

10th European Otolaryngology-ENT Surgery Conference

December 12-13, 2024

Rome, Italy

Daniel Saad, J Laser Opt Photonics 2024, Volume 11

Professor Pietro Tullio's pigeons - a glimpse at historic vestibular physiology research

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In 1932, Professor Pietro Tullio was nominated for the Nobel Prize in Physiology or Medicine for his experimental work using pigeons which revolutionised the understanding of vestibular physiology at the time. From the late 19th century to the early 20th century, his experimental work culminated in the discovery of the eponymously named 'Tullio phenomenon'. This describes when a vestibular impulse is generated in response to sound. Pigeons have historically been used to model our vestibular system, as the avian inner ear comprises a structure similar to that of humans. Their inner ear also houses three orthogonal semicircular canals, however there are some notable differences. Interestingly, birds have an extra third otolith organ named the lagena which contains iron and manganese compounds allowing detection of the Earth's magnetic field (1). Their cochlear duct is straight as opposed to our spiral cochlea and they only have one ossicle termed the 'columella' which means they detect a narrower range of frequencies compared with humans(2). Tullio's experiments involved drilling holes in pigeon semicircular canals and measuring their head movements in relation to sound stimulus. His findings demonstrated that semicircular canal dehiscence or fistulae can lead to aberrant vestibular system stimulation by sound. (3). Tullio's phenomenon notably occurs in superior semicircular canal dehiscence which was first described as a case series of 8 patients in 1998, of which 7 were Tullio positive (4). The phenomenon may also be observed in non-canal dehiscence pathologies such as perilymph fistulae and enlarged vestibular aqueduct(5).

Biography

Daniel Saad is a Core Surgical Trainee on a ENT-themed programme based in London at the prestigious Imperial College Healthcare NHS Trust, a national UK ENT centre specialising in laryngology and rhinology. During his training here he has been exposed to airway reconstructive surgery, management of rare sinonasal malignancies and rhinological surgical treatments of hereditary haemorrhagic telangiectasia. In addition to his aspirations to become an ENT specialist, Dr Saad is passionate about medical education and mentorship for younger doctors seeking a surgical career. He regularly volunteers to teach surgical skills, anatomy and physiology to medical students.

Received: November 19, 2024; **Accepted:** November 22, 2024; **Published:** December 13, 2024
