We use a wide range of principles and disciplines to understand how cochlear implants work and how they might work better. Clinical approaches are investigated through our Audiology and Speech-Language Pathology programs at University of Maryland. Psychological perception tests are performed to understand how the brain perceives acoustical and electrical stimulation of the auditory system. Neural modeling of the auditory system allows us to better understand electrical stimulation.

Are you a student or post-doc interested in cochlear-implant research?

Research opportunities in the lab are available to undergraduates, particularly those interested in pursuing advanced degrees in:
- Audiology
- Speech Language Pathology
- Auditory Neuroscience
- Psychology
- Physics, Electrical Engineering, or Biomedical Engineering
- Other related fields

Graduate students and post-docs interested in opportunities in the lab should contact Dr. Goupell to discuss research interests and future career goals.

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What is a cochlear implant?

A cochlear implant can restore hearing to those with severe sensorineural hearing loss, even when a hearing aid may not provide a benefit. Cochlear implants send acoustic information to the auditory system by directly stimulating the inner ear.

Cochlear implants are not perfect. For example, speech perception is often reported as sounding “robotic.” While cochlear implant companies and researchers know approximately what information to provide to users, they do not know exactly what information to keep and what to disregard. Furthermore, there are technical limitations that must be considered when designing a cochlear implant.

What are we studying?

One cochlear implant
- What speech information is necessary to present to cochlear-implant users to fully understand speech?
- How does speech understanding change as a cochlear-implant user ages?
- What basic auditory processing is lost when using an implant, and can it be restored?

Two cochlear implants
- How can we improve speech understanding in noise?
- How can we improve sound localization?

Cochlear-implant simulations
- How do we simulate listening through an implant with typical hearing?

About us...

Our research is funded by the National Institute of Health and the University of Maryland at College Park. We receive support from Cochlear Ltd. and the Med-El Corporation to perform our studies. We are partnered with the cochlear implant program at the University of Maryland Medical Center in Baltimore. We collaborate with other cochlear implant research including groups at NYU, University of Wisconsin - Madison, and the Austrian Academy of Sciences.

We are also involved with:
- Center for Comparative and Evolutionary Biology of Hearing (C-CEBH: http://www.ccebh.umd.edu/)
- Language Science Program (http://languagescience.umd.edu/)
All at the University of Maryland - College Park.

Are you eligible?

Do you have a Nucleus-type implant (N24, Freedom, or N5) or Med-El?

If so, you may be a candidate for our direct stimulation studies. If not, we also perform other studies like sound field measurements. Remuneration, including travel costs, is provided for participants.

How will the studies take place?

We will bypass your everyday processor and control your implant at the single electrode level. This is a powerful technique to examine our research questions because we are able to use very specialized signals.

Otherwise, we will use your everyday processor or bypass the microphone to ask our research questions.

Testing can be done in 2- to 6-hour appointments for those who live in the area. For those traveling from out of town, day or multi-day trips are arranged.

Are there any risks?

- We do not change your clinical maps, so there is no risk of losing or ruining them.
- Tests that use the everyday processor produce no risks beyond what is experienced daily.
- Direct stimulation testing involves minimal risk because we use your internal device like your clinical processor does.