

# Cochlear Implantation Outcomes in the Geriatric Population

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## Abstract

Research has supported that **cochlear implants offer as much benefit in seniors as they do in younger adults**. To further assess the benefit of cochlear implantation **within the senior population** and the potential negative effects of advanced age, this study aims to evaluate hearing outcomes following cochlear implantation. 40 patients over the age of 60 years were enrolled, divided into 2 groups based on age—**older adults (age 60-74 years) and advanced geriatrics (age 75+ years)**—and assessed to determine the effects of cochlear implants (CIs) on hearing outcomes. Patients in this study underwent audiological testing including preoperative audiograms and pre- and postoperative AZbio tests, CNC words and phonemes tests, as well as GBI, APHAB, and technology surveys.

## Introduction

Nationally, there has been significant **aging of the population**. Not only are more Americans becoming senior citizens, but their life expectancy is also increasing. In 2017, the average life expectancy was 79.7 years and it is expected to increase to **81.7 years by 2030** and 85.6 years in 2060.<sup>1</sup> Concurrently, the prevalence of **hearing loss** increases with age.<sup>2</sup> With a growing elderly population and prevalence of hearing loss, **cochlear implantation (CI)** offers hearing, cognitive, and quality of life benefits to an expanding demographic.

### Hearing Benefits:

- CI in the **young is comparable** to that of the elderly<sup>3,4,5</sup>
- Lack of difference in complication rates in the young vs elderly, even though there are increased comorbidities in the elderly<sup>6</sup>

### Cognitive Benefits:

- Mild to severe hearing loss: 2-5 fold increase of developing **dementia**<sup>7</sup>
- Low rate of progression to dementia, and even documented cognitive improvement following CI<sup>8</sup>

### Quality of Life Benefits:

- Increase in social activity, **autonomy**, speech perception, and cognitive ability<sup>1,9,10,11</sup>

Further studies to concede on the upper age limit for cochlear implantation, and the benefits/effectiveness of CI with respect to advanced age are needed. The aim of the current study is to assess whether there are differential benefits between a younger cohort of older patients (age 60-74) and a more advanced age geriatric population (age 75+).

## Methods and Materials

- Retrospective review of 40 adults over the age of 60
- Patients were divided into **older adult (age 60-75)** and **advanced geriatric (age 75+)** for analysis
- Measures included:
  - AzBio score (preoperative, 6-12 month, most recent results)
  - CNC score (preoperative, 6-12 month, most recent results)
  - GBI survey
  - APHAB survey
  - Technology survey
- T-test was performed to determine any significant differences between variables, alpha <0.05
- Chi-square test performed for technology survey

## Results

Overall, all of the measured variables (AzBio, CNC, GBI survey, APHAB survey, technology survey) demonstrated **no significant difference** between the older adults and advanced geriatrics age groups, **alpha level 0.05**.

Table 1: AzBio and CNC Results

	AZBIO		6-12 month		Most Recent	
	OA	AG	OA	AG	OA	AG
MEAN	24.765	18.478	62.267	52.000	63.071	49.500
P VALUE	0.457		0.261		0.196	

	CNC WORDS		6-12 month		Most Recent	
	OA	AG	OA	AG	OA	AG
MEAN	11.067	12.125	50.545	44.125	48.571	43.143
P VALUE	0.830		0.435		0.518	

	CNC Phonemes		6-12 month		Most Recent	
	OA	AG	OA	AG	OA	AG
MEAN	28.200	24.875	50.545	60.375	60.143	57.571
P VALUE	0.701		0.121		0.738	

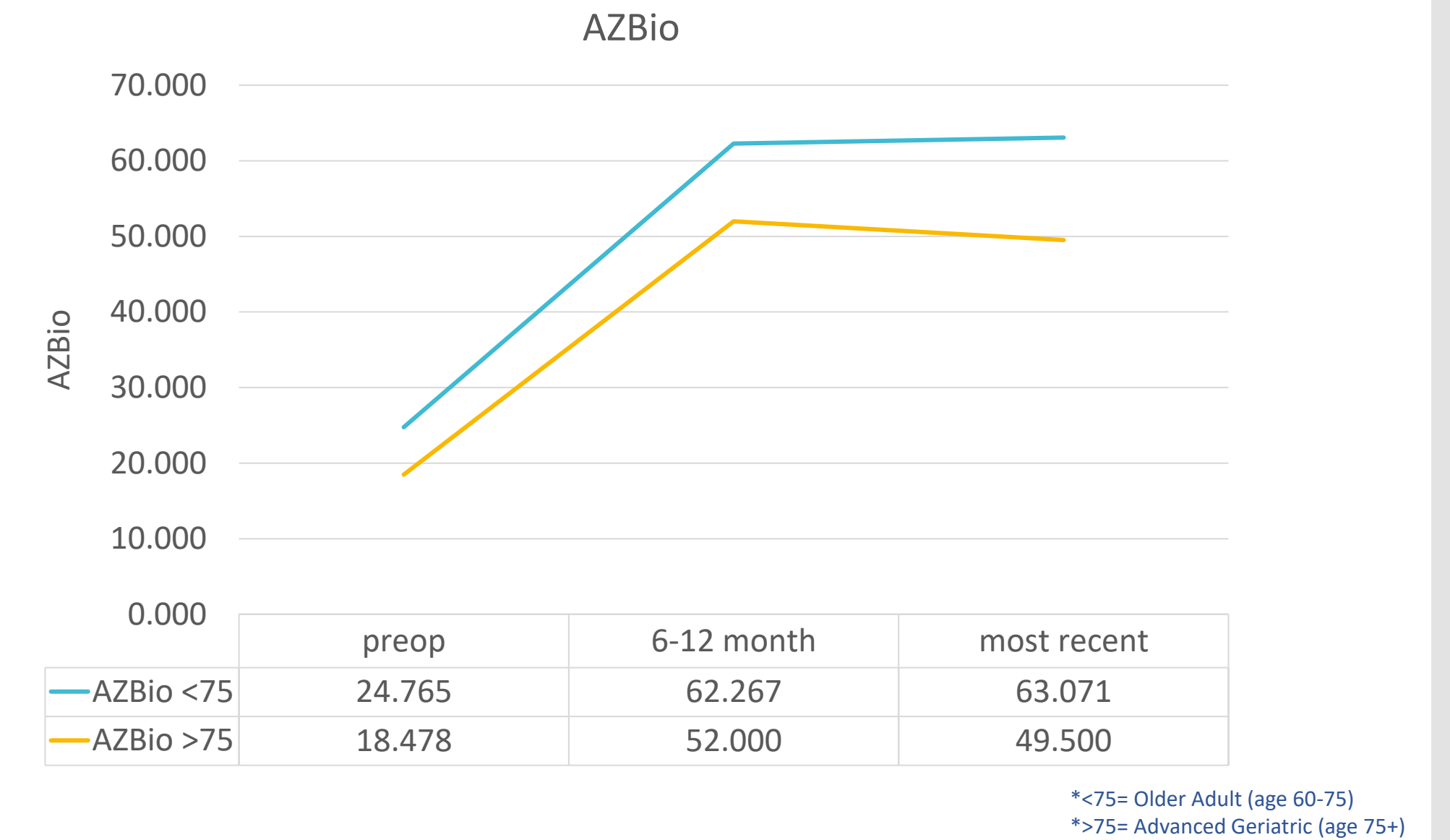
Table 2: GBI, APHAB, Technology surveys

GBI survey	p-value	APHAB survey	p-value	Technology Survey	p-value	Technology survey	p-value
Total score	0.289	Ease of communication	0.719	Smart phone	0.197	Internet use	0.126
General subscale	0.382			Ipad	0.677	Hours per day using implant	0.529
Social Support	0.122	Background noise	0.288	Computer	0.380	Accessory Use	0.690
Physical Health	0.463	Reverberation	0.677	Internet	0.380	*survey performed based on never/once per week/few times per week/multiple times per week/ all the time response	*analysis based on chi-square analysis
		Averseness	0.971	Technology difficult	0.461		

\*OA= Older Adult (age 60-75)

\*AG= Advanced Geriatric (age 75+)

Figure 1. AzBio Trend



## Discussion

Overall, none of the measured variables of AzBio, CNC, GBI, APHAB, or technology survey demonstrated a significant difference within the senior population between **the older adults (age 60-74) and advanced geriatrics (age 75+)** groups. Both age groups showed a relative **improvement in AzBio** results in postoperative outcomes. Based on the results of the study, **cochlear implantation in the significantly advanced age population is successful**, and age alone should not be an exclusionary factor for candidacy.

When accounting for patient demographics along with the analysis above, it becomes apparent that age amongst the elderly does not have a significant impact on benefits from cochlear implantation and quality of life. Thus, cochlear implantation should be a consideration for the advanced geriatric population in the promotion of elderly welfare.

### Future Directions:

- Analysis of speech outcomes were carried out with the best data from the 6-12 month and most recent postoperative period. Further investigation of longer-term audiometric data would be useful for analysis
- Further studies can improve this study with broader sample size, random sampling, analysis of cochlear implant usage time, gender analysis, record of social influences (differences in motivation and familial support)

## Contact

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