Attachment 7 - Medical Device Reports Database Search and Results for Product Code LOF, Non-invasive Bone Growth Stimulator

The petitioner conducted a review of the FDA databases for Medical Device Reports to demonstrate that the risks associated with the Non-invasive Bone Growth Stimulator do not pose an unreasonable risk of illness or injury. A search for product code LOF in both the MDR and MAUDE databases generated a total of 47 adverse events, and each of these reports is provided in this section for review. The FDA databases cover from present back to December 13, 1984. An overview of the reported events is provided below in Table 1. The events are categorized according to the type of report that was filed by the manufacturer with the FDA, and further analysis was made by the petitioner to determine if the event pertained to the device or if the patient experienced an unrelated adverse event. After categorizing the event by report type, the petitioner summed the number of specific events that were reported, and accounted for each of these events as a percent. The petitioner considered 5 of the 47 reported events to be overlapping, and the analysis of this data accounts for the potential that the events are either unique or duplicative. Summaries of each of the 47 events are detailed below in Table 2.

Of the 47 reported events, 33 of these events are described in detail in the body of the petition. Each of the 33 reports was analyzed and included in 1 of the 4 grouped risks discussed in Section VI.C (i.e. electrical shock, burn, skin irritation and/or allergic reaction, and inconsistent or ineffective treatment). During the review of the reports, the petitioner noted that the 14 events not included in the body of this petition coincided with another event. Due to the lack of additional information associating the event with the use of the Non-invasive Bone Growth Stimulator, these 14 events are only included in the results of the database searches conducted by the petitioner. A list of those reports that are not included within Section VI.C of the petition is provided in Table 3. For example, 3 of the 14 events stated that the stimulator 'had to be removed,' implying that the nature of the device was implantable; 1 event resulted in the patient's death but the report stated the death was related to physiological or procedural factors; and, 1 event was related to a patient tripping over the cord and sustaining a fracture of the toe. Based on the review of the FDA safety databases for the Non-invasive Bone Growth Stimulator, the petitioner concludes that the risks of illness or injury are not unreasonable, and can be adequately controlled through the use of General and Special Controls, as detailed in Section VI.D of this petition.

Table 1: Summary of MDR/MAUDE Data for Product Code LOF

Summary			
Report Type	**Total** [#] = Number excluding potentially overlapping events		**Incidence (%)** [#] = Number excluding potentially overlapping events
Malfunction or Other (not resulting in adverse event)	10 [8]		21.3% [19%]
Serious Injury or Malfunction (resulting in an adverse event)	Shock	1	2.1% [2.4%]
	Burns	16	34.0% [38.1%]
	Skin Irritation/ Reddened Area	2	4.3% [4.8%]
	No Bone Growth	1	2.1% [2.4%]
	Surgical Intervention	5 [3]	10.6% [7.1%]
	Seizure Disorder	1	2.1% [2.4%]
	Increased Blood Glucose	1	2.1% [2.4%]
	Benign Tumor	1	2.1% [2.4%]
	Toe Fracture	1	2.1% [2.4%]
	Hives, Insomnia, Agitation and Anxiety	1	2.1% [2.4%]
Serious Injury (due to improper use of treatment device)	3 [2]		6.4% [4.8%]
Death	1		2.1% [2.4%]
Unknown	3		6.4% [7.1%]
Total	**47 [42]**		

Potentially Overlapping Events

First Reference Number	Potential, Overlapping Event Reference Number
23	24
32	35
29	36
40	41
43	44

(Please see Table 2 for information corresponding to the aforementioned reference numbers)

Table 2: Adverse Event Reports Listed Chronologically for LOF Non-invasive Bone Growth Stimulators

Reference:	Product Brand Name	Manufacturer	Access Number	Report Type	Product Code	Date FDA Received	Description of Event
1	EBI Bone Healing System	Electro-Biology, Inc.	M123821	Malfunction	LOF	07/03/1986	Cable supplying the electrical current from the battery pack shorted out.
2	EBI Bone Healing System	Electro-Biology, Inc.	M185611	Malfunction	LOF	03/09/1990	The patient developed a skin irritation after treatment.
3	EBI Bone Healing System	Electro-Biology, Inc.	M239323	Serious Injury	LOF	08/15/1991	The device was used at night, the charger became unplugged from device, and the end of the charger burned the patient.
4	EBI Bone Healing System	Electro-Biology, Inc.	M361405	Serious Injury	LOF	01/11/1993	The patient woke up with burn marks after wearing the unit while sleeping.
5	Physio-Stim	American Medical Electronics, Inc.	M362646	Death	LOF	01/25/1993	The patient had a history of heart problems and blood clots, and died 15 minutes after using the device on the femur. The cause of death was heart failure, determined to be related to physiological or procedural factors.
6	EBI Bone Healing System	Electro-Biology, Inc.	M369823	Serious Injury	LOF	02/18/1993	The patient woke up with several burn marks on their back after inadvertently sleeping on the connector plug.
7	Spinal-Stim	American Medical Electronics, Inc.	M382071	Serious Injury	LOF	04/23/1993	The patient reported several incidents of benign tumors on their back and abdomen after a period of use.
8	EBI Bone Healing System	Electro-Biology, Inc.	M397989	Serious Injury	LOF	07/08/1993	The control module and charger were in bed with the patient, the connector disconnected from the charger, and left a small burn on the patient.
9	EBI Bone Healing System	Electro-Biology, Inc.	M397988	Serious Injury	LOF	07/08/1993	The patient slept with the control unit and battery charger, the charger connector disconnected from the control unit, and left a small burn on the patient's leg.
10	EBI Bone Healing System	Electro-Biology, Inc.	M397987	Serious Injury	LOF	07/08/1993	The patient slept with the control unit and battery charger, the charger connector disconnected from the control unit, and left a burn on the patient's abdomen (patient was being treated for a nonunion of the radius).
11	EBI Bone Healing System	Electro-Biology, Inc.	M397986	Serious Injury	LOF	07/08/1993	The patient slept with the control unit and battery charger, the charger connector disconnected from the control unit, and left a burn on the patient's arm (patient was being treated for a nonunion of the tibia).
12	EBI Bone Healing System	Electro-Biology, Inc.	M406057	Serious Injury	LOF	08/13/1993	After tripping on the cord to the device three times, the fourth time the patient tripped and sustained a toe fracture.
13	Physio-Stim	American Medical Electronics, Inc.	M408115	Serious Injury	LOF	09/03/1993	The patient received minor medical intervention coinciding with the use of the device. An implanted k-wire had to be surgically removed, due to pain from migration of the wire to the dorsal surface.
14	EBI Bone Healing System	Electro-Biology, Inc.	M408846	Serious Injury	LOF	09/14/1993	The patient used the device while sleeping, and awoke to a small reddened area that later became blistered.

Table 2: Adverse Event Reports Listed Chronologically for LOF Non-invasive Bone Growth Stimulators (continued)

Reference:	Product Brand Name	Manufacturer	Access Number	Report Type	Product Code	Date FDA Received	Description of Event
15	EBI Bone Healing System	Electro-Biology, Inc.	M409539	Serious Injury	LOF	09/21/1993	The patient used the device while sleeping, and awoke to two burns, one on the hip and one on the buttocks.
16	EBI Bone Healing System	Electro-Biology, Inc.	M475834	Serious Injury	LOF	01/31/1994	The patient reported a second degree burn following 4 ½ hours of treatment for a metatarsal fracture.
17	EBI Bone Healing System	Electro-Biology, Inc.	M488899	Serious Injury	LOF	03/15/1994	The patient used the device while sleeping, and later reported four burn-like marks on their torso.
18	EBI Bone Healing System	Electro-Biology, Inc.	M543569	Serious Injury	LOF	08/01/1994	The patient slept with the control unit and battery charger, the charger connector disconnected from the control unit, and left a burn on the patient's forearm (patient was being treated for fractures of the radius and ulna).
19	EBI Bone Healing System	Electro-Biology, Inc.	M543568	Serious Injury	LOF	08/01/1994	While treating a femoral fracture, the patient felt the coil getting warm, and later noted a burn and blister under the coil area.
20	EBI Bone Healing System	Electro-Biology, Inc.	M813771	Malfunction	LOF	11/14/1994	The patient reported an intermittent "electrical shocking" sensation during treatment.
21	EBI Bone Healing System	Electro-Biology, Inc.	M709247	Serious Injury	LOF	05/01/1995	The patient slept with the control unit and battery charger, the charger connector disconnected from the control unit, and was burned on two, separate occasions (patient stated that the events took place in 1992).
22	EBI Bone Healing System	Electro-Biology, Inc.	M710920	Serious Injury	LOF	05/12/1995	The patient used the device while sleeping, applied a foam insert to prevent the unit from slipping, which subsequently stuck to the patient and left a burn on their leg.
23	Spinal-Stim	American Medical Electronics, Inc.	23285	Other	LOF	07/03/1995	The patient bumped the control unit, causing it to crack, and the incorrect, replacement unit was sent to the patient. The replacement was unit was correctly switched for another unit.
24	Physio-Stim	American Medical Electronics, Inc.	28787	Other	LOF	07/03/1995	The patient bumped the control unit, causing it to crack, and the incorrect, replacement unit was sent to the patient. The replacement was unit was correctly switched for another unit.
25	Physio-Stim	American Medical Electronics, Inc.	28786	Other	LOF	08/16/1995	The patient was sent a different model than prescribed, and a correct, replacement model was provided.
26	EBI Bone Healing System	Electro-Biology, Inc.	M763616	Serious Injury	LOF	07/11/1996	The patient used the device while sleeping, and later reported six burns on their leg.
27	Orthologic 1000	Orthologic	65281	Malfunction	LOF	01/16/1997	The additional, company-provided 9V battery, located inside the carrying case, appeared to get hot and outgas, melting the inner lining of the carrying case and covering the device in soot (first case reported out of 100,000 batteries).
28	Orthofix	American Medical Electronics, Inc.	127988	Serious Injury	LOF	10/23/1997	The patient suffered hives, insomnia, agitation and anxiety.

Table 2: Adverse Event Reports Listed Chronologically for LOF Non-invasive Bone Growth Stimulators (continued)

Reference:	Product Brand Name	Manufacturer	Access Number	Report Type	Product Code	Date FDA Received	Description of Event
29	Physio-Stim	American Medical Electronics, Inc.	170830	Serious Injury	LOF	04/24/1998	The patient used the device on their neck, and has since been diagnosed with reflex sympathetic dystrophy.
30	Orthologic 1000	Orthologic	166147	Malfunction	LOF	05/01/1998	The unit suffered severe heating and charring, due to a battery malfunction.
31	EBI Bone Healing System	Electro-Biology, Inc.	170901	Serious Injury	LOF	05/06/1998	The patient used the device after surgery, which caused severe burns and scarring, requiring additional surgery (noted that metal screws remained in leg).
32	EBI Bone Healing System	Electro-Biology, Inc.	177887	Serious Injury	LOF	07/17/1998	The patient developed a blister on their foot that ultimately became gangrenous, and the patient underwent below the knee amputation.
33	EBI Bone Healing System	Electro-Biology, Inc.	206676	Other	LOF	01/13/1999	The patient wears an infusion pump 24 hours/day. The first night with the device, their blood sugar rose to 380 and the second night it rose to 440.
34	Orthologic 1000	Orthologic	206640	Not available	LOF	01/14/1999	The treatment was applied for 7 months, and was found to be unsuccessful. The patient subsequently had to undergo surgery for the non-union fracture.
35	EBI Bone Healing System	Electro-Biology, Inc.	214086	Serious Injury	LOF	02/25/1999	After one week of treatment, the patient developed a blister on their foot that ultimately became gangrenous, and the patient underwent below the knee amputation.
36	Physio-Stim	American Medical Electronics, Inc.	239371	Serious Injury	LOF	09/08/1999	The doctor instructed the patient to use the device on their neck 5 months after surgery, and, consequently, has been diagnosed with reflex sympathetic dystrophy and four "split" disks.
37	Orthologic 1000	Orthologic Corp.	264435	Other	LOF	02/23/2000	The patient reports that the device did not work (e.g. no heat generated, indicator light or vibration from device).
38	Physio-Stim Lite	Orthofix	318989	Serious Injury	LOF	03/04/2001	The patient used the device for 11 days for a cervical application, per the physician's instruction, subsequently becoming nervous and edgy, and ultimately discontinued treatment.
39	EBI Bone Healing System	Electro-Biology, Inc.	320143	Malfunction	LOF	03/12/2001	The patient tried to use the device, but it never functioned properly (no injury to patient).
40	Spinal-Stim	American Medical Electronics, Inc.	373914 Device Seq. Number 1	Serious Injury	LOF	01/07/2002	After the fusion site was determined to be healed, an x-ray revealed a growth on the patient's lung after 3 months of use. The patient had 1/3 of their lung removed. The pathology report was benign, and the mass was calcification.
41	Spinal-Stim	American Medical Electronics, Inc.	373914 Device Seq. Number 2	Serious Injury	LOF	01/07/2002	After the fusion site was determined to be healed, an x-ray revealed a growth on the patient's lung after 3 months of use. The patient had 1/3 of their lung removed. The pathology report was benign, and the mass was calcification.
42	Unknown	Unknown	388238	Not available	LOF	04/10/2002	The osteogenic stimulator was removed.

Table 2: Adverse Event Reports Listed Chronologically for LOF Non-invasive Bone Growth Stimulators (continued)

Reference:	Product Brand Name	Manufacturer	Access Number	Report Type	Product Code	Date FDA Received	Description of Event
43	SpinalPak	Biolectron, Inc.	426563 Device Seq. Number 1	Malfunction	LOF	11/05/2002	The device failed to operate approximately 24 hours after initiating the treatment. The replacement device worked intermittently and stopped working, as well. Malfunctioned believed to be related to power supply.
44	SpinalPak	Biolectron, Inc.	426563 Device Seq. Number 2	Malfunction	LOF	11/05/2002	The device failed to operate approximately 24 hours after initiating the treatment. The replacement device worked intermittently and stopped working, as well. Malfunctioned believed to be related to power supply.
45	Unknown	Unknown	435464	Not available	LOF	03/04/2003	The osteogenic stimulator was removed.
46	EBI Bone Healing System	Electro-Biology, Inc.	506525	Serious Injury	LOF	01/05/2004	The patient had a history of seizures, and, after using the device, immediately had chills up and down leg, progressing to sensations in the chest, and exacerbating the patient's seizure disorder (unit worn on right metatarsal).
47	Unknown	Unknown	512845	Not available	LOF	02/19/2004	The bone growth stimulator was removed from the patient's left leg.

NOTE: With the high occurrence of serious injuries related to the EBI Bone Healing System, the petitioner attempted to locate a corresponding PMA supplement that would indicate if the manufacturing defects were addressed. Any PMA supplement around that timeframe (1993-1996) that was reviewed by the FDA did not specifically indicate what was modified.

Table 3: MDR/MAUDE Data Not Included in Section VI.C of the Petition

Reference:	Product Brand Name	Manufacturer	Access Number	Report Type	Product Code	Date FDA Received	Description of Event
5	Physio-Stim	American Medical Electronics, Inc.	M362646	Death	LOF	01/25/1993	The patient had a history of heart problems and blood clots, and died 15 minutes after using the device on the femur. The cause of death was heart failure, determined to be related to physiological or procedural factors.
7	Spinal-Stim	American Medical Electronics, Inc.	M382071	Serious Injury	LOF	04/23/1993	The patient reported several incidents of benign tumors on their back and abdomen after a period of use.
12	EBI Bone Healing System	Electro-Biology, Inc.	M406057	Serious Injury	LOF	08/13/1993	After tripping on the cord to the device three times, the fourth time the patient tripped and sustained a toe fracture.
13	Physio-Stim	American Medical Electronics, Inc.	M408115	Serious Injury	LOF	09/03/1993	The patient received minor medical intervention coinciding with the use of the device. An implanted k-wire had to be surgically removed, due to pain from migration of the wire to the dorsal surface.
28	Orthofix	American Medical Electronics, Inc.	127988	Serious Injury	LOF	10/23/1997	The patient suffered hives, insomnia, agitation and anxiety.
32	EBI Bone Healing System	Electro-Biology, Inc.	177887	Serious Injury	LOF	07/17/1998	The patient developed a blister on their foot that ultimately became gangrenous, and the patient underwent below the knee amputation.
33	EBI Bone Healing System	Electro-Biology, Inc.	206676	Other	LOF	01/13/1999	The patient wears an infusion pump 24 hours/day. The first night with the device, their blood sugar rose to 380 and the second night it rose to 440.
35	EBI Bone Healing System	Electro-Biology, Inc.	214086	Serious Injury	LOF	02/25/1999	After one week of treatment, the patient developed a blister on their foot that ultimately became gangrenous, and the patient underwent below the knee amputation.
40	Spinal-Stim	American Medical Electronics, Inc.	373914 Device Seq. Number 1	Serious Injury	LOF	01/07/2002	After the fusion site was determined to be healed, an x-ray revealed a growth on the patient's lung after 3 months of use. The patient had 1/3 of their lung removed. The pathology report was benign, and the mass was calcification.
41	Spinal-Stim	American Medical Electronics, Inc.	373914 Device Seq. Number 2	Serious Injury	LOF	01/07/2002	After the fusion site was determined to be healed, an x-ray revealed a growth on the patient's lung after 3 months of use. The patient had 1/3 of their lung removed. The pathology report was benign, and the mass was calcification.
42	Unknown	Unknown	388238	Not available	LOF	04/10/2002	The osteogenic stimulator was removed.
45	Unknown	Unknown	435464	Not available	LOF	03/04/2003	The osteogenic stimulator was removed.
46	EBI Bone Healing System	Electro-Biology, Inc.	506525	Serious Injury	LOF	01/05/2004	The patient had a history of seizures, and, after using the device, immediately had chills up and down leg, progressing to sensations in the chest, and exacerbating the patient's seizure disorder (unit worn on right metatarsal).
47	Unknown	Unknown	512845	Not available	LOF	02/19/2004	The bone growth stimulator was removed from the patient's left leg.