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October 1, 2003

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VIA ECFS

Marlene H. Dortch, Esq.
Secretary
Federal Communications Commission
Washington, DC 20554

Re: ET Docket 03-92, Biotronik, Inc. Request for Waiver,
Ex Parte Notification

Dear Ms. Dortch:

On September 30, 2003, Philip Inglis of TRP, Inc., a consultant to Medtronic, Inc., emailed the attached document to Julius Knapp and Bruce Romano of the Office of Engineering and Technology.

Respectfully,

/s/ David E. Hilliard

David E. Hilliard
Counsel for Medtronic

Attachment

cc (via email): Messrs. Knapp and Romano

From: jinglis@erols.com
Sent: Tuesday, September 30, 2003 11:35 AM
To: Julius Knapp; Bruce Romano
Cc: Hilliard, David; Kuzin, John
Subject: DISTANCE CALCULATIONS

1_DistanceCalculations-v1.DOC

Julie, Bruce,
Attached is a document showing the distance calculations discussed in our meeting on 9-25-2003.
Phil

DISTANCE CALCULATIONS

San Francisco Area:

Calculation is for the Philos unit based on applicable FCC certification file information with the Philos unit located indoors with one intervening wall.
FS at 3 meters = 120 uV/m.
Power level 1.2 e-9 watts.
Nominal C/I ratio is 14 dB for 10 e-5 BER.

San Francisco NTIA ambient graph shows a received power level that would require a field strength of 31 uV/m to produce.

Based on a FS level of 120 uV/m at 3 meters the ambient field must be no higher than 24 uV/m to meet the 14 dB C/I ratio. Allowing for 12 dB wall attenuation, the outdoor ambient level must be no higher than 96 uV/m.

Calculating the distance from the source at which the ambient field will be 96 uV/m:
31/96 : X/20 km
X = 6.4 km.

Thus at any distance less than 6.4 km from the source of the emission, the ambient will be above 96 uV/m and the probability of interference to the Philos transmission is high. As one gets closer to the source of the emission, this probability obviously increases. Similar calculations for the other San Francisco site show that at distances less than 1.25 km from the source of the emission, the interference probability is high and will increase as the distance from the source is reduced.

Patient-to-Patient interference:

Four scenarios were presented in the Medtronic September 4 presentation. Following are calculations for the first two.

1. In this case the field strength levels from the transmit only implant, the MICS compliant implant and the MICS compliant programmer/controller are of equal value.

Interference will occur when the signal from the MICS implant to the receiver in the MICS programmer/controller is jammed by the transmit only implant signal.
C/I ratio for 10 e-5 BER = 14 dB.

For the signal from the MICS implant to be received by the programmer/controller, the signal level from the transmit only implant can be no higher than 14 dB below the desired signal level. Since both implants have equal field strengths at 3 meters, the C/I ratio requirement must be met by path loss between the programmer/controller receiver and the transmit only implant and no adjustment based on implant radiated field strength is needed. As an example take the Philos 120 uV/m field strength level.

For a C/I ratio at the programmer/controller receiver, the undesired signal from the transmit only device must be no higher than 24 uV/m at the programmer/controller antenna. The signal from the transmit only implant will decrease to 24 uV/m at a distance of 15 meters from the patient. (C/I ratio of 14 dB is a factor of 5 to 1 in terms of voltage.)

120/24 : X/3
X = 15 meters

Since the programmer/controller is 3 meters from the MICS implant patient and could be located along a radial toward the transmit only device we need to add 3 meters to get the patient to patient separation distance for no interference. 15 meters + 3 meters = 18 meters. As the separation distance between the patient's decreases to 12 meters, there is no location within 3 meters of the MICS implanted patient that the signal from the other patient would be attenuated sufficiently to avoid a high probability of interference.

2. For case 2 let us consider a MICS implant with a field strength of 100 uV/m at 3 meters and a transmit only implant producing an undesired signal with a field strength of 18,000 uV/m at 3 meters, which is the maximum allowed for MICS. This level is consistent with the –7 dBm developmental authority granted to Biotronik in Canada. For this scenario, it is reasonable to allow for 24 dB wall attenuation to account for two intervening walls. Reducing the signal by 24 dB to account for wall attenuation, we have a signal level of 1135 uV/m.

Calculating based on inverse linear ratio:
1135/20 : X/3
X = 170 meters.
For patient-to-patient separation in this case, the 3 meters variation as the programmer/controller is moved around the patient can be ignored.

The Biotronik home monitoring system scheduled transmission feature uses redundant transmissions in order to improve the reliability of data transfer from the implant to the remote receiver in the presence of ambient interfering signals. As stated in discussions, the more frequently an implant emits these redundant transmissions, the greater the interference to other systems issue is exacerbated. Redundant transmissions are a "crutch" to increase the reliability of one system to the detriment of all other systems. The parties to this proceeding all agree that the reliability of medical communications is a major concern related to patient well being. Reliability dictates that frequency monitoring and channel selection capability (demonstrated by Medtronic) must be required of all systems operating in the MICS band.