

# COCHLEAR™ NUCLEUS® SYSTEM RELIABILITY REPORT

Volume 2 | December 2019

## Reporting to ANSI/AAMI C186 Standard

### ABOUT THIS DOCUMENT

This document provides reliability data for the internal (cochlear implant) and external (sound processor) components of our Cochlear™ Nucleus® Implant Systems.

This data meets the reporting standards and methodology recommended by ANSI/AAMI C186 – Cochlear implant systems: Requirements for safety, functional verification, labeling and reliability reporting<sup>1</sup>.

*Hear now. And always*



## THE ANSI/AAMI C186 STANDARD

In 2017, the ANSI/AAMI C186 guidelines were approved, outlining procedures that manufacturers should follow when reporting the reliability of cochlear implants and sound processors.

The guidelines require manufacturers to provide information to the public about the percentage of implanted devices that have been removed following implantation. This number is the cumulative removal percentage, or CRP. Age-related differences may affect the CRP, so data is also shown for patients who are both older (10 years of age or older) and younger (less than 10 years of age) at the time they received the implant. Typically, children younger than 10 years of age have a higher chance of activity-related damage to the device.

The guidelines also require manufacturers to provide information about returned device failure rates for sound processor models sold in the US. This metric is the Failed Component Return Rate (FCRR).

You will note that no hearing implant device has perfect reliability over time. If a cochlear implant is removed, the surgeon returns the device to the implant manufacturer for testing. If the manufacturer finds that the device is not working properly, additional tests are performed to determine the cause of the failure. Once testing is complete, the results are sent to the hearing professional and the manufacturer's reliability data is updated. As part of the requirements of ANSI/AAMI C186, device manufacturers send detailed reliability reports to the U.S. Food and Drug Administration (FDA) every six months. Frequently, the device manufacturer uses the results of these tests to improve the design of future products.

The guidelines require manufacturers to publish their updated reliability data every six months. To ensure you have the most recent information, check the date on this document. The most recent report is available on the manufacturer's website.

## COCHLEAR™ IMPLANT DATA

In this document, Cumulative Removal Percentage (CRP) is used to measure implant reliability. CRP is the percentage of implanted devices that have been removed following implantation. The CRP provides information regarding the reliability of a certain make and model of implant over time.

For example, if the CRP after five years of experience with a specific implant model is 7%, this means that after five years, the patient's chance of obtaining continued benefit from the cochlear implant system, as described for its intended use, is 93%.

It is important to track device reliability information over time because cochlear implants typically remain implanted for many years. It is also important to track the reasons for removal when devices are replaced. The CRP classifies removed devices into three categories that define the reason for removal:

- **Medical Related.** Examples of medical reasons for device removal include infection, rejection of the device due to allergy, or incorrect positioning of the internal device.
- **Device Failure.** Examples of device failure reasons for removal include suspected implant failure due to mechanical or electrical issues, moisture damage, or other problems with device function.
- **Inconclusive.** Occasionally, testing of the device indicates no fault, despite a reason for removal. For example, a patient experiences unexplained performance decline, but testing of the removed device reveals normal function.

# NUCLEUS® PROFILE™ PLUS SERIES IMPLANT

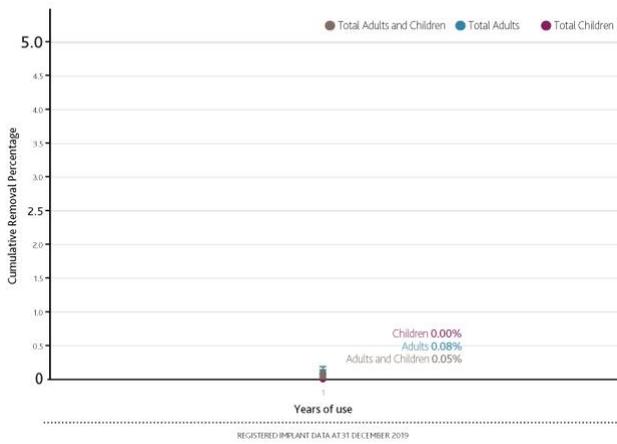
Number of registered Profile™ Plus Series Implants - 31 December 2019

ADULTS	CHILDREN	COMBINED
5,303	2,002	7,305

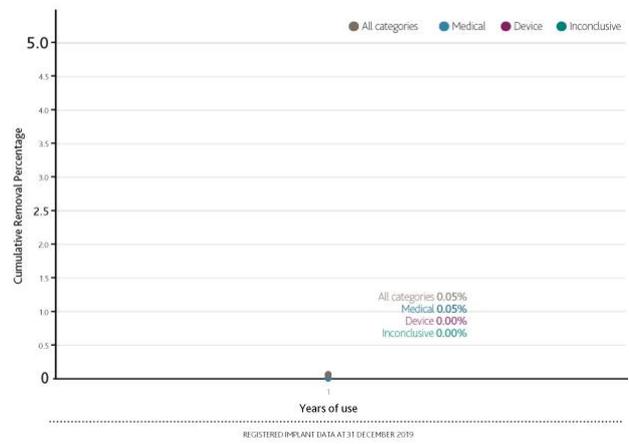
## Profile Plus Series Implant Cumulative Removal Rates

Group	Adults						Children						Combined Adults and Children						
	Sub-category	Medical Related	Device Failure	Inconclusive	Total		Medical Related	Device Failure	Inconclusive	Total		Total		Medical Related	Device Failure	Inconclusive	Total		
	Years	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down
1		0.08%	0.00%	0.00%	0.08%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.05%	0.13%	0.00%

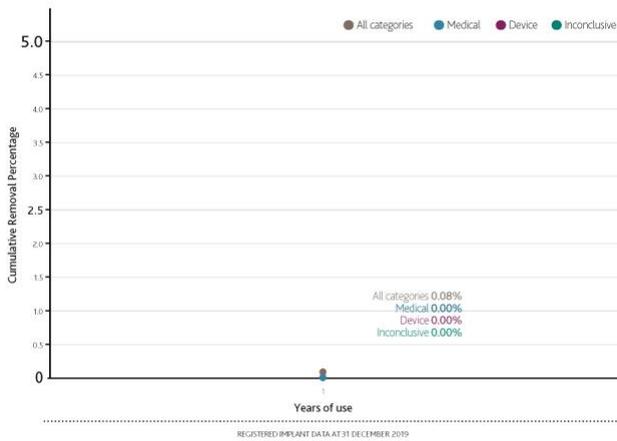
Profile Plus Series Implant - removal rates for all analysis categories and different patient populations



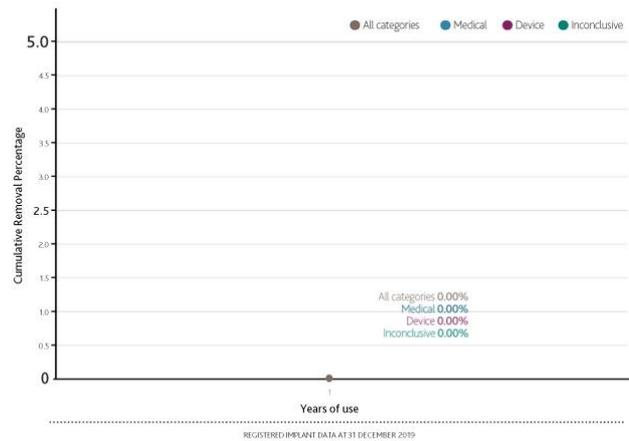
Profile Plus Series Implant - removal rates by analysis category for adults and children



Profile Plus Series Implant - removal rates by analysis category for adults



Profile Plus Series Implant - removal rates by analysis category for children



# NUCLEUS PROFILE SERIES IMPLANT

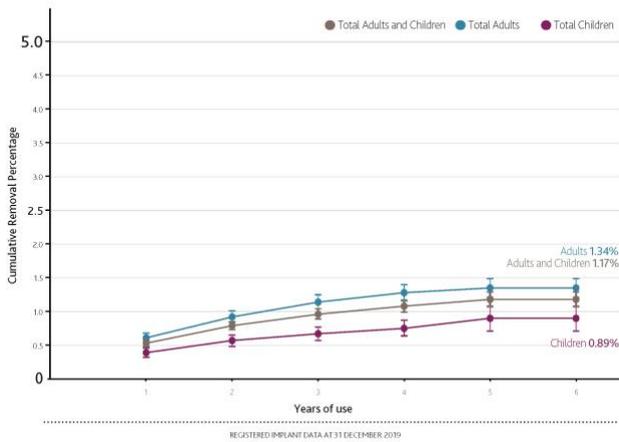
Number of registered Profile Series Implants - 31 December 2019

ADULTS	CHILDREN	COMBINED
55,314	35,089	90,403

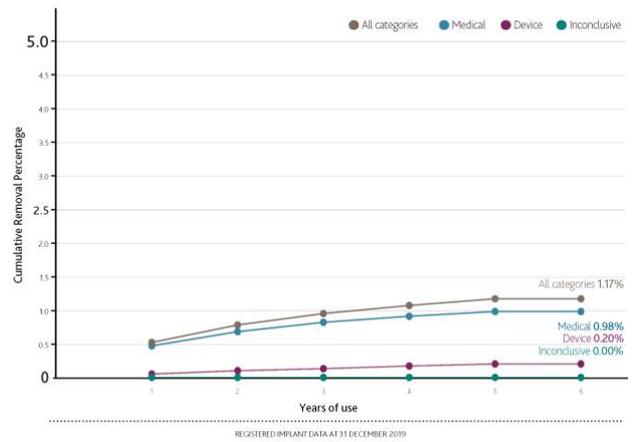
## Profile Series Implant Cumulative Removal Rates

Group	Adults						Children						Combined Adults and Children						
	Sub-category	Medical Related	Device Failure	Inconclusive	Total		Medical Related	Device Failure	Inconclusive	Total		Medical Related	Device Failure	Inconclusive	Total				
	Years	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down
1		0.56%	0.04%	0.00%	0.60%	0.67%	0.54%	0.31%	0.07%	0.00%	0.38%	0.45%	0.31%	0.47%	0.05%	0.00%	0.52%	0.57%	0.47%
2		0.84%	0.08%	0.00%	0.91%	1.00%	0.83%	0.41%	0.15%	0.00%	0.56%	0.64%	0.47%	0.68%	0.10%	0.00%	0.78%	0.84%	0.72%
3		1.04%	0.10%	0.00%	1.13%	1.24%	1.03%	0.48%	0.18%	0.00%	0.66%	0.76%	0.56%	0.82%	0.13%	0.00%	0.95%	1.03%	0.88%
4		1.16%	0.12%	0.00%	1.27%	1.39%	1.15%	0.49%	0.25%	0.00%	0.74%	0.86%	0.63%	0.91%	0.17%	0.00%	1.07%	1.16%	0.98%
5		1.20%	0.14%	0.00%	1.34%	1.48%	1.20%	0.60%	0.29%	0.00%	0.89%	1.07%	0.70%	0.98%	0.20%	0.00%	1.17%	1.28%	1.06%
6		1.20%	0.14%	0.00%	1.34%	1.48%	1.20%	0.60%	0.29%	0.00%	0.89%	1.07%	0.70%	0.98%	0.20%	0.00%	1.17%	1.28%	1.06%

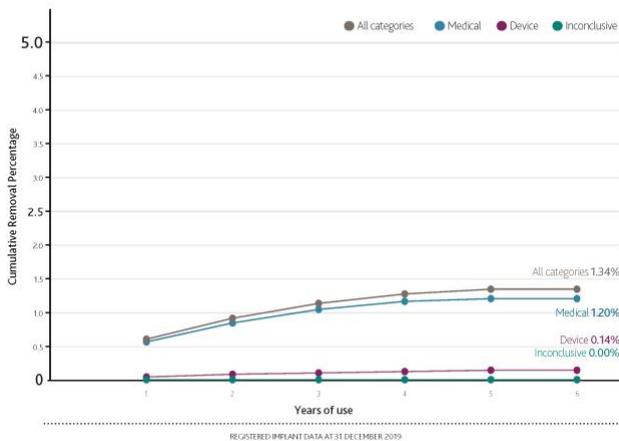
Profile Series Implant - removal rates for all analysis categories and different patient populations



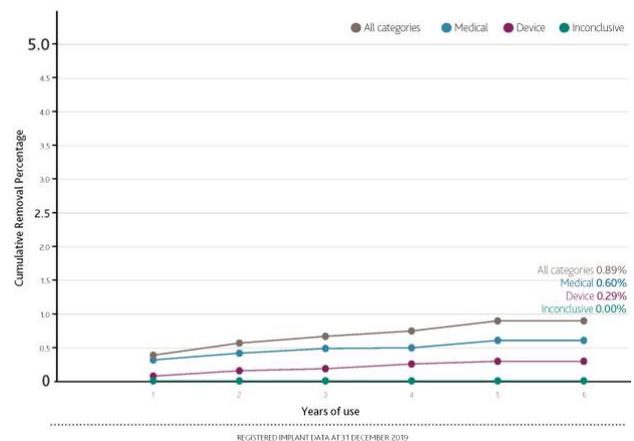
Profile Series Implant - removal rates by analysis category for adults and children



Profile Series Implant - removal rates by analysis category for adults



Profile Series Implant - removal rates by analysis category for children



## NUCLEUS CI24RE SERIES IMPLANT

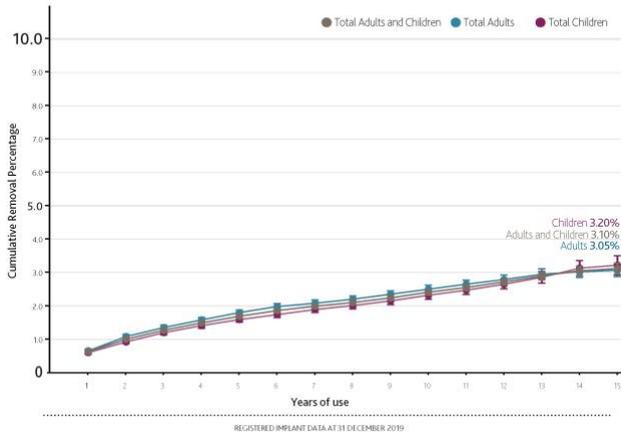
Number of registered CI24RE Series implants - 31 December 2019

ADULTS	CHILDREN	COMBINED
93,025	102,907	195,932

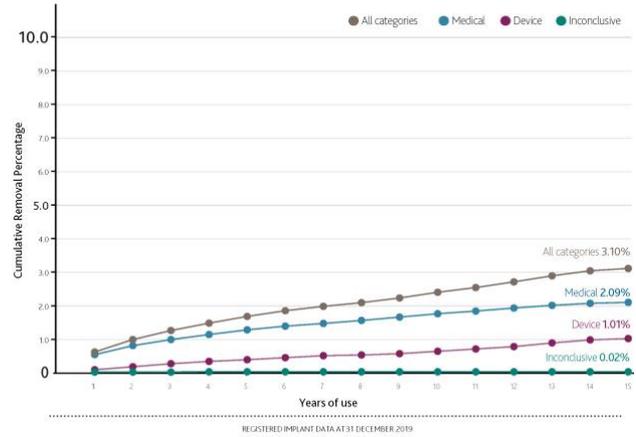
### CI24RE Series Cumulative Removal Rates

Group	Adults						Children						Combined Adults and Children					
	Sub-category	Medical Related	Device Failure	Inconclusive	Total	Total	Medical Related	Device Failure	Inconclusive	Total	Total	Medical Related	Device Failure	Inconclusive	Total	Total		
	Years	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up
1	0.57%	0.06%	0.01%	0.63%	0.69%	0.58%	0.49%	0.09%	0.01%	0.58%	0.63%	0.54%	0.53%	0.08%	0.01%	0.61%	0.64%	0.57%
2	0.93%	0.12%	0.01%	1.06%	1.13%	1.00%	0.68%	0.22%	0.01%	0.90%	0.96%	0.85%	0.80%	0.17%	0.01%	0.98%	1.03%	0.94%
3	1.14%	0.18%	0.01%	1.33%	1.41%	1.26%	0.83%	0.34%	0.01%	1.18%	1.25%	1.11%	0.98%	0.26%	0.01%	1.25%	1.30%	1.20%
4	1.33%	0.22%	0.01%	1.56%	1.64%	1.47%	0.94%	0.44%	0.02%	1.39%	1.46%	1.31%	1.13%	0.33%	0.02%	1.47%	1.52%	1.41%
5	1.51%	0.26%	0.01%	1.78%	1.86%	1.69%	1.05%	0.51%	0.02%	1.57%	1.65%	1.49%	1.27%	0.38%	0.02%	1.67%	1.73%	1.61%
6	1.63%	0.32%	0.01%	1.96%	2.05%	1.86%	1.14%	0.57%	0.02%	1.72%	1.81%	1.63%	1.38%	0.44%	0.02%	1.84%	1.90%	1.77%
7	1.70%	0.35%	0.01%	2.06%	2.16%	1.97%	1.22%	0.64%	0.02%	1.87%	1.96%	1.78%	1.46%	0.50%	0.02%	1.97%	2.03%	1.90%
8	1.79%	0.38%	0.01%	2.18%	2.28%	2.08%	1.30%	0.67%	0.02%	1.99%	2.09%	1.89%	1.55%	0.52%	0.02%	2.08%	2.15%	2.01%
9	1.91%	0.41%	0.01%	2.33%	2.43%	2.22%	1.39%	0.72%	0.02%	2.13%	2.23%	2.02%	1.65%	0.56%	0.02%	2.22%	2.30%	2.15%
10	2.03%	0.45%	0.01%	2.48%	2.60%	2.37%	1.46%	0.83%	0.03%	2.30%	2.42%	2.18%	1.75%	0.63%	0.02%	2.39%	2.47%	2.31%
11	2.14%	0.49%	0.01%	2.63%	2.75%	2.50%	1.51%	0.92%	0.03%	2.45%	2.58%	2.32%	1.83%	0.70%	0.02%	2.53%	2.62%	2.44%
12	2.23%	0.54%	0.01%	2.77%	2.91%	2.64%	1.60%	1.02%	0.03%	2.63%	2.78%	2.49%	1.92%	0.77%	0.02%	2.70%	2.80%	2.60%
13	2.30%	0.63%	0.01%	2.93%	3.09%	2.78%	1.69%	1.14%	0.03%	2.84%	3.01%	2.66%	2.00%	0.88%	0.02%	2.88%	2.99%	2.76%
14	2.32%	0.68%	0.01%	3.00%	3.17%	2.83%	1.80%	1.30%	0.03%	3.11%	3.34%	2.88%	2.06%	0.97%	0.02%	3.03%	3.16%	2.89%
15	2.37%	0.68%	0.01%	3.05%	3.25%	2.86%	1.80%	1.39%	0.03%	3.20%	3.48%	2.91%	2.09%	1.01%	0.02%	3.10%	3.26%	2.93%

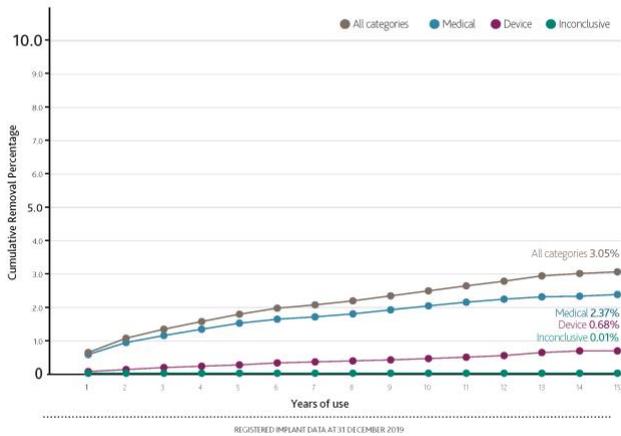
CI24RE Series - removal rates for all analysis categories and different patient populations



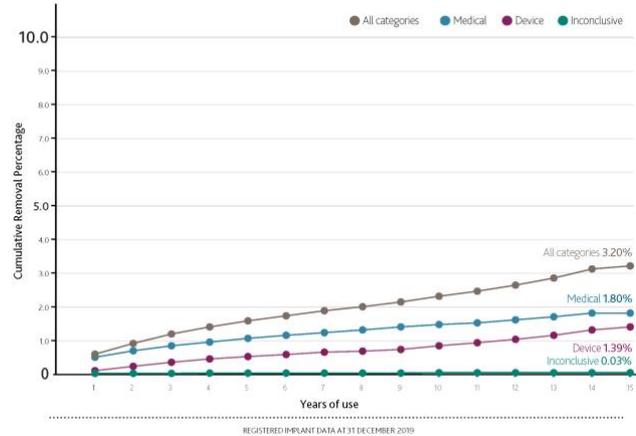
CI24RE Series - removal rates by analysis category for adults and children



CI24RE Series - removal rates by analysis category for adults



CI24RE Series - removal rates by analysis category for children



## NUCLEUS CI500 SERIES IMPLANT

Note: The CI500 Series was voluntarily recalled in September 2011.

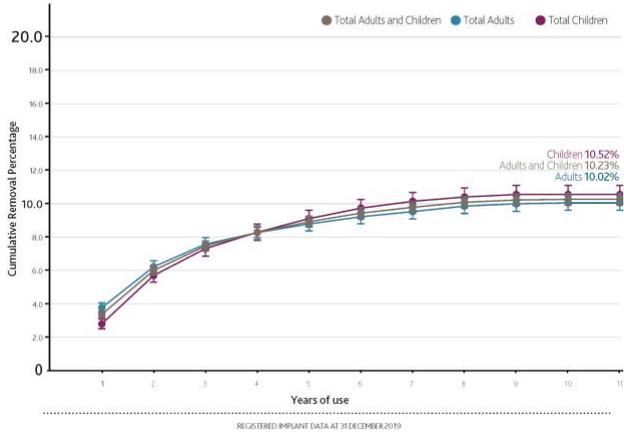
Number of registered CI500 Series implants - 31 December 2019

ADULTS	CHILDREN	COMBINED
17,557	12,335	29,892

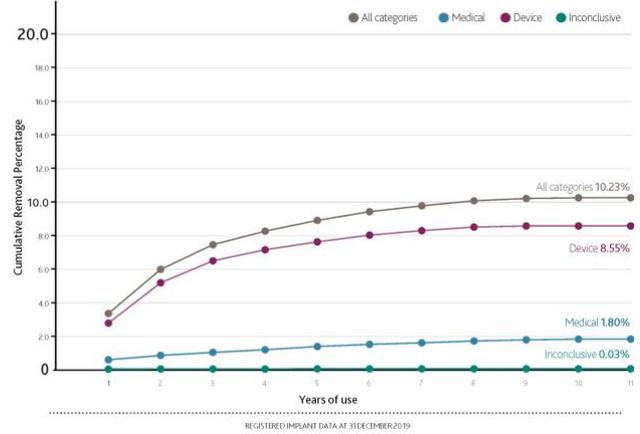
### CI500 Series Cumulative Removal Rates

Group	Adults						Children						Combined Adults and Children					
	Sub-category	Medical Related	Device Failure	Inconclusive	Total	Total	Medical Related	Device Failure	Inconclusive	Total	Total	Medical Related	Device Failure	Inconclusive	Total	Total		
Years	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down
1	0.69%	3.04%	0.02%	3.73%	4.01%	3.45%	0.41%	2.36%	0.00%	2.76%	3.05%	2.47%	0.57%	2.76%	0.01%	3.33%	3.53%	3.13%
2	1.04%	5.17%	0.02%	6.18%	6.54%	5.82%	0.54%	5.14%	0.01%	5.66%	6.06%	5.25%	0.83%	5.16%	0.02%	5.96%	6.23%	5.69%
3	1.23%	6.36%	0.02%	7.54%	7.93%	7.15%	0.69%	6.61%	0.02%	7.27%	7.73%	6.81%	1.01%	6.47%	0.02%	7.43%	7.73%	7.13%
4	1.42%	6.87%	0.03%	8.23%	8.63%	7.82%	0.81%	7.49%	0.02%	8.25%	8.74%	7.77%	1.17%	7.13%	0.02%	8.24%	8.55%	7.93%
5	1.63%	7.21%	0.03%	8.75%	9.17%	8.33%	0.97%	8.15%	0.04%	9.07%	9.58%	8.57%	1.36%	7.60%	0.03%	8.88%	9.21%	8.56%
6	1.79%	7.50%	0.03%	9.18%	9.61%	8.76%	1.06%	8.70%	0.04%	9.70%	10.22%	9.18%	1.49%	8.00%	0.03%	9.40%	9.73%	9.07%
7	1.87%	7.74%	0.03%	9.49%	9.92%	9.05%	1.17%	9.01%	0.04%	10.11%	10.64%	9.57%	1.58%	8.27%	0.03%	9.75%	10.08%	9.41%
8	1.99%	7.97%	0.03%	9.82%	10.26%	9.38%	1.27%	9.19%	0.04%	10.37%	10.91%	9.83%	1.69%	8.48%	0.03%	10.05%	10.39%	9.71%
9	2.04%	8.05%	0.03%	9.96%	10.40%	9.51%	1.36%	9.26%	0.04%	10.52%	11.07%	9.98%	1.76%	8.55%	0.03%	10.19%	10.54%	9.85%
10	2.11%	8.05%	0.03%	10.02%	10.47%	9.57%	1.36%	9.26%	0.04%	10.52%	11.07%	9.98%	1.80%	8.55%	0.03%	10.23%	10.58%	9.88%
11	2.11%	8.05%	0.03%	10.02%	10.47%	9.57%	1.36%	9.26%	0.04%	10.52%	11.07%	9.98%	1.80%	8.55%	0.03%	10.23%	10.58%	9.88%

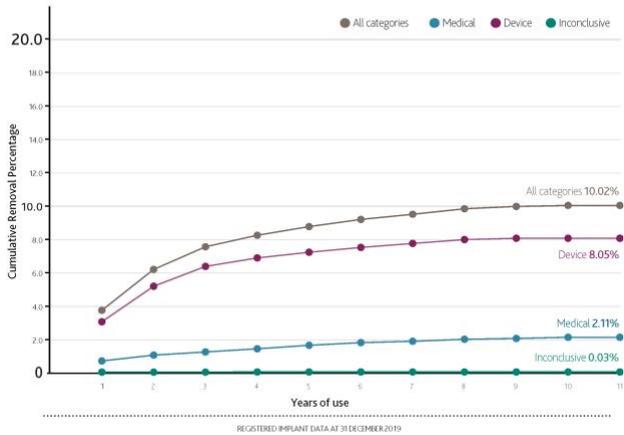
CI500 Series - removal rates for all analysis categories and different patient populations



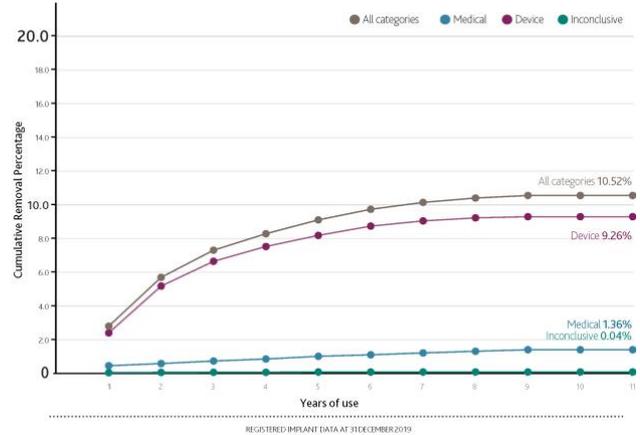
CI500 Series - removal rates by analysis category for adults and children



CI500 Series - removal rates by analysis category for adults



CI500 Series - removal rates by analysis category for children



# NUCLEUS CI24R IMPLANT

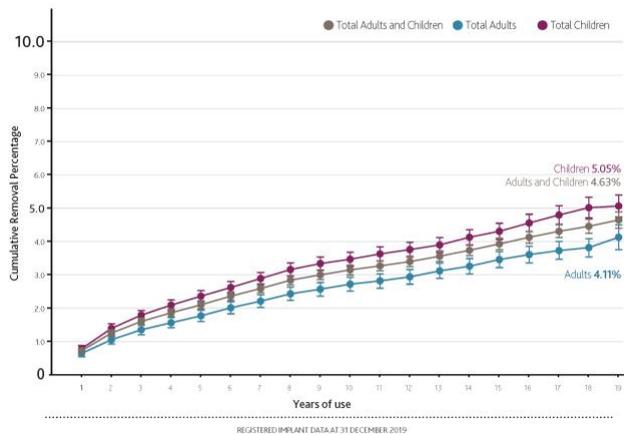
Number of registered CI24R implants - 31 December 2019

ADULTS	CHILDREN	COMBINED
23,264	30,246	53,510

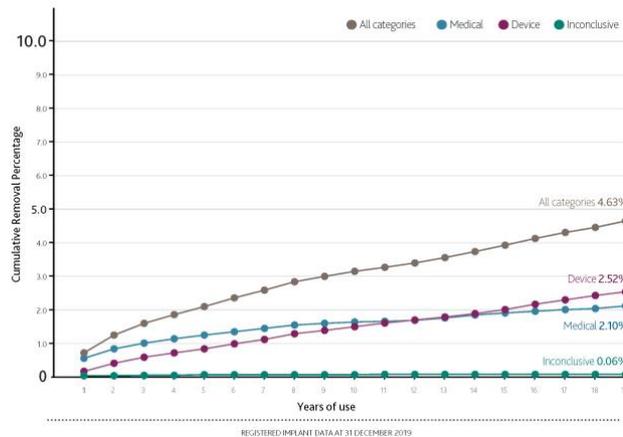
## CI24R Cumulative Removal Rates

Group	Adults						Children						Combined Adults and Children					
	Sub-category	Medical Related	Device Failure	Inconclusive	Total	Total	Medical Related	Device Failure	Inconclusive	Total	Total	Medical Related	Device Failure	Inconclusive	Total	Total		
	Years	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up
1	0.54%	0.06%	0.02%	0.62%	0.73%	0.52%	0.53%	0.21%	0.02%	0.76%	0.86%	0.66%	0.54%	0.15%	0.02%	0.70%	0.77%	0.63%
2	0.81%	0.21%	0.02%	1.03%	1.16%	0.90%	0.82%	0.53%	0.03%	1.37%	1.51%	1.24%	0.82%	0.39%	0.02%	1.23%	1.32%	1.13%
3	0.98%	0.33%	0.03%	1.33%	1.48%	1.18%	0.99%	0.75%	0.03%	1.77%	1.91%	1.62%	0.99%	0.57%	0.03%	1.58%	1.68%	1.47%
4	1.11%	0.41%	0.03%	1.54%	1.70%	1.39%	1.12%	0.92%	0.04%	2.07%	2.23%	1.91%	1.12%	0.70%	0.03%	1.84%	1.95%	1.73%
5	1.21%	0.51%	0.05%	1.75%	1.92%	1.58%	1.24%	1.07%	0.04%	2.34%	2.51%	2.17%	1.23%	0.82%	0.05%	2.08%	2.20%	1.96%
6	1.30%	0.65%	0.06%	1.99%	2.17%	1.81%	1.36%	1.22%	0.05%	2.60%	2.78%	2.42%	1.33%	0.97%	0.05%	2.34%	2.47%	2.21%
7	1.40%	0.74%	0.06%	2.19%	2.38%	2.00%	1.46%	1.38%	0.05%	2.87%	3.05%	2.68%	1.43%	1.10%	0.05%	2.57%	2.71%	2.44%
8	1.51%	0.86%	0.06%	2.41%	2.61%	2.21%	1.54%	1.58%	0.05%	3.14%	3.34%	2.94%	1.53%	1.27%	0.05%	2.82%	2.96%	2.68%
9	1.55%	0.95%	0.06%	2.55%	2.75%	2.34%	1.60%	1.69%	0.05%	3.32%	3.52%	3.11%	1.58%	1.37%	0.05%	2.98%	3.13%	2.84%
10	1.59%	1.06%	0.06%	2.70%	2.91%	2.49%	1.63%	1.80%	0.05%	3.45%	3.66%	3.24%	1.62%	1.48%	0.05%	3.13%	3.27%	2.98%
11	1.62%	1.13%	0.06%	2.80%	3.01%	2.58%	1.65%	1.95%	0.05%	3.61%	3.82%	3.40%	1.64%	1.59%	0.06%	3.25%	3.41%	3.10%
12	1.67%	1.21%	0.06%	2.92%	3.14%	2.70%	1.67%	2.05%	0.06%	3.74%	3.96%	3.52%	1.67%	1.68%	0.06%	3.38%	3.54%	3.23%
13	1.77%	1.29%	0.07%	3.10%	3.33%	2.87%	1.71%	2.15%	0.06%	3.88%	4.10%	3.65%	1.74%	1.77%	0.06%	3.54%	3.70%	3.38%
14	1.86%	1.34%	0.07%	3.24%	3.47%	3.01%	1.78%	2.30%	0.06%	4.11%	4.34%	3.87%	1.83%	1.87%	0.06%	3.72%	3.89%	3.56%
15	1.94%	1.46%	0.07%	3.44%	3.68%	3.20%	1.84%	2.43%	0.06%	4.29%	4.53%	4.04%	1.89%	1.99%	0.06%	3.91%	4.08%	3.74%
16	1.98%	1.57%	0.07%	3.59%	3.84%	3.34%	1.89%	2.64%	0.06%	4.54%	4.80%	4.28%	1.94%	2.15%	0.06%	4.11%	4.29%	3.93%
17	2.00%	1.68%	0.07%	3.71%	3.98%	3.45%	1.98%	2.79%	0.06%	4.78%	5.06%	4.50%	1.99%	2.28%	0.06%	4.29%	4.48%	4.10%
18	2.00%	1.76%	0.07%	3.80%	4.07%	3.52%	2.03%	2.97%	0.06%	5.00%	5.31%	4.69%	2.02%	2.41%	0.06%	4.44%	4.65%	4.23%
19	2.16%	1.93%	0.07%	4.11%	4.48%	3.74%	2.03%	3.03%	0.06%	5.05%	5.38%	4.72%	2.10%	2.52%	0.06%	4.63%	4.87%	4.38%

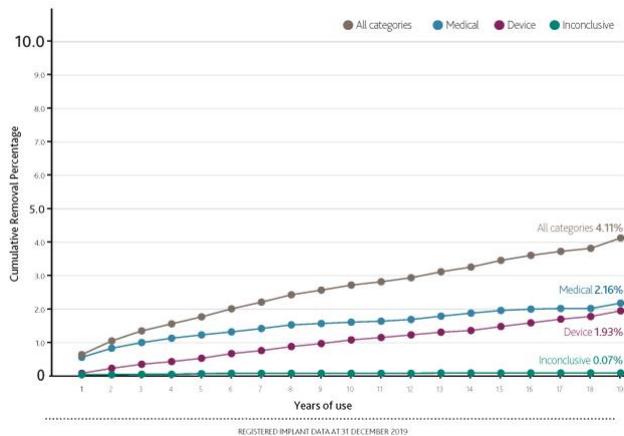
C124R - removal rates for all analysis categories and different patient populations



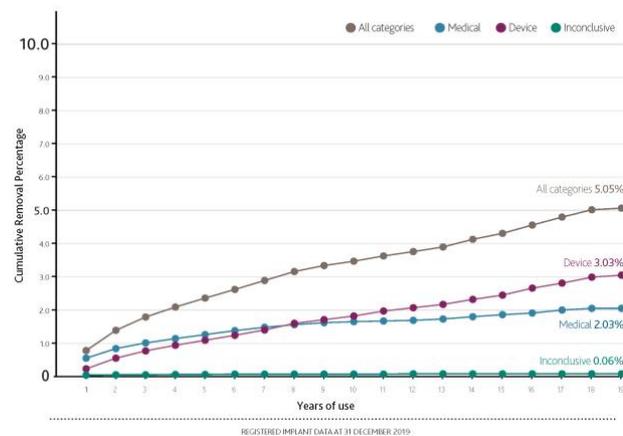
C124R - removal rates by analysis category for adults and children



C124R - removal rates by analysis category for adults



C124R - removal rates by analysis category for children



## NUCLEUS CI24M IMPLANT

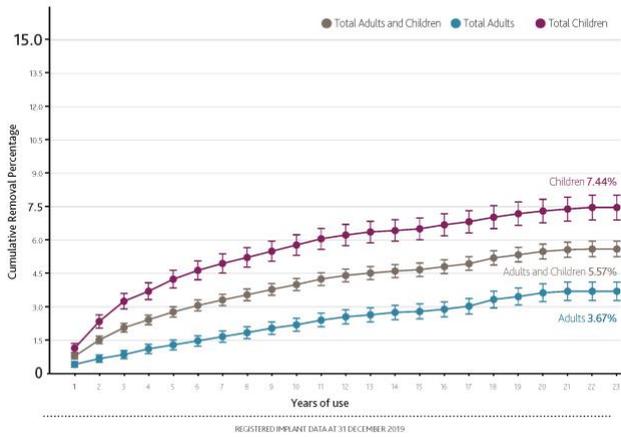
Number of registered CI24M implants - 31 December 2019

ADULTS	CHILDREN	COMBINED
9,697	9,825	19,522

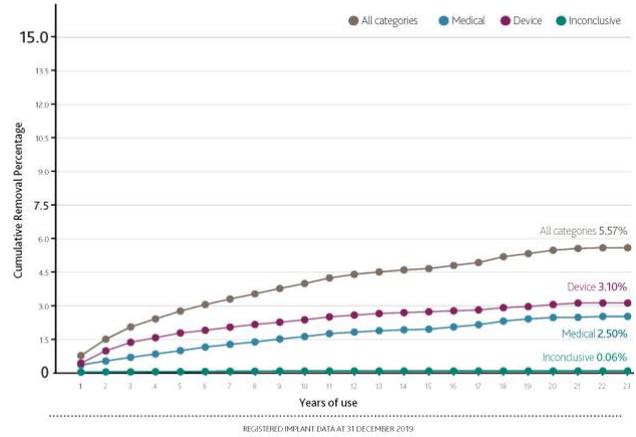
CI24M Cumulative Removal Rates

Group	Adults						Children						Combined Adults and Children					
	Sub-category	Medical Related	Device Failure	Inconclusive	Total		Medical Related	Device Failure	Inconclusive	Total		Medical Related	Device Failure	Inconclusive	Total			
	Years	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up
1	0.27%	0.10%	0.01%	0.38%	0.51%	0.26%	0.39%	0.72%	0.01%	1.11%	1.32%	0.91%	0.33%	0.41%	0.01%	0.75%	0.87%	0.63%
2	0.41%	0.21%	0.02%	0.64%	0.80%	0.48%	0.60%	1.70%	0.02%	2.31%	2.61%	2.01%	0.51%	0.96%	0.02%	1.48%	1.65%	1.31%
3	0.51%	0.29%	0.02%	0.82%	1.00%	0.64%	0.84%	2.39%	0.02%	3.22%	3.57%	2.87%	0.67%	1.34%	0.02%	2.03%	2.23%	1.83%
4	0.69%	0.36%	0.03%	1.08%	1.29%	0.87%	0.95%	2.73%	0.02%	3.67%	4.05%	3.30%	0.82%	1.55%	0.03%	2.39%	2.60%	2.17%
5	0.83%	0.40%	0.03%	1.26%	1.48%	1.03%	1.11%	3.10%	0.03%	4.21%	4.61%	3.81%	0.97%	1.76%	0.03%	2.74%	2.97%	2.51%
6	0.97%	0.43%	0.04%	1.44%	1.67%	1.20%	1.29%	3.32%	0.04%	4.61%	5.03%	4.19%	1.13%	1.88%	0.04%	3.03%	3.28%	2.79%
7	1.08%	0.51%	0.04%	1.63%	1.88%	1.37%	1.42%	3.50%	0.05%	4.92%	5.35%	4.49%	1.25%	2.02%	0.05%	3.28%	3.54%	3.03%
8	1.21%	0.57%	0.04%	1.81%	2.07%	1.54%	1.51%	3.69%	0.05%	5.19%	5.63%	4.75%	1.36%	2.14%	0.05%	3.51%	3.77%	3.25%
9	1.34%	0.64%	0.04%	2.01%	2.29%	1.73%	1.65%	3.81%	0.07%	5.47%	5.92%	5.02%	1.49%	2.24%	0.06%	3.75%	4.02%	3.49%
10	1.41%	0.72%	0.04%	2.16%	2.46%	1.87%	1.79%	3.96%	0.07%	5.75%	6.21%	5.29%	1.60%	2.35%	0.06%	3.97%	4.25%	3.70%
11	1.51%	0.83%	0.04%	2.37%	2.68%	2.07%	1.94%	4.10%	0.07%	6.03%	6.50%	5.56%	1.73%	2.48%	0.06%	4.22%	4.50%	3.93%
12	1.59%	0.90%	0.04%	2.52%	2.84%	2.20%	2.02%	4.20%	0.07%	6.20%	6.68%	5.72%	1.80%	2.56%	0.06%	4.38%	4.67%	4.09%
13	1.65%	0.94%	0.04%	2.61%	2.93%	2.29%	2.06%	4.29%	0.07%	6.34%	6.82%	5.85%	1.86%	2.63%	0.06%	4.49%	4.78%	4.20%
14	1.70%	1.00%	0.04%	2.72%	3.04%	2.39%	2.11%	4.32%	0.07%	6.40%	6.89%	5.92%	1.90%	2.67%	0.06%	4.58%	4.87%	4.28%
15	1.72%	1.02%	0.04%	2.76%	3.10%	2.43%	2.14%	4.36%	0.07%	6.48%	6.97%	5.99%	1.93%	2.71%	0.06%	4.64%	4.94%	4.34%
16	1.77%	1.06%	0.04%	2.86%	3.19%	2.52%	2.28%	4.42%	0.07%	6.66%	7.16%	6.16%	2.03%	2.75%	0.06%	4.78%	5.08%	4.47%
17	1.87%	1.10%	0.04%	3.00%	3.34%	2.65%	2.39%	4.44%	0.07%	6.80%	7.30%	6.29%	2.13%	2.79%	0.06%	4.91%	5.22%	4.61%
18	2.10%	1.18%	0.04%	3.30%	3.67%	2.92%	2.48%	4.56%	0.07%	7.00%	7.52%	6.49%	2.29%	2.89%	0.06%	5.17%	5.49%	4.85%
19	2.20%	1.21%	0.04%	3.43%	3.81%	3.05%	2.58%	4.63%	0.07%	7.16%	7.69%	6.64%	2.39%	2.94%	0.06%	5.31%	5.64%	4.99%
20	2.20%	1.39%	0.04%	3.60%	4.00%	3.20%	2.69%	4.65%	0.07%	7.28%	7.81%	6.75%	2.45%	3.03%	0.06%	5.46%	5.79%	5.12%
21	2.24%	1.42%	0.04%	3.67%	4.08%	3.26%	2.69%	4.74%	0.07%	7.37%	7.91%	6.83%	2.46%	3.10%	0.06%	5.54%	5.88%	5.20%
22	2.24%	1.42%	0.04%	3.67%	4.08%	3.26%	2.75%	4.74%	0.07%	7.44%	7.99%	6.88%	2.50%	3.10%	0.06%	5.57%	5.92%	5.22%
23	2.24%	1.42%	0.04%	3.67%	4.08%	3.26%	2.75%	4.74%	0.07%	7.44%	7.99%	6.88%	2.50%	3.10%	0.06%	5.57%	5.92%	5.22%

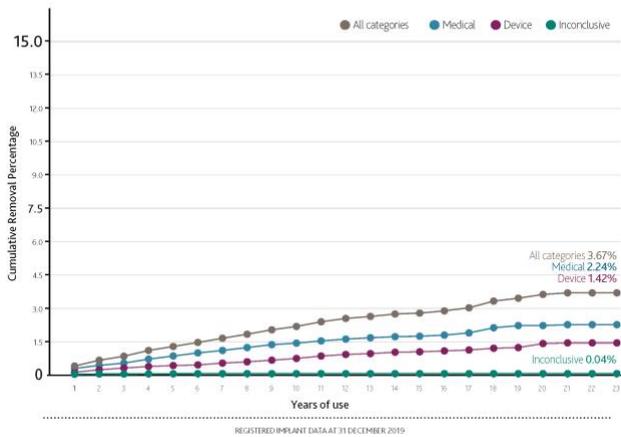
CI24M - removal rates for all analysis categories and different patient populations



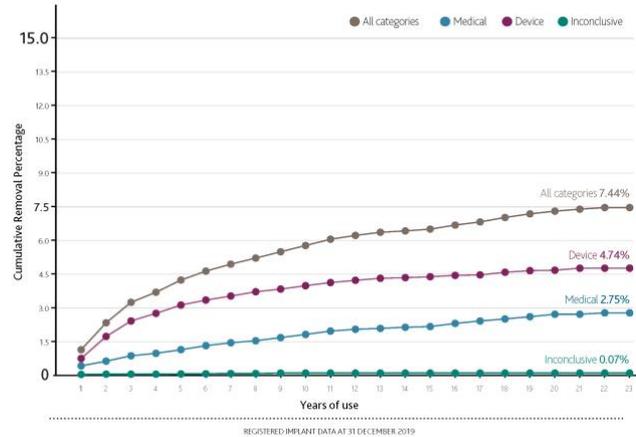
CI24M - removal rates by analysis category for adults and children



CI24M - removal rates by analysis category for adults



CI24M - removal rates by analysis category for children



# NUCLEUS CI22M IMPLANT

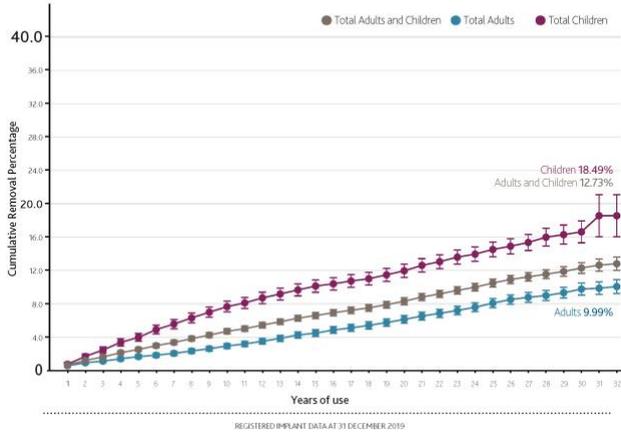
Number of registered CI22M implants - 31 December 2019

ADULTS	CHILDREN	COMBINED
11,123	6,542	17,665

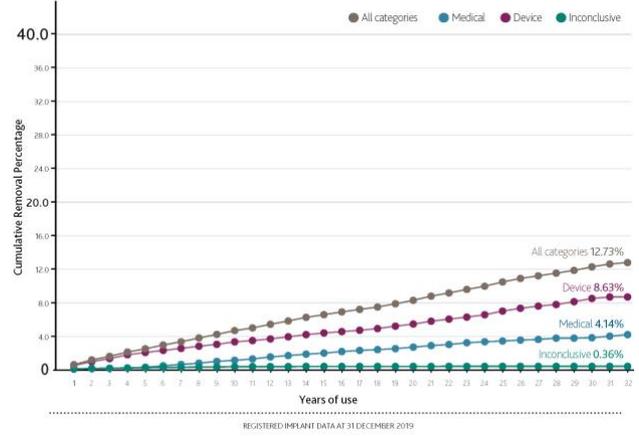
## CI22M Cumulative Removal Rates

Group	Adults						Children						Combined Adults and Children					
	Medical Related	Device Failure	Inconclusive	Total	Total		Medical Related	Device Failure	Inconclusive	Total	Total		Medical Related	Device Failure	Inconclusive	Total	Total	
	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down	CRP	CRP	CRP	CRP	CI_up	CI_down
1	0.05%	0.43%	0.02%	0.49%	0.62%	0.36%	0.09%	0.52%	0.06%	0.68%	0.87%	0.48%	0.06%	0.46%	0.03%	0.56%	0.67%	0.45%
2	0.09%	0.68%	0.08%	0.85%	1.03%	0.68%	0.15%	1.33%	0.12%	1.60%	1.91%	1.30%	0.11%	0.92%	0.10%	1.13%	1.29%	0.98%
3	0.10%	0.85%	0.10%	1.05%	1.24%	0.86%	0.19%	2.01%	0.20%	2.39%	2.76%	2.02%	0.13%	1.28%	0.14%	1.55%	1.73%	1.37%
4	0.13%	1.08%	0.12%	1.33%	1.54%	1.11%	0.23%	2.84%	0.24%	3.30%	3.73%	2.86%	0.17%	1.74%	0.16%	2.06%	2.27%	1.85%
5	0.18%	1.26%	0.16%	1.59%	1.82%	1.35%	0.38%	3.28%	0.25%	3.89%	4.36%	3.42%	0.25%	2.01%	0.19%	2.45%	2.68%	2.22%
6	0.26%	1.30%	0.20%	1.76%	2.00%	1.51%	0.71%	3.87%	0.30%	4.83%	5.35%	4.31%	0.43%	2.26%	0.23%	2.90%	3.15%	2.65%
7	0.38%	1.42%	0.20%	1.98%	2.24%	1.72%	0.92%	4.31%	0.32%	5.49%	6.05%	4.93%	0.58%	2.50%	0.24%	3.29%	3.56%	3.02%
8	0.49%	1.58%	0.21%	2.26%	2.54%	1.98%	1.17%	4.76%	0.38%	6.23%	6.82%	5.64%	0.74%	2.76%	0.27%	3.74%	4.03%	3.46%
9	0.64%	1.69%	0.21%	2.54%	2.83%	2.24%	1.47%	5.14%	0.42%	6.92%	7.54%	6.30%	0.95%	2.98%	0.29%	4.17%	4.47%	3.88%
10	0.74%	1.90%	0.23%	2.86%	3.17%	2.54%	1.65%	5.59%	0.47%	7.58%	8.23%	6.94%	1.08%	3.28%	0.32%	4.62%	4.94%	4.31%
11	0.91%	1.99%	0.23%	3.11%	3.43%	2.78%	1.82%	5.87%	0.48%	8.03%	8.69%	7.36%	1.24%	3.43%	0.33%	4.94%	5.27%	4.62%
12	1.09%	2.14%	0.23%	3.43%	3.78%	3.09%	2.14%	6.16%	0.50%	8.63%	9.31%	7.94%	1.48%	3.63%	0.33%	5.37%	5.71%	5.04%
13	1.29%	2.29%	0.23%	3.78%	4.14%	3.41%	2.24%	6.55%	0.50%	9.10%	9.80%	8.39%	1.64%	3.88%	0.33%	5.77%	6.12%	5.42%
14	1.47%	2.53%	0.23%	4.18%	4.56%	3.80%	2.41%	6.86%	0.54%	9.59%	10.31%	8.87%	1.81%	4.14%	0.35%	6.20%	6.56%	5.84%
15	1.57%	2.66%	0.23%	4.41%	4.80%	4.02%	2.58%	7.15%	0.55%	10.05%	10.78%	9.31%	1.94%	4.34%	0.35%	6.52%	6.89%	6.15%
16	1.78%	2.83%	0.23%	4.78%	5.19%	4.38%	2.70%	7.31%	0.55%	10.32%	11.06%	9.57%	2.12%	4.50%	0.35%	6.85%	7.23%	6.47%
17	1.91%	2.97%	0.23%	5.04%	5.46%	4.63%	2.87%	7.51%	0.55%	10.66%	11.42%	9.91%	2.26%	4.66%	0.35%	7.15%	7.54%	6.76%
18	2.02%	3.15%	0.23%	5.33%	5.76%	4.90%	2.93%	7.74%	0.55%	10.93%	11.70%	10.17%	2.35%	4.86%	0.35%	7.43%	7.82%	7.03%
19	2.14%	3.39%	0.23%	5.68%	6.12%	5.24%	3.03%	8.12%	0.55%	11.40%	12.18%	10.62%	2.47%	5.15%	0.35%	7.82%	8.22%	7.41%
20	2.33%	3.58%	0.23%	6.05%	6.50%	5.59%	3.21%	8.45%	0.55%	11.88%	12.67%	11.08%	2.65%	5.40%	0.35%	8.23%	8.65%	7.82%
21	2.44%	3.89%	0.23%	6.45%	6.92%	5.98%	3.51%	8.84%	0.55%	12.53%	13.34%	11.72%	2.83%	5.74%	0.35%	8.73%	9.16%	8.30%
22	2.56%	4.09%	0.25%	6.78%	7.26%	6.29%	3.66%	9.17%	0.55%	12.98%	13.81%	12.15%	2.96%	5.99%	0.36%	9.11%	9.54%	8.67%
23	2.71%	4.29%	0.25%	7.12%	7.62%	6.62%	3.94%	9.47%	0.55%	13.52%	14.36%	12.67%	3.17%	6.23%	0.36%	9.53%	9.97%	9.08%
24	2.81%	4.60%	0.25%	7.51%	8.03%	7.00%	4.10%	9.70%	0.55%	13.88%	14.74%	13.02%	3.29%	6.51%	0.36%	9.91%	10.37%	9.45%
25	2.91%	5.01%	0.25%	8.00%	8.54%	7.46%	4.20%	10.19%	0.55%	14.44%	15.33%	13.55%	3.38%	6.95%	0.36%	10.42%	10.89%	9.94%
26	3.03%	5.34%	0.25%	8.44%	9.00%	7.87%	4.28%	10.52%	0.55%	14.83%	15.74%	13.91%	3.49%	7.28%	0.36%	10.84%	11.33%	10.34%
27	3.08%	5.56%	0.25%	8.70%	9.28%	8.11%	4.41%	10.88%	0.55%	15.28%	16.24%	14.32%	3.57%	7.54%	0.36%	11.15%	11.67%	10.64%
28	3.18%	5.69%	0.25%	8.91%	9.52%	8.31%	4.71%	11.25%	0.55%	15.91%	16.97%	14.84%	3.72%	7.73%	0.36%	11.47%	12.01%	10.94%
29	3.18%	6.04%	0.25%	9.25%	9.90%	8.61%	4.71%	11.59%	0.55%	16.22%	17.37%	15.08%	3.72%	8.07%	0.36%	11.80%	12.38%	11.23%
30	3.25%	6.43%	0.25%	9.69%	10.41%	8.97%	4.71%	11.93%	0.55%	16.55%	17.85%	15.24%	3.77%	8.45%	0.36%	12.22%	12.85%	11.58%
31	3.25%	6.54%	0.25%	9.79%	10.54%	9.05%	6.20%	12.62%	0.55%	18.49%	21.02%	15.97%	3.96%	8.63%	0.36%	12.56%	13.28%	11.84%
32	3.45%	6.54%	0.25%	9.99%	10.82%	9.15%	6.20%	12.62%	0.55%	18.49%	21.02%	15.97%	4.14%	8.63%	0.36%	12.73%	13.52%	11.94%

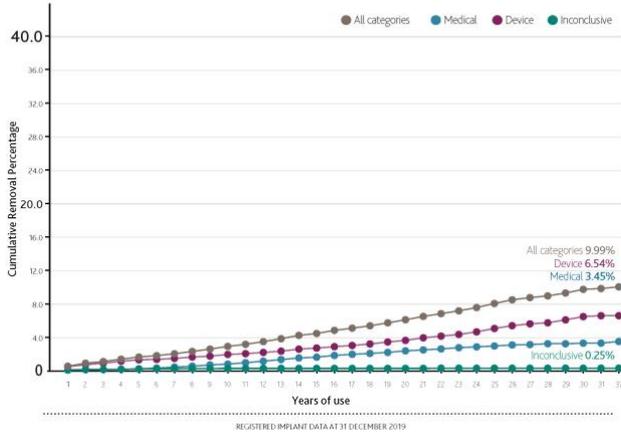
CI22M - removal rates for all analysis categories and different patient populations



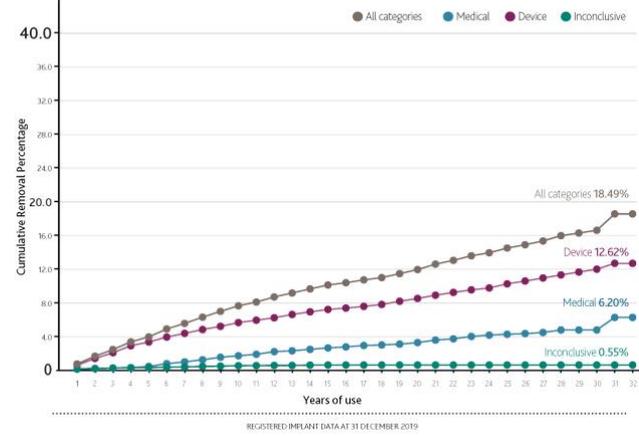
CI22M - removal rates by analysis category for adults and children



CI22M - removal rates by analysis category for adults



CI22M - removal rates by analysis category for children



## SOUND PROCESSOR DATA

In this document, Failed Component Return Rate (FCRR) is the metric used to measure sound processor reliability. FCRR provides information regarding the reliability of each make and model of sound processor.

Cochlear tests sound processors that have been returned to determine if they are working and, if not, why they failed. The FCRR is the percentage of the total number of failed processors received within a month compared to the total number of the same processor sold by the end of that month.

For example, if 20 faulty sound processors are returned in a month and 10,000 of the same sound processors have been sold as at the end of the month, the FCRR is 0.2%.

The FCRR classifies reasons for failure into the following categories:

- **Moisture Damage Failure.** A functional failure that is a result of moisture ingress. This category excludes corrosion and other similar damage unless it results in a functional failure.
- **Electrical Failure.** A functional failure of the electronics or the electronic assembly.
- **Mechanical Failure.** A functional failure resulting from physical damage caused by mechanical stress, chemical exposure, or ultraviolet (UV) exposure that is a result of normal use.
- **Fault-Free.** A returned device that is found to be fully functional is classified as fault-free. The device condition might reflect normal wear and tear, such as minor mechanical damage (including scratches, cracks, and discoloration), corrosion, and/or moisture damage that did not result in a functional failure.
- **Other/Unknown.** Failures that don't fit in the other categories (e.g. firmware failures).

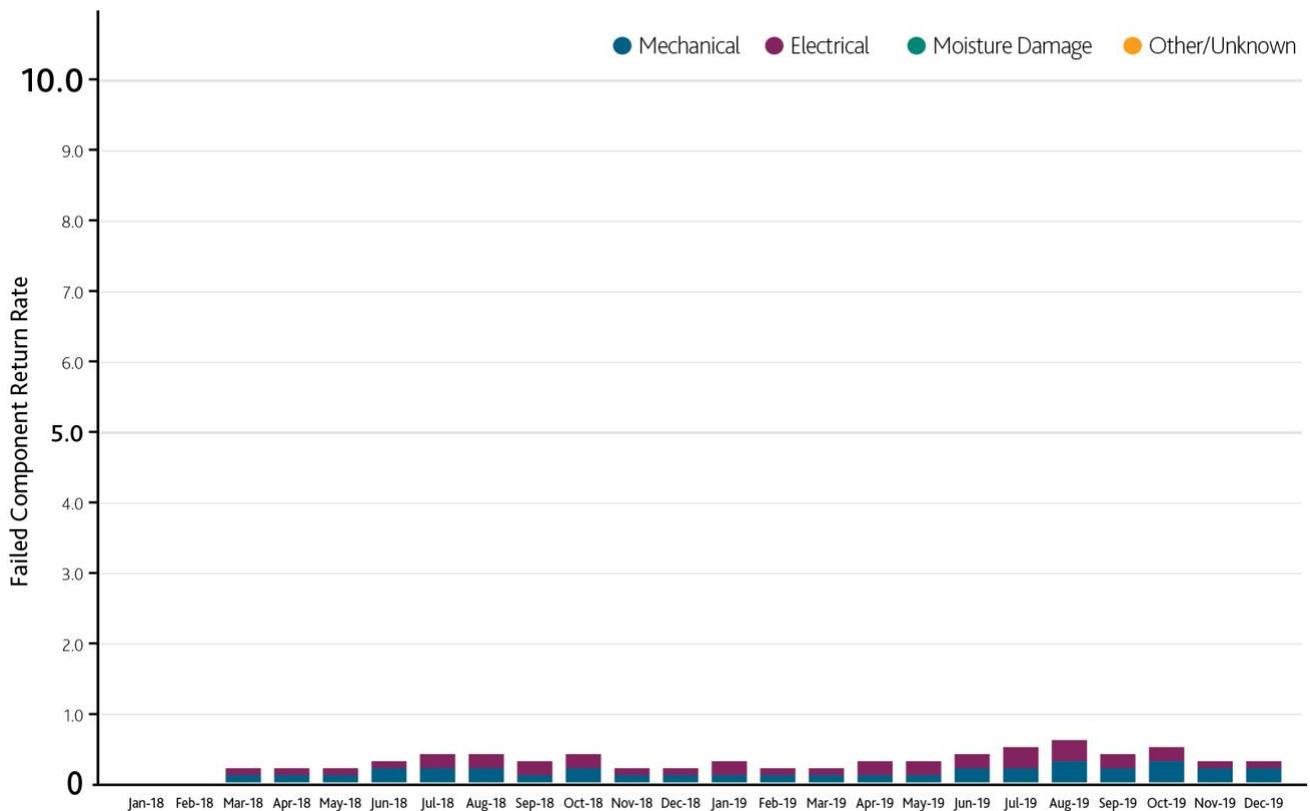
# NUCLEUS® 7 SOUND PROCESSOR

## Nucleus® 7 Sound Processor Component Return Rate

Fail mode	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18
Mechanical	-	-	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%
Electrical	-	-	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.1%	0.2%	0.1%	0.1%
Moisture	-	-	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	-	-	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fault-Free	-	-	0.3%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%

Fail mode	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
Mechanical	0.2%	0.1%	0.1%	0.2%	0.2%	0.2%	0.3%	0.3%	0.2%	0.2%	0.1%	0.1%
Electrical	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.3%	0.2%	0.3%	0.2%	0.2%
Moisture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fault-Free	0.3%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%

## Nucleus 7 Sound Processor - Failed Component Return Rate



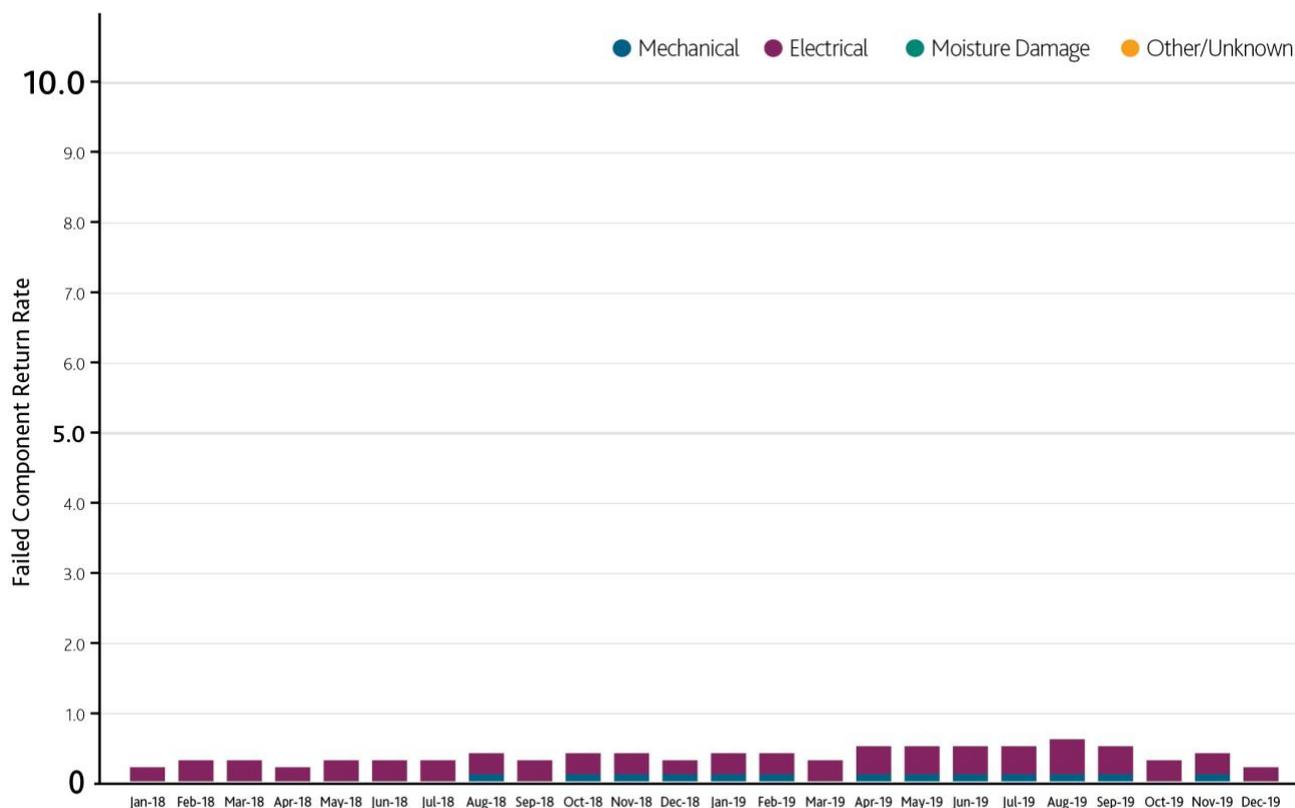
## NUCLEUS KANSO® SOUND PROCESSOR

### Nucleus Kanso Sound Processor Component Return Rate

Fail mode	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18
Mechanical	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.1%
Electrical	0.2%	0.3%	0.3%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%
Moisture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fault-Free	0.5%	0.5%	0.6%	0.4%	0.5%	0.5%	0.4%	0.5%	0.5%	0.4%	0.5%	0.4%

Fail mode	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
Mechanical	0.1%	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%
Electrical	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	0.5%	0.4%	0.3%	0.3%	0.2%
Moisture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fault-Free	0.5%	0.5%	0.5%	0.5%	0.3%	0.4%	0.4%	0.3%	0.3%	0.4%	0.3%	0.2%

### Nucleus Kanso Sound Processor - Failed Component Return Rate



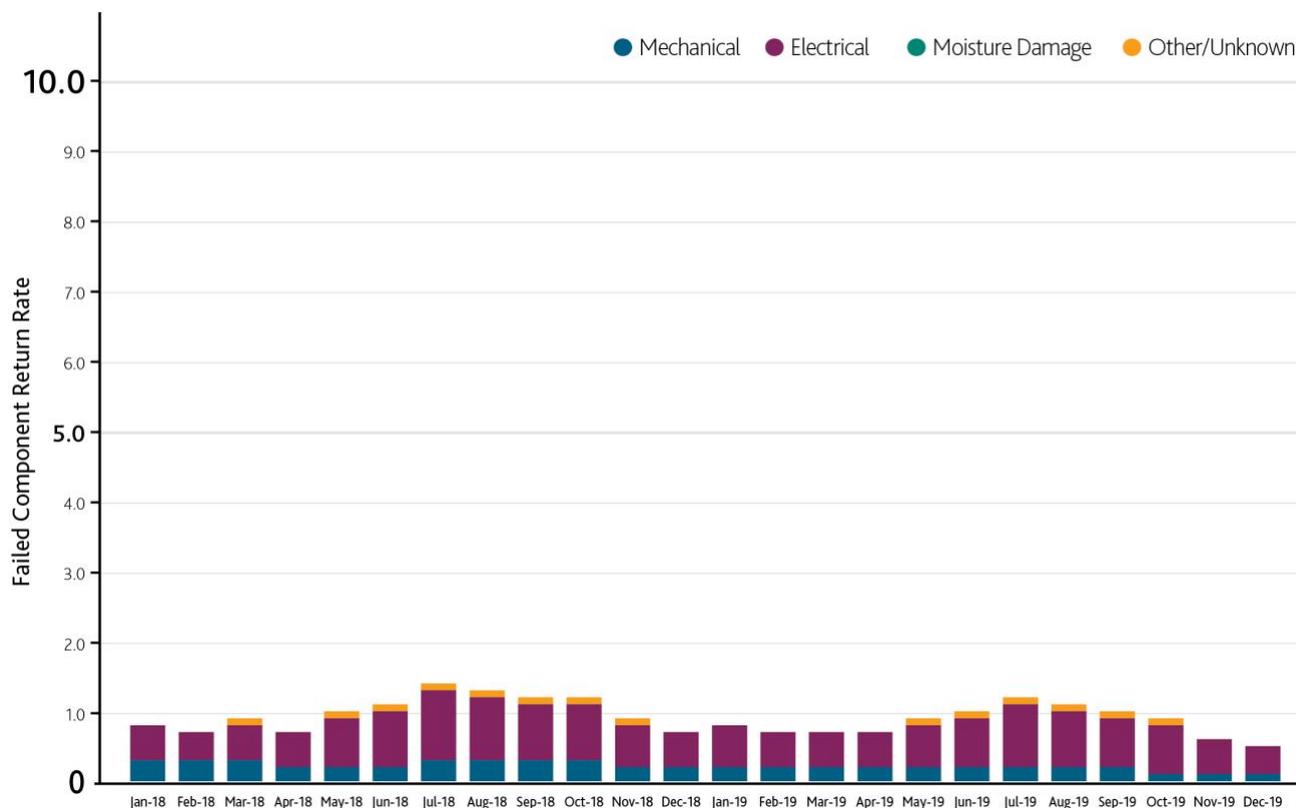
## NUCLEUS 6 SOUND PROCESSOR

### Nucleus 6 Sound Processor Component Return Rate

Fail mode	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18
Mechanical	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%
Electrical	0.5%	0.4%	0.5%	0.5%	0.7%	0.8%	1.0%	0.9%	0.8%	0.8%	0.6%	0.5%
Moisture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%
Fault-Free	0.3%	0.2%	0.3%	0.3%	0.3%	0.4%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%

Fail mode	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
Mechanical	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%
Electrical	0.6%	0.5%	0.5%	0.5%	0.6%	0.7%	0.9%	0.8%	0.7%	0.7%	0.5%	0.4%
Moisture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%
Fault-Free	0.2%	0.2%	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%

### Nucleus 6 Sound Processor - Failed Component Return Rate



## APPENDIX

### GRAPHICAL REPRESENTATION OF IMPLANT DATA

Each implant graph represents a type of device based on the receiver/stimulator portion.

RECEIVER/ STIMULATOR	IMPLANTS*
Profile Plus Series	Cochlear Nucleus Profile Plus with Contour Advance Electrode (CI612) Cochlear Nucleus Profile Plus with Slim Straight Electrode (CI622) Cochlear Nucleus Profile Plus with Slim Modiolar Electrode (CI632)
Profile Series	Cochlear Nucleus Profile with Contour Advance Electrode (CI512) Cochlear Nucleus Profile with Slim Straight Electrode (CI522) Cochlear Nucleus Profile with Slim Modiolar Electrode (CI532) Cochlear Nucleus Profile Auditory Brainstem Implant (ABI541)
CI24RE Series	Nucleus Freedom® with Contour Advance Electrode Nucleus Freedom with Straight Electrode Cochlear Nucleus CI422 Cochlear Implant Cochlear Hybrid™ L24 Cochlear Implant
CI500 Series	Cochlear Nucleus CI512 Cochlear Implant Cochlear Nucleus CI513 Cochlear Implant Cochlear Nucleus CI551 Double Array Cochlear Implant Cochlear Nucleus ABI541 Auditory Brainstem Implant
CI24R	Nucleus 24 with Contour Advance Electrode Nucleus 24 with Contour® Electrode Nucleus 24k with Straight Electrode
CI24M	Nucleus 24 with Straight Electrode Nucleus 24 with Double Array Nucleus 24 Auditory Brainstem Implant [ABI]
CI22M	Nucleus 22

\* Implant availability varies by market.

#### References:

1. ANSI/AAMI CI86. Cochlear implant systems: Requirements for safety, functional verification,. (2017). Arlington, VA: American National Standards Institute.