لإجراء الفحص الأولي هو GSI AudioScreener، حيث يتكشف عن نقص السمع في أذن أو أذنين في الترددات التي تتراوح بين 2000 إلى 6000 هيرتز. في حال كان الفحص الأولي ناصراً، يتم تدقيق الطفل في مجمع الملك سعود الطبي، حيث يتم استخدام المعينات السمعية الطبية الطبية.

الإحصائيات من 1/1/1429 إلى 30/12/1429 هـ:
- تم فحص 10174 طفل حديث الولادة، منهم 5821 في مستشفى اليمامة و4353 في مجمع الملك سعود الطبي، 396 منهم لم ينجحوا (3.89%) من حيث نسبة النجاح في الفحص الأولي.
- عدد الأطفال حديثي الولادة الذين تم فحصهم في مستشفى اليمامة كان (342) أثنا (2765 نجحوا، و 158 لم ينجحوا).
- عدد الأطفال حديثي الولادة الذين تم فحصهم في مستشفى اليمامة كان (342) أثنا (2765 نجحوا، و 158 لم ينجحوا).
- عدد الأطفال الذين تم فحصهم في مجمع الملك سعود الطبي كان (4353) أثنا (3867 نجحوا، و 486 لم ينجحوا).
- بلغ مجموع الأطفال الذين تم فحصهم منذ بداية البرنامج وحتى نهاية شهر ذو الحجة لعام 1429هـ (17559) طفل حديث الولادة، منهم 10165 في مستشفى اليمامة، و 7394 في مجمع الملك سعود الطبي، 583 منهم لم ينجحوا (3.32%).

ملاحظة:
يقوم المختصون في عيادة السمعيات في مجمع الملك سعود الطبي بتوجيه أولياء أمور الأطفال الذين لم يحققوا النجاح في الفحص الأولي إلى ضرورة استخدام المعينات السمعية (OAEs) وتحديد جذع الدماغ (ABR) في حالات مرضية أخرى، وخاصة في حالات ضعف السمع الشديد أو المزدوج.
الإحصائيات من 1-1-1429 هـ إلى 30-12-1429 هـ:
- تم فحص 10174 طفل حديث الولادة، منهم 5821 في مستشفى اليمامة و 4353 في مجمع الملك سعود الطبي، 396 منهم لم ينجحوا (3.89%).

![Chart showing statistics of newborns and their outcomes in different hospitals.](chart.png)
بلغ مجموع الأطفال الذين تم فحصهم منذ بداية البرنامج وحتى نهاية شهر ذو الحجة لعام 1429 هـ (17559) طفل حديث الولادة، منهم 16101 في مستشفى اليمامة، و7394 في مجمع الملك سعود الطبي، 583 منهم لم ينجحوا (3.32%).
البرنامج الوطني للإعاقة السمعية

تعد الإعاقة السمعية أكثر الإعاقة البشرية انتشارًا في جميع أنحاء العالم، مع توفر العديد من طرق الكشف المبكر والتدخل السريع وتحديد طرق العلاج، بل وحتى الوقاية من هذه الإعاقة، وانطلاقاً من توجيهات حكومتنا الرشيدة بقيادة خادم الحرمين الشريفين وسمو ولي عهدنا الأمين -حفظهم الله ورعاه- في تعزيز وتطوير الرعاية الصحية للمواطن، والعمل لتقديمها بشكل متميز، والعمل بصفة مستمرة على توسيع وتوحيد الخدمات الصحية وضمان تلبية لحاجة المجتمع بما يعكس الخطة التنموية للدولة فقد صدر المرسوم الملكي رقم 4015 وتاريخ 26/1/1436ه. يعتمد برنامج الكشف والتدخل المبكر للإعاقة السمعية وضمان إقرار السجل الوطني لحالات ضعف السمع في أكبر مرجعية صحة في المملكة (المجلس الصحي السعودي).
Advance Audiology Lab

 BASIC AUDIOLOGICAL EVALUATION

VNG
VEMP
vHIT

ECochG
ABR

Vestibular Test Battery

Position is for left Dix-Hallpike test
Conventional Hearing Aid

feedback
occlusion
distortion
Chronic ear disease
cosmetics
Hearing Implants – Level of Intervention

BAHA/Atrac
Bone Bridge
Sophono

Hearing aids

1ST

MEIs (partial /Total)
C.I. EAS
ABI / MB
Cochlear Implant At KFSH&RC
Cochlear implant program At KFSH&RC

- January 1994 (Riyadh)
- Core Competency Program
- Country Referral Institute
- Total of 248 cases (Feb 2007)
- Pediatric cases 189
Cochlear Implant Surgery
5 y. old
1 y. 9 months post-implant
Middle Ear Implant

- Passive (classical ossiculopasty and Stapes Surgery).

- Active (Powered Middle ear implant).
Conductive Hearing Loss

Ossiculoplasty (Passive)

44576
STRATEGY OF DIFFERENT IMPLANTABLE HEARING DEVICES

Active Implants

Esteem (Envoy) (Total implant)  Vibrant Sound Bridge (VSB)  CARINA/MET
Ototonix- Maxum  Bone anchored HA
Bone Anchored Hearing Aid (BAHA)
Cond.HL / Mix.HL / SSD
Electromechanical (Bone Anchored Hearing Aid)

(Percutaneous)

(Percutaneous)

SOPHONO ALPH1 (M)

The Baha® 4 Attract System

Ponto Pro (Oticon Medical)

BONEBRIDGE IMPLANT
Middle Ear Implants
SOUND BRIDGE VIBROPLASTY (VSB)
Vibroplasty
Vibrant Sound Bridge (SVB)

Treatment of hearing loss via vibratory stimulation in the middle ear.

<table>
<thead>
<tr>
<th>SNHL</th>
<th>Conductive &amp; Mixed HL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incus Vibroplasty</td>
<td>Round Window Vibroplasty</td>
</tr>
<tr>
<td></td>
<td>PORP / TORP Vibroplasty</td>
</tr>
<tr>
<td></td>
<td>Oval Window / Stapes</td>
</tr>
<tr>
<td></td>
<td>Vibroplasty</td>
</tr>
<tr>
<td></td>
<td>Third window Vibroplasty</td>
</tr>
</tbody>
</table>
Total Middle Ear Implant (Bionic Ear)
Envoy (Esteem) total implant

How It Works
MET® Middle Ear Implant

- The sound processor A captures sound, processes it and transmits it to the implant B.
- The implant sends it to the actuator C.
- The actuator converts the signal to mechanic vibrations, which stimulate the cochlea via the ossicular chain or round window.
MET® Middle Ear Implant System

Implant

Fixation System

Button® Audio Processor
Gene of Deafness research
Genetic study in the Deaf Saudi Arabian population

Research group:
This work was funded and supported in part by:

Prince Salman Centre for Disability Research
(PSCDR #04-IN-0005-04-EP-1)

King Faisal Specialist Hospital (RAC#2040039)

King Abdulaziz City for Science and Technology

ENT Medical Center, Riyadh

KF Medical City, Riyadh

KF MH, Jeddah
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- Dr Khaild Tabbara
- Dr Fowzan Al-Kuraya

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- Asst. Prof. Dr Ahmed Khater
- Mrs. Saher Al Dehaish
- Dr Adel Al Adawy
- Lolo Juma

**King Fahd General Hospital**
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- Bashair Al-Mubarak
- Ghada Bin-Khamis
- Abeer Al-Mostafa
- Rabab Allam

**King Fahad Medical City**
- Dr S. Bamkhaimar

**PSCDR**
- Dr Sultan Al-Sedairy
- Dr Heidi Al-Askary

**Special Thanks**
- Sheikh Nasser Al-Mutawa (Donation)
Although non-syndromic HD is clinically homogeneous, genetically it is **heterogeneous**.

It is estimated that >300 genes are involved in hearing process.
Outline of statistics in previous studies in hereditary hearing loss that our study is targeting

- Prelingual Deaf Children: 1/1000
  - Idiopathic: 25%
  - Non-genetic: 25%
  - Genetic: 50%
    - Non-syndromic: 70%
    - Syndromic: 30%
      - Autosomal recessive: 75%–85%
        - DFNB1: 50% (70% connexin 26 - + connexin 30)
      - Autosomal dominant: 15%–24%
      - X-linked: 1%–2%
Saudi Population is Ideal for Disease-Gene Discovery

- **Consanguinity**
  - 52% Consanguinity rate
  - Mostly first cousin marriages

- **Large family size**
  - Average nuclear family size is 8-10
Affymetrix GeneChip® Human Mapping 250K/6.0 Microarrays to identify regions containing any known-deafness causing genes that were subsequently sequenced.
Clinical and Experimental Stages in the Hereditary Deafness Study

Step 1

ENT CLINIC
AUDIOLOGY CLINIC
SUPPORT SERVICE

Step 2

KFSH&RC

538 samples taken so far

ENT MEDICAL CENTER

Step 3

DNA Extracted

500 patients screened for mutations in CONNEXIN genes
Work Flow at (KFSH&RC): Pre-PCR

- DNA EXTRACTION
- PRE-PCR SETUP
- PCR AMPLIFICATION
Work Flow at (KFSH&RC): Post-PCR

GEL VISUALIZATION & DOCUMENTATION

SEQUENCE ANALYSIS
Publications

**USH1G with unique retinal findings caused by a novel truncating mutation identified by genome-wide linkage analysis**

Khushnooda Ramzan a,*, Khalid Taibah b, Faiqa Imtiaz a, Asma I. Tahir a, Nada Al-Tassan a, Amal Berhan a, Ahmed M. Khater b, Selwa Al-Hazzaa c, Mohammed Al-Owain d,e, Faiqa Imtiaz a

**COL4A4-related nephropathy caused by a novel mutation in a large consanguineous Saudi family**

Khushnooda Ramzan a,*, Faiqa Imtiaz a, Khalid Taibah b, Samir Alnufiee c, Mohammed Akhtar d, Selwa A.F. Al-Hazzaa e, Mohammed Al-Owain d,e

**ILDR1: Novel mutation and a rare cause of congenital deafness in the Saudi Arabian population.**

Khushnooda Ramzan a,*, Khalid Taibah b, Asma I. Tahir a, Nada Al-Tassan a, Amal Berhan a, Ahmed M. Khater b, Selwa Al-Hazzaa c, Mohammed Al-Owain d,e, Faiqa Imtiaz a
MUTATIONS IDENTIFIED IN GENES IN SAUDI POPULATION

<table>
<thead>
<tr>
<th>GENES IDENTIFIED IN SAUDI POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>GJB2</td>
</tr>
<tr>
<td>MYO15A</td>
</tr>
<tr>
<td>TMC1</td>
</tr>
<tr>
<td>LHFPL5</td>
</tr>
<tr>
<td>MARVLD2</td>
</tr>
<tr>
<td>TMPRSS3</td>
</tr>
<tr>
<td>USH1G</td>
</tr>
<tr>
<td>GIPC3</td>
</tr>
<tr>
<td>ILDRI</td>
</tr>
<tr>
<td>COL4A4</td>
</tr>
<tr>
<td>CDH23</td>
</tr>
<tr>
<td>PCDH15</td>
</tr>
<tr>
<td>MYO7A</td>
</tr>
<tr>
<td>MYO6</td>
</tr>
<tr>
<td>OTOF</td>
</tr>
<tr>
<td>SLC26A4</td>
</tr>
<tr>
<td>WHRN</td>
</tr>
<tr>
<td>ATP6V1B1</td>
</tr>
<tr>
<td>PEX6</td>
</tr>
<tr>
<td>HGF</td>
</tr>
</tbody>
</table>

80 FAMILIES

DIFFERENT DEAFNESS GENES

50 DIFFERENT MUTATIONS
Road Map For Treatment Of Deafness

Genetic Map

Premarital Exam

National Program For Early Dedication Of Deafness

Sensory neural HL

- Hearing Aid
- Gene therapy/ Molecu?
  - Cochlear Implant
  - BSI/MBI/cortical ?
  - Optical Cochlear Imp?
  - Sign Language
- Rehab.

Mixed / Conductive HL

- Stem cell ?
  - Tube/Middle ear S.
  - Bone- AHA
  - Surgical option
- Medical Treatment
- Middle ear implant
- Rehabilitation
- Integration

Medical Treatment

Rehabilitation

Integration
CONCLUSION: A race for 10 to 15 years away

Patient counselling !!!!!!!
Comparison of various strategies in inner ear drug delivery.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Efficiency</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systemic strategies</td>
<td>Low</td>
<td>Low safety, side effects caused by high systemic doses over time</td>
</tr>
<tr>
<td>Intratympanic strategies</td>
<td>Moderate, produce variable outcome</td>
<td>High safety, minimally invasive procedure that can be performed in a physician’s office</td>
</tr>
<tr>
<td>Intracochlear strategies</td>
<td>High</td>
<td>Limited safety, precise surgery is needed and potential of serious complications</td>
</tr>
</tbody>
</table>
INTRATYMPANIC INJECTION
Kanzaki, S.; Saito, H.
Biotechnology-based approaches of inner ear drug delivery

1- Gene therapy

Atoh 1 genes, green fluorescent protein (GFP), glial-derived neurotrophic factor (GDNF),

2- Stem cell therapy

embryonic stem cells, fetal dorsal root ganglion otocyst cells
hair cell regeneration:

(1) direct of transdifferentiation from supporting cells (SCs) to new hair cells (HCs) (green)
(2) proliferation of SCs and mitotic regeneration (red).

Sho Kanzaki
Gene therapy

- inject Atoh 1 genes into the cochlea to induce hair cell regeneration

- viral vectors include adenovirus, herpes virus, Sendai virus.

- adeno-associated virus vectors (AAV)s , can pass the RWM without making a hole.
Photomicrographs of whole-mounted guinea pig cochlea showing the distribution of GFP-fusion protein after injection of GFP-fused Sendai virus vector (GFP-SeV/DF) into the scala media

S. Karger AG
Growing new Hair cell in Guiana pigs (gene Math 1)
Future Implant

- Robotics Cochlear Implant.

- Vestibular Implant.
Tunnel Drilling
Ø1.8 x 30 mm
OSCILLOPSIA
Bilateral Vestibular functional loss
VESTIBULAR SYSTEM IMPLANT
The prototype vestibular implant

- **Components:**
  - An electrical stimulator
  - Three extracochlear electrodes that are placed in the ampullae of each semicircular canal
  - An intracochlear array
  - Ecapi ground

Vestibular implant designed by MED-EL (Innsbruck, Austria).
Maastricht Vestibular Electrode

Electrode position in the ampullae (Temporal bones)

Facial recess to access the cochlea

Dr Sunil Narayan Dutt
THANKS

Khalid M. Taibah, MBBch, FRCSc., ABOto.
Professor, Alfaisal University, Medical Collage, Riyadh
Director of ENT Medical Center, Riyadh
Founder of Saudi Society For Hearing Impairment (Saudi Hi)
Former, Head Section Otolaryngology, H&N King Faisal Sp.Hosp. &RC

www.ent.com.sa
**Left image:** One of the oldest existing copies of *The Canon of Medicine* by Avicenna, c. 1030

**Right image:** The *Canon of Medicine*, printed in Venice 1595
Empedocles, Greek philosopher, known for numbering the four basic elements (fire, air, earth and water), was the first to describe the cochlea. He called the structure, the name of a seashell found in the Mediterranean region. However, his discovery intrigued him more for the perfect and singular shape of that anatomical structure than its function or relation with hearing.
Aristotle (384 B.C. to 322 B.C.)

Aristotle, one of the best-known Greek philosophers, even without anatomical knowledge, created a theory on hearing.

He believed there was a resonating space within the inner ear, which vibrated in response to sound.

Pure air was implanted in the ear as the person was born, and congenitally deaf people did not have this air implanted there.

As time passes, people would lose this pure air, thus reducing hearing.
by: Maria Do Sameiro Barroso

This article presents Abu'l-Qasim Khalaf ibn 'Abbas al-Zaharawi, Arabic. أبا القاسم خلف بن عباس الزهراوي, Latin Albuçasis (938-1013 A.D.), one of the most outstanding Arabic physicians and the most remarkable Arabic surgeon. His work had a strong impact in middle ages. Greek-Roman surgery had almost ceased to be practiced, in the Western world, after Paul of Aegina (625-690 A.D.), the last Byzantine compiler. Albuçasis took for himself the task of making of surgery an honorable art. He recovered ancient surgical texts from damaged scrolls, developed, expanded and refined Greek-Roman operations, adding his own pioneer techniques, procedures, and devising his own instruments. His clear and insightful teachings laid the foundations of accurate and safer surgical procedures that were adopted in the following centuries.
923 A.C.
1700 - 1800

Following instruments are ear speculums invented by Jean Marc Gaspar Itard (1774-1838) and Wilhelm Kramer (1801-1875).

Jean Marc Gaspar Itard

Kramer’s speculum

The tkuznica mirror

Karl Theodor Seitz's reflection

Way of placing the Speculum in use (removed)

The Italian speculum

Winding is over (removed)
1800 - 1900

Adam Politzer (1835-1920)

Politzer is considered to be the father of Otology on the continent, he was the teacher of generations of otologists, inventor of the Politzer balloon and of a tiny little instrument for hearing tests.

The tooth holder and how to use it.

The Türk Reflector
Politser's Textbook of otology (12 editions)
Burt D. La Force (1869-1947)

Tonsillectomies by Fahnestock, Mathieu and Brüning
Early Electric laryngoscope (Theodor Simon 1937)

Theodor Simon Philau

who was a laryngologist in Berlin (1868-1937). He left us this very early electric endoscope, especially to be used when the patient’s mouth is shut....
A BRIEF HISTORY OF OTOLARYNGOLOGY IN THE
UNITED STATES FROM 1847 TO 1947

RALPH A. FENTON, M.D., Sc.D.
PORTLAND, ORE.

The American Ophthalmological and Otological Society was formed in 1868, mainly among specialists of Boston, New York and Philadelphia, and by 1871 those interested only in the ear withdrew at Providence, R. I., to form the American Otological Society. The American Laryngological Association was formed in 1879 in New York. It should be remembered that these small American societies, limited in membership, antedated all similar groups in England and on the continent of Europe. The American Laryngological, Rhinological and Otological Society was founded in New York in 1895, to reach a somewhat larger group of men, who qualify for membership by submitting theses. The American
KFSH&RC ENT Department
CARINA MIT
Cochlear co.
Carina® Fully Implantable Middle Ear Implant

- The subcutaneous microphone captures sound, and sends it to the implant.
- The implant sends it to the actuator.
- The actuator converts the signal to mechanic vibrations, which stimulate the cochlea via the ossicular chain or round window.
100th Year Anniversary
Department of Otolaryngology, McGill University
100th Year Anniversary
Department of Otolaryngology, McGill University
100th Year Anniversary
Department of Otolaryngology, McGill University
McGill University
Otolaryngology, Head & Neck Surgery
SAUDI GRADUATES
1982-2005

1. Moheedin Mandura, Makkah
2. Khalid Taibah, Riyadh
3. Surayie Al Dousary, Riyadh
4. Khalid Al Noury, Jeddah
5. Essam Al Zimaiti, Jeddah
6. Saeed Al Ghamdi, Assir
7. Saleh Al Ghamdi, Dhahran
8. Khalid Al Ghamdi, Jeddah
9. S. Al Jedher, Dhahran
10. Ashraf Al Benayan, Jeddah
11. Saleh Al Dhahri, Riyadh
12. Nasser Al Faqeeh, Assir
13. Ahmad Al Ammar, Riyadh

100\textsuperscript{th} Year Anniversary
Department of Otolaryngology, McGill University
Disease Characteristics

Hereditary Hearing Loss:

- Non-Syndromic or Syndromic

- Worldwide rate for pre-lingual deafness is between 1-2/1000

- Incidence is higher in Saudi Arabia (Prof. Zakzoug) (1.6%)
Principal Aim

- ESTABLISH THE ROLE OF CONNEXIN GENES, *GJB2* AND *GJB6 (DFNB1)* IN THE AETIOLOGY OF NON-SYNDROMIC HEREDITARY DEAFNESS IN SAUDI PATIENTS
A comprehensive introduction to the genetic basis of non-syndromic hearing loss in the Saudi Arabian population

Faiqa Intiaz1, Khalid Taibah2, Khushnooda Ramzan1, Ghada Bin-Khamis3, Shelley Kennedy4, Bashayer Al-Mubarak1, Daniah Trabzuni1, Rabab Allam1, Abeer Al-Mostafa1, Sameera Sogaty5, Abdulmoneem H Al-Shaikh6, Saeed S Bamukhayyar7, Brian F Meyer1 and Mohammed Al-Owain8,9
USH1G with unique retinal findings caused by a novel truncating mutation identified by genome-wide linkage analysis

Faiqa Imtiaz, Khalid Taibah, Ghada Bin-Khamis, Shelley Kennedy, Amal Hemidan, Faisal Al-Qahtani, Khalid Tabbara, Bashayer Al Mubarak, Khushnooda Ramzan, Brian F. Meyer, Mohammed Al-Owain

1Department of Genetics, King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia; 2ENT Medical Centre, Riyadh, Saudi Arabia; 3Department of Otolaryngology, King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia; 4Ontario Newborn Screening Program, Children's Hospital of Eastern Ontario, Ottawa, Ontario, Canada; 5Department of Ophthalmology, King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia; 6Department of Medical Genetics, King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia; 7College of Medicine, Al-Faisal University, Riyadh, Saudi Arabia
Short communication

Homozygosity mapping identifies a novel GIPC3 mutation causing congenital nonsyndromic hearing loss in a Saudi family

Khushnooda Ramzan a,*, Mohammed Al-Owain b,c, Rabab Allam a, Amal Berhan a, Gheid Abuharb d, Khalid Taibah e, Faiqa Imitiaz a
COL4A4-related nephropathy caused by a novel mutation in a large consanguineous Saudi family

Khushnooda Ramzan a,* Faiqa Imtiaz a, Khalid Taibah b, Samir Alnufiee c, Mohammed Akhtar d, Selwa A.F. Al-Hazzaa e, Mohammed Al-Owain c,f
Short clinical report

**ILDR1**: Novel mutation and a rare cause of congenital deafness in the Saudi Arabian population.

Khushnooda Ramzan a,*, Khalid Taibah b, Asma I. Tahir a, Nada Al-Tassan a, Amal Berhan a, Ahmed M. Khater b, Selwa Al-Hazzaa c, Mohammed Al-Owain d, e, Faiqa Imtiaz a
Short communication

Homozygosity mapping identifies a novel GIPC3 mutation causing congenital nonsyndromic hearing loss in a Saudi family

Khushnooda Ramzan a,*, Mohammed Al-Owain b, c, Rabab Allam a, Amal Berhan a, Gheid Abuharb d, Khalid Taibah e, Faiqa Imtiaz a

a Department of Genetics, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia
b Department of Medical Genetics, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia
c School of Medicine, Al-Faisal University, Saudi Arabia
d Department of Otolaryngology, King Faisal Specialist Hospital and Research Centre, Riyadh, Saudi Arabia
e ENT Medical Centre, Riyadh 11333, Saudi Arabia
Conclusion:

For genetic study in the Saudi Arabian population:

- Our results strongly indicate that DFNB1 only accounts for 3% of non-syndromic hearing loss in the Saudi Arabian population of ethnic ancestry.

- The overall results of this study are highly suggestive that underlying molecular basis of autosomal recessive non-syndromic deafness in Saudi Arabia is very genetically heterogeneous.

- In addition, we report that there does not seem to be any common or more prevalent loci, genes or mutations in patients with autosomal recessive non-syndromic hearing loss in patients of Saudi Arabian tribal origin.
Photomicrographs of histological sections of guinea pig scala media

Hair cells and supporting cells from the organ of Corti in an inoculated ear.
Photomicrographs of histological sections of guinea pig scala media

Sensory epithelial cells and fibrocytes of the scala tympani