

Endoscopic probe for multi-channel upper airway diagnostics

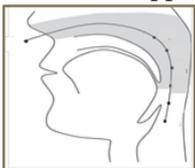
BACKGROUND

The upper airway is the main passageway for food and respiration. The anatomical structure is intrinsically complex and may be affected by many health-related problems (eg. obesity). Mechanisms that underpin the healthy physiology of the human upper airway are well understood. However, lack of appropriate imaging tools has prevented further understanding of how upper airway function is altered in health and disease.

MRI studies have clearly demonstrated that change in upper airway geometry is complex during respiration (tidal breathing). Hence, the ability to measure changes in airway diameter along the length of the upper airway in a single breath would be a valuable diagnostic tool for respiratory diseases. Other than MRI, CT scans and X-rays, there are no imaging tools that can perform such measurements. Neither are ideal for routine clinical application, as MRI is costly and both CT scans and X-rays emit harmful radiation.

OUR SOLUTION

We have designed a multi-channel Optical Coherence Tomography (OCT) device, with integrated pressure sensors. As opposed to single-channel devices (multiple



measurements at different locations), our novel design enables detailed simultaneous measurement of changes in airway dimensions in a single breath at multiple locations.

ADVANTAGES	BENEFITS
Device Design	Longitudinal distribution of multiple scanning heads and pressure sensors on an endoscopic probe
System Cost	Designed at optimum cost. The system's cost per channel is minimal as a beam from single broadband light source is split and distributed to different channels
Imaging and Data	<ul style="list-style-type: none"> - Simultaneous imaging of circumference of airway cross section at different points - Measurement of upper airway collapse and associated pressure during breathing
Scalability	<ul style="list-style-type: none"> - Possible integration of further functions (eg. pressure transducers) - Adjustable number of channels

TECHNOLOGY APPLICATIONS

✓ Severe obstructive sleep apnea (OSA):

OSA is an underrecognized and underdiagnosed medical condition despite the deleterious effects this disease has on health and society. The cost of untreated OSA has been estimated to be approximately \$3.4 billion annually in the US alone.

Polysomnography - this "gold-standard" of OSA diagnostic testing is expensive, time-consuming, cumbersome and has high rate of patients aversion. Studies suggest that identifying the mechanics of upper airway collapse during wakefulness could be potentially used as a complementary tool to diagnose OSA and to determine the best treatment strategies.

Our multi-channel OCT device can be used to determine tissue mechanics and upper airway collapsibility in individuals to improve OSA diagnosis.

Additional potential applications include:

- ✓ Imaging of the upper airway geometry
- ✓ Other respiratory disease diagnosis
- ✓ Swallowing disorders
- ✓ Flow rate measurements
- ✓ Blood vessel geometry quantification

Stage of development: Prototype testing. Opportunity to influence its development and future patentable IP

INTELLECTUAL PROPERTY POSITION

Patent filed. Inventors: Taye Tolu, Shaokoon Cheng, Jason Amatory, Agi Kourmatzis - Department of Engineering, Faculty of Science & Engineering.

PARTNERING OPPORTUNITY

We are seeking an industry partner for further development and commercialisation of this technology through a research collaboration or technology license.

WOULD YOU LIKE TO KNOW MORE?

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