VOLUME 20, ISSUE 1 | JANUARY 3, 2024

Orthopedics This Week

WEEK IN REVIEW

4 Bioventus's Long Strange Trip >> These last couple years nearly broke one of the largest, most consequential suppliers of musculoskeletal products, Bioventus. Here is the story of that firm's long, strange trip…and the re-retirement of interim CEO Tony Bihl.

9 Novel Osteopenic Bone Treatment Lands 4th Patent >> The U.S. Patent and Trade Office (PTSO) just granted a 4th patent for an osteopenic bone treatment that, perhaps, is not as well-known nor fully appreciated within the broader musculoskeletal community. The new patent is # US20210052407A1.

12 Breakthrough FDA Designation for Hip/Knee PJI Drug >> This new therapy received FDA Breakthrough Therapy Designation after results from a Phase 2 clinical study showed that 93% of treated patients were infection free after one year.

BREAKING NEWS

For all news that is ortho, read on.

CLICK HERE TO DOWNLOAD A PDF VERSION OF THIS WEEK'S NEWSLETTER

Orthopedic Power Rankings

Robin Young's Entirely Subjective Ordering of Public Orthopedic Companies

THIS WEEK: The 24 suppliers of orthopedic and spine products ended 2023 at a collective $665.4 billion market value—of course that includes such behemoths as JNJ and Medtronic. That's 8.63% down from exactly one year ago. Take out JNJ and Medtronic, and the performance jumps to a record 23% increase year-over-year. The top three performing equities in 2023 were, in rank order: Xtant Medical Holdings, up 105%; Bioventus, up 104.6%, and Zimvie, up 93%. All three were low valuation stocks and each company had a particular catalyst that attracted buyers. And each one was on the Power Rankings. What looks good for 2024? Here's the list.

RANK	LAST WEEK	COMPANY	TTM OP MARGIN	30-DAY PRICE CHANGE	COMMENT
1	1	Bioventus	(5.33%)	30.45%	It has truly been a long and strange and winding road for BVS. Tony Bihl will re-retire this month and new CEO, Robert Claypoole, takes over. It feels like a new chapter is beginning.
2	3	Integra LifeSciences	17.32	11.24	Speaking of catalysts, IART's operational problems in 2023 seem to be over, so sales and earnings may outperform expectations.
3	2	ZimVie	(5.96)	85.67	ZimVie announced that it was selling the spine business to H.I.G. capital for $325 million. What will HIG do with ZimVie's spine business? That's the BIG question. ZIMV is 100% dental now.
4	8	Pacira Biosciences	12.86	24.87	New CEO for a new year. Frank D. Lee—a self-described transformational leader. BS alert! At least, investors are happy. And the stock is certainly cheap.
5	4	Zimmer Biomet	19.31	6.83	2024 will be new CEO Tornos's first full year. Right now Wall Street is predicting that $7.7 billion in sales for 2024 under Tornos, up from $7.38 billion in 2023. Will he meet or beat? Stay tuned.
6	10	Orthofix	(8.51)	19.72	Nice jump in the Power Rankings. New CEO on the way and he will bring, I think, stability and a tone that both employees and investors will like.
7	6	ConMed	7.42	3.06	CNMD is about to report 19.60% sales growth for all of 2023, with decent profit margins...yet it remains one of the cheapest equities in ortho.
8	NR	Globus Medical	17.73	18.87	Globus Medical, 2nd largest spine supplier and one of the fastest growing trauma companies, is expected to report $1.55 billion for 2023, up 52% from 2022. And almost 18% profit margins.
9	NR	Smith & Nephew	10.06	5.25	SNN just acquired CartiHeal, soon to become the #1 treatment for knee cartilage repair. FDA approved. Strong clinical data. Best in class. Ideal for SNN's sports franchise.
10	NR	Johnson & Johnson	30.07	3.04	JNJ's management thinks that operational sales can growth 5-6% in 2024. Wall Street thinks it'll be closer to 3%. I think DePuy Synthes had a good 2023 and should keep momentum going in 2024.

Robin Young's Orthopedic Universe

TOP PERFORMERS LAST 30 DAYS

	COMPANY	SYMBOL	PRICE	MKT CAP	30-DAY CHG
1	ZimVie	ZIMV	$17.75	$471	85.67%
2	Bioventus	BVS	$5.27	$415	30.45%
3	Nevro Corp	NVRO	$21.52	$780	28.40%
4	Alphatec Holdings	ATEC	$15.11	$2,060	26.55%
5	Pacira Biosciences	PCRX	$33.74	$1,567	24.87%
6	Orthofix	OFIX	$13.48	$495	19.72%
7	Globus Medical	GMED	$53.29	$7,493	18.87%
8	SI-BONE, Inc	SIBN	$20.99	$850	14.08%
9	Medacta	MOVE	$149.67	$2,993	11.48%
10	Integra LifeSciences	IART	$43.55	$3,405	11.24%

WORST PERFORMERS LAST 30 DAYS

	COMPANY	SYMBOL	PRICE	MKT CAP	30-DAY CHG
1	MicroPort Scientific	0853	$1.08	$1,978	-32.36%
2	Xtant Medical Hldgs	XTNT	$1.13	$147	-13.74%
3	Dynatronics Corp	DYNT	$0.59	$3	-5.65%
4	Aurora Spine	ASG.V	$0.30	$21	-4.32%
5	Anika Therapeutics	ANIK	$22.66	$332	1.57%
6	Stryker	SYK	$299.46	$113,763	1.73%
7	Johnson & Johnson	JNJ	$156.74	$377,317	3.04%
8	ConMed	CNMD	$109.51	$3,368	3.06%
9	Medtronic	MDT	$82.38	$109,537	4.46%
10	OrthoPediatrics Corp	KIDS	$32.51	$759	4.50%

LOWEST PRICE / EARNINGS RATIO (TTM)

	COMPANY	SYMBOL	PRICE	MKT CAP	P/E
1	Integra LifeSciences	IART	$43.55	$3,405	18.86
2	Johnson & Johnson	JNJ	$156.74	$377,317	18.92
3	Medtronic	MDT	$82.38	$109,537	19.55
4	Zimmer Biomet	ZBH	$121.70	$25,433	26.21
5	Globus Medical	GMED	$53.29	$7,493	27.37

HIGHEST PRICE / EARNINGS RATIO (TTM)

	COMPANY	SYMBOL	PRICE	MKT CAP	P/E
1	Medacta	MOVE	$149.67	$2,993	57.23
2	Smith & Nephew	SNN	$27.28	$11,913	53.42
3	Pacira Biosciences	PCRX	$33.74	$1,567	43.10
4	ConMed	CNMD	$109.51	$3,368	40.65
5	Stryker	SYK	$299.46	$113,763	33.92

LOWEST P/E TO GROWTH RATIO (EARNINGS ESTIMATES)

	COMPANY	SYMBOL	PRICE	MKT CAP	PEG
1	Smith & Nephew	SNN	$27.28	$11,913	-6.68
2	ConMed	CNMD	$109.51	$3,368	1.42
3	Globus Medical	GMED	$53.29	$7,493	1.68
4	Medacta	MOVE	$149.67	$2,993	2.05
5	Stryker	SYK	$299.46	$113,763	3.20

HIGHEST P/E TO GROWTH RATIO (EARNINGS ESTIMATES)

	COMPANY	SYMBOL	PRICE	MKT CAP	PEG
1	Medtronic	MDT	$82.38	$109,537	5.80
2	Integra LifeSciences	IART	$43.55	$3,405	5.24
3	Zimmer Biomet	ZBH	$121.70	$25,433	3.78
4	Pacira Biosciences	PCRX	$33.74	$1,567	3.75
5	Johnson & Johnson	JNJ	$156.74	$377,317	3.64

LOWEST PRICE TO SALES RATIO (TTM)

	COMPANY	SYMBOL	PRICE	MKT CAP	PSR
1	Dynatronics Corp	DYNT	$0.59	$3	0.07
2	ZimVie	ZIMV	$17.75	$471	0.52
3	Bioventus	BVS	$5.27	$415	0.81
4	SINTX Technologies	SINT	$0.38	$2	1.04
5	Orthofix	OFIX	$13.48	$495	1.08

HIGHEST PRICE TO SALES RATIO (TTM)

	COMPANY	SYMBOL	PRICE	MKT CAP	PSR
1	SI-BONE, Inc	SIBN	$20.99	$850	7.99
2	Globus Medical	GMED	$53.29	$7,493	7.33
3	Medacta	MOVE	$149.67	$2,993	6.85
4	OrthoPediatrics Corp	KIDS	$32.51	$759	6.21
5	Stryker	SYK	$299.46	$113,763	6.17

PSR: Aggregate current market capitalization divided by aggregate sales and the calculation excluded the companies for which sales figures are not available.

Bioventus's Long Strange Trip

BY ROBIN YOUNG

(Left to right): Tony Bihl, Interim CEO Bioventus, Ken Reali, Former CEO Bioventus, Nir Altschuler, CEO CartiHeal, Robert Claypoole, new CEO Bioventus
Courtesy of Bioventus Inc.

Tony Bihl is leaving the stage. He was BioVentus's CEO, twice.

We join a long list of people who will miss him.

Smith & Nephew. Bioventus's employees, current and former suppliers, and shareholders.

Essex Woodlands? Hard to say. They seem to be moving on.

Biologics, after all, isn't the "hot space" it was more than a decade ago.

The other leader in the market for hyaluronic acid (HA) injections, Anika Therapeutics, has diversified into implants, instruments, and a really interesting HA + corticosteroid combo knee injection. And companies like Organogenesis are pioneering the use of amniotic fluids and tissues for knee repair and pain relief. And down the road LifeNet Health is showing how to innovate in the tough allograft business.

Among Tony's feats of business legerdemain were his talents for infusing the financially engineered Bioventus with an entrepreneur's unity of vision, purpose, and team building.

Two years ago, Bihl also exited the Bioventus stage and handed the company to Ken Reali.

Fourteen months later, Bihl returned to clean up Reali's mess. Does Bihl's latest successor, Robert Claypoole, know what he's getting into?

Essex Woodland's Engineering Project

About a dozen years ago, biologics—stem cells, advanced forms of HA (single injections, for example), amniotic tissue and fluid and the sense that bone morphogenic proteins had untapped potential—seemed destined to become the new wealth creation engine for musculoskeletal investors.

Smith & Nephew, which had funded an early, ambitious regenerative biologic product—Dermagraft—never lost its interest in the regenerative medicine space but couldn't allocate the financial resources to be a player in 2010.

Enter Marty Sutter, founding partner and managing director of $2.5 billion Essex Woodland, one of the largest and oldest growth equity and venture capital firms in the U.S.

Marty believed in the economic future of regenerative medical products. If they could heal such musculoskeletal problems as arthritic joints and find a niche between INSAIDS and end-

stage, expensive, arthroplasty surgeries—well, it could be—at most game changing—at least a massive return on investment.

He made Smith & Nephew an offer they couldn't refuse—$258 million—$98 million in cash and a $160 million five-year note.

In return, this 154-year-old London-based company agreed to spin out its U.S. biologics team, HA and other clinical therapies business into a brand-new start-up named Bioventus. Smith & Nephew would own 49% and Essex Woodlands would own 51%.

Bioventus Is Born

Bioventus officially entered the world on January 4, 2012. Its first CEO was Mark Augusti. Its products were Exogen ultrasound bone healing system and Supartz hyaluronic acid injections (5 injection protocol). Its first full year's sales were $232 million. The new company lost $26 million in that first year.

Of course, Essex planned to take Bioventus public. But first it bolted on a calcium-based bone graft product platform (OsteoAmp) and a bone morphogenic protein project with Pfizer—the supplier of Infuse to Medtronic Spine. The Pfizer deal didn't last long.

In 2016, Bioventus tried to float a public stock offering—8.8 million shares for $180 million. It sank.

In February 2021, under new CEO Ken Reali, Bioventus tried again. This time it worked—8.5 million shares for $111 million. Stock symbol: BVS. Market value: $1 billion.

Between 2012 and 2022 sales more than doubled, rising from $232 million to $512 million—a 9.2% annual growth rate. Notably, BVS's most profitable year, 2020, was Tony Bihl's final year and one year before Ken Reali took the company public.

Sales in Tony Bihl's 2020 year were $321 million, which were actually down from the prior year's $340 million, but profits leaped from $7 million to $19 million.

In 2021, under Reali's leadership, Bioventus committed an aggregate $628 million to buy Misonix, a provider of minimally invasive therapeutic ultrasonic products and Bioness, a supplier of devices for rehab and neuromodulation.

With those two acquisitions, Bioventus's sales rose to $431 million in 2021, up more than 34% from 2020, but losses were a stunning $159 million.

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Bioventus Sales and Earnings (Losses): 2013-2022 ($ in millions)										
Year	**2022**	**2021**	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**
Sales	$512	$431	$321	$340	$319	$292	$274	$254	$243	$232
Profit (loss)	**($127)**	**($159)**	**$19**	**$7**	**($12)**	**$1**	**($18)**	**($38)**	**($17)**	**($26)**

Source: RRY Publications LLC

Between 2021 and 2022, Bioventus lost nearly $300 million, and its market value fell from $1 billion to $330 million.

How did that happen?

A big reason was the bond market. Cheap money, which fueled an M&A boom throughout life sciences, ended abruptly.

But, most of all, CEO Ken Reali overreached. In retrospect, buying three companies in one year…and the last one, CartiHeal, possibly the most valuable of the three, was one deal too many and it nearly broke Bioventus.

The Lure of Knee Cartilage Repair

A 1994 article in the *New England Journal of Medicine (NEJM)*, "Treatment of deep cartilage defects in the knee with autologous chondrocyte transplantation" by Brittberg M, Lindahl A, Nilsson A, Ohlsson C, Isaksson O, Peterson L., effectively launched cartilage repair in the United States.

One year later Boston-based Genzyme Corporation took the autologous chondrocyte transplantation (ACI) technology described in the *NEJM* article and created a cartilage repair product and process named Carticel.

Two years *after that*, the FDA granted Genzyme a license for Carticel. It was the first time the FDA had licensed/approved or cleared a living cell technology for commercial sale.

Jump ahead 25 years, and after more than 1 million annual cartilage treatment procedures in the U.S., including 430,000 debridement procedures and 220,000 microfracture surgeries (Source: *SmartTRAK.net - Cartilage Replacement – U.S.*, January 3, 2019), cartilage repair remains more a hope than a standard of care.

Carticel along with another ACI treatment, MACI (autologous cultured

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chondrocytes on porcine collagen membrane), are the most popular cartilage repair technologies in the United States. Those treatments (along with a related technology for wound repair—Epicel) generate about $40-45 million in annual product sales.

Other cartilage repair products that were also developed include Zimmer's DeNovo-NT, plug-type scaffolds for arthroscopic delivery like Dunlop Corp's carbon fiber plug or Smith & Nephew's True-Fit plug, Tigenex's Chondromimetic implant and Histogenic's NeoCart (collagen scaffold with autologous living cells).

Even so, within the overall market to treat deteriorating knees, cartilage repair product sales barely register.

In terms of dollars ($7 billion), knee replacement surgery is the principal treatment modality for patients suffering from end-stage osteoarthritis. Hospitals, physicians, suppliers, and payers understand that that is the bread and butter of the industry.

A quick perusal of American Academy of Orthopaedic Surgeons' (AAOS) clinical practice guidelines for osteoarthritis (OA) of the knee finds a whole range of pre-knee replacement therapies including NSAIDs, cortisone shots, platelet rich plasma injections and osteotomies.

CartiHeal

CartiHeal's Agili-C™, FDA approved, repairs cartilage better than the standard of care and anything that has come before. It is destined to become the most successful cartilage repair product yet, by far.

Bioventus first invested $2.5 million in CartiHeal in 2018. Johnson & Johnson, Elron, Accelmed, Access Medical Ventures, aMoon and Peregrine Ventures also, over the years, put money into CartiHeal.

Bioventus followed that first investment with another $15 million in 2020. Tony Bihl was Bioventus's CEO for both of those decisions.

CartiHeal used the funds to pay for an ambitious, 250 patient FDA approved PMA clinical study. The product, Agili-C, is a treatment for a broad spectrum of cartilage defects, including mild to moderate osteoarthritis (OA) of the knee, osteochondral defects and focal cartilage lesions.

Its IDE (investigational device exemption) study was a multi-center, 2:1 randomized, open-label and controlled study. The primary endpoint was change from baseline to 24 months in the average Overall KOOS score (pain, symptoms, QOL, ADL and Sports).

The patients in the Agili-C study arm demonstrated clear superiority over standard of care. Sustained for 24 months. Here are the details.

- The baseline KOOS Overall score was similar in both groups: 41.2 in the Agili-C arm and 41.7 in the SSOC arm. At Month 24, the posterior mean for the treatment group improvement from baseline in the Agili-C arm was 42.7 compared to 21.4 for the SSOC arm.
- The degree of improvement for Agili-C compared to SSOC was similar for subjects with Mild-moderate Osteoarthritis (Kellgren-Lawrence Grades of 2 or 3) and for subjects with Large Lesions (total lesion areas larger than 3 cm^2).
- The posterior probability of superiority of Agili-C relative to SSOC was also 1.000 for all 4 Secondary Confirmatory Endpoints: KOOS Pain, KOOS ADL and KOOS QOL and Responder Rate.
- The responder rate, which was *a-priori* defined as improvement of at least 30 points in Overall KOOS at 24 months compared to baseline, was 77.8% in the Agili-C arm compared to 33.6% in the SSOC arm.

CartiHeal's Agili-C was approved by the FDA for commercial sale in March 2022.

Bioventus Buys CartiHeal

Bioventus had an option to buy CartiHeal once the FDA approved Agili-C.

On June 17, 2022, Reali exercised that option. The price tag was approximately $315 million with up to $135 million in milestone payments. And Bioventus had to pay CartiHeal's $8 million of legal and M&A expenses.

Bioventus didn't have $315 million in either cash or lines of credit. It needed to raise it.

Nir Altshuler, founder and CEO of CartiHeal, knew Bioventus didn't have the money but, at his board's insistence—and his board included key venture capital funds—he agreed to new terms. "I was sure," Altshuler told *OTW*, "that Bioventus would be unable to meet the payment terms and we'd have our company back in six months."

On June 27, John Nosenzo, Bioventus chief commercial officer resigned. No reason given. He wasn't replaced.

On July 11, Bioventus borrowed $80 million from Wells Fargo to help pay the cash due for CartiHeal.

On July 15, Bioventus's purchase of CartiHeal closed. Of the $315 million purchase price, $215 million was now deferred, to be paid in five tranches starting in 2023 and ending no later than 2027.

On August 29, Stavros G. Vizirgianakis, who'd joined Bioventus's board as part of the Misonix deal, resigned.

Bioventus informed the SEC that it could not file its Quarterly Report for the period ending October 1, 2022, on time. Apparently, the company had received a revised invoice for rebate claims from a large private insurance payer which was tied to Bioventus's Pain Treatment products. Even worse, it now appeared as though Bioventus would NOT be able to meet all of its financial obligations as they come due within one year.

On December 6, 2022, Bioventus announced a corporate restructuring.

CartiHeal Divorces Bioventus

For Altshuler and his board, the writing was on the wall. Bioventus did not have the financial capability to complete the acquisition of CartiHeal and Reali's own position at the company was increasingly tenuous.

Between December 2022 and February 2023, the two companies negotiated their divorce agreement. On February 27, 2023, Bioventus unconsolidated CartiHeal, gave back all the shares it had received, wrote off the $100 million it had already paid and paid an extra $10 million.

With that, Bioventus eliminated $215 million in upcoming payment obligations which, if certain milestones had been met, could have ballooned to $350 million.

CartiHeal started recruiting a U.S. based sales force to sell its now FDA approved cartilage repair system.

On April 3, 2023, the Board of Directors fired Ken Reali. During his two years at Bioventus, Reali was paid about $17 million.

On April 4, 2023, Tony Bihl returned as Interim Chief Executive Officer.

On May 10, 2023, Bioventus sold its TheraSkin Product and the TheraGenesis Products for $35,000,000 plus $5 million deferred for 18 months and as much as $45 million in earn-out payments to LifeNet Health.

Smith & Nephew Buys CartiHeal for $180 Million Plus Milestones

Two days before Thanksgiving 2023, and nine months after CartiHeal divorced Bioventus, Smith & Nephew, BioVentus's largest shareholder, announced that it had agreed to buy CartiHeal for $180 million and committed to pay a further $150 million contingent on financial performance. While that was about 26% less than Bioventus's deal, CartiHeal's shareholders (who include Johnson & Johnson, Elron, Accelmed, Access Medical Ventures, aMoon and Peregrine Ventures) may well ultimately receive, if milestone payments are made and including Bioventus's payments, approximately $400 million.

"The acquisition of this disruptive technology supports our strategy to invest behind our successful Sports Medicine business," said Deepak Nath, chief executive officer of smith & Nephew. "Agili-C's superior clinical performance makes it highly complementary to our existing knee repair portfolio and with our proven commercial expertise in high-growth biologics, we are confident that we will drive further success with this compelling treatment option."

Bihl Re-Retires and Bioventus Hires Robert Claypoole

This January 2024 Tony Bihl will re-retire.

And 52-year-old Robert Claypoole will become Bioventus's latest CEO. Most recently he was executive vice president of Mölnlycke's $1.2 billion Wound Care business. Claypoole had been at Mölnlycke for six years. Before that he was at Medtronic and Covidien where he managed the Obesity and Metabolic Health businesses and before that the Soft Tissue Repair and Hemostats business.

All told, Claypoole has been a senior executive and board member of numerous health care suppliers for about three decades.

Where does Bioventus go from here?

Certainly, Claypoole will need to continue Bihl's efforts to rebuild Bioventus's financial health. And Reali did significantly expand Bioventus's product offerings in a number of valuable markets.

But Bioventus also needs to shed the legacy of its sterile, financially engineered birth.

Usually, the team that bonded in the trenches during a company's formative years, creates a brand differentiation in the process—rooted in something authentic about the company, its products and people. It's how customers come to know and understand a business.

If Claypoole can figure that out, then the BVS's future is bright indeed. ◆

Novel Osteopenic Bone Treatment Lands 4th Patent

BY ELIZABETH HOFHEINZ, M.P.H., M.ED.

The U.S. Patent and Trade Office (PTSO) just granted a 4th patent for an osteopenic bone treatment that, perhaps, is not as well-known nor fully appreciated within the broader musculoskeletal community.

The new patent is # US20210052407A1. Here's a link if you want to read it yourself.

It is a continuation of another U.S. patent (issued in 2015), which was itself a continuation of another U.S. patent (issued in 2013) which, naturally, was also a continuation of another U.S. patent (issued in 2012).

Source: Bone Health Technologies, Inc. and the USPTO

All of this intellectual property rests on a simple, intriguing scientific principle—that stimulating and loading bone—repeatedly—will make that bone (osteopenic bone, for example) denser, stronger … while also inhibiting fat deposits (adipogenesis).

Low bone mineral density (BMD) is a significant problem. Especially among the elderly—who endure about 1.5 million bone fractures annually.

Bisphosphonates, a class of compounds that is often used to treat low bone mineral density, work well, but the side effects include osteonecrosis of the jaw, erosion of the esophagus, and atypical femoral fractures.

Shake, Rattle and Roll

This 4th patent was issued to Redwood City, California-based Bone Health Technologies, Inc. that, incidentally, also owns the three earlier patents.

Before Bone Health Technologies was founded, scientists tested the effects of repeated mechanical loading on bone tissue using relatively high frequencies (e.g. 15-90 Hz) and relatively low mechanical loads (e.g., 0.1-1.5 g's).

Repeated loading, they documented, (they called it Whole Body Vibrations or WBV) could delay and/or halt the progression of osteoporosis (Rubin et. al., *Journal of Bone and Mineral Research*, 19:343-351, 2004).

In another randomized study, scientists documented that ≥0.6 g's of vibratory force delivered to the feet of patients improved bone mineral density at a statistically significant rate compared to control. (Verschueren et al., *Journal of Bone and Mineral Research*, 19:352-359, 2004).

And the studies kept piling up.

- WBV improved hip and preserve spine bone mineral densities among healthy cyclists, postmenopausal women, and disabled children (Am J Phys Med Rehabil 2010; 89:997-1009, Ann Intern Med 2011; 155:668-679, *J Bone and Mineral Research* 2011; 26(8):1759-1766).

- Shear stress within bone marrow in trabecular architecture during high frequency vibration could provide the mechanical signal to marrow cells that leads to bone anabolism (*Journal of Biomechanics* 45(2012):2222-2229).

- Shear stress above 0.5 Pa is mechanostimulatory to osteoblasts, osteoclasts, and mesenchymal stem cells (*Journal of Biomechanics* 45(2012):2222-2229).

The first attempts at a product to treat osteopenic patients were vibrating platforms. Patients would stand on them and thereby receive repeated mechanical loading up from the feet to the rest of the body. Sounds like fun, right?

Anyway, the products (e.g., Galileo 900/2000™, Novotec Medical, Pforzheim, Germany; or Power Plate™, Amsterdam, The Netherlands) worked to a degree, but patients had to stand on them for 30 minutes or so and shaking up the feet first really was not efficient. Up to 40% of vibration power was absorbed or dampened by the ankles and knees before reaching hips and spine. (Rubin et al., *Spine* (Phila Pa. 1976), 28:2621-2627, 2003).

Site Specific Good Vibrations

Bone Health's family of patents teach how to build a site-specific method to load and vibrate bone. Their devices deliver vibration force directly to the hip, spine, or wherever required—effectively localizing repeated mechanical loads.

In addition, the patents teach how to directionalize the vibrations and bone loading.

Bone Health's wearable vibration and loading delivery systems make this treatment available to millions of patients with osteopenic bone or who engage in activities which could reduce bone mineral density.

Worth noting, importantly, is that these wave forms have demonstrated an ability to suppress adiposity (*PNAS*. Nov. 6, 2007; 104(45):17879-17884)—which is to say, reduce stem cell adipogenesis and act as a "non-pharmacologic prevention of obesity and its sequelae" (*PNAS*. Nov. 6, 2007; 104(45):17879-17884).

There is actually a study which documented the effects of these wave forms on obese women where, in the words of the research team, they displayed a "positive effect on body weight and waist circumference reduction" (Korena *J Fam Med*. 2011; 32:399-405).

Bone Health Technologies, Inc.

OTW talked with the CEO of Bone Health Technologies (BHT) and asked her about these patents and the ways in which she hopes to "shake things up" for osteopenic patients and their doctors.

"Over 63 million Americans have low bone density, yet the field has been lacking new therapies with no new

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agents in clinical trials—innovations such as Osteoboost are critical to turning around the public health trajectory of fractures," said Bone Health Technologies CEO Laura Yecies.

"Osteoboost" by the way, is the brand name of Bone Health's lead product.

"Vibrations mimic the force of high-impact exercise such as jumping on the skeleton—similar to that exercise the vibration has an anabolic effect stimulating the osteoblasts to create new bone cells and lessening the osteoclast (bone removing) cell activity," Yecies explained to *OTW.*

The founder of Bone Health Technologies, Dr. Shane Mangrum, told *OTW,* "My motivation to invent a novel solution for low bone density resulted directly from my experience treating so many patients with painful vertebral compression fractures. I was determined to develop a non-drug treatment that patients would be interested in using and could incorporate into their daily lives to prevent the loss of bone that results in fractures."

A Connection to NASA

Like so many other groundbreaking technologies, these wave form inventions have their roots at NASA. "The original research on using whole body vibration to improve bone density and strength was funded by NASA as astronauts lose bone density when in space (since their bones do not get normal weight bearing stimulation in zero gravity)," explained Yecies, "That research found that whole body vibration improved bone density but outside of the astronaut group compliance was a challenge."

"There are no approved therapies for post-menopausal women with osteopenia. Walking, swimming, and biking are not enough stimulation to the bones, yet the typical older woman cannot or will not do high-impact exercise (and certainly not daily). Without a safe and effective intervention these women are left to lose bone risking their health and lifespan. Osteoboost uniquely is a safe and clinically proven intervention to improve bone strength."

Now with patent #4 and the ever-increasing body of literature supporting this non-invasive, conservative treatment for low bone mineral density, perhaps it is time to take a much closer look at repeated bone loading using a site-specific approach championed by Bone Health Technologies of Redmond City, California. Here's a link to the company's website. ♦

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Breakthrough FDA Designation for Hip/Knee PJI Drug

BY KIM DELMONICO

The U.S. Food and Drug Administration (FDA) has granted Breakthrough Therapy Designation to an investigational drug therapy for periprosthetic joint infection (PJI) of the hip and knee.

With this designation, the drug's manufacturer, Osteal Therapeutics, Inc., will be able to expedite the drug's development and FDA review. Also noteworthy is that the FDA acknowledged that preliminary clinical evidence indicated that Osteal's drug may demonstrate substantial improvement over available therapy on a clinically significant endpoint(s).

Osteal's product, which is a drug-device combination, is called VT-X7 (vancomycin hydrochloride and tobramycin sulfate for irrigation/VT-X7 irrigation system).

Osteal Therapeutics, a privately held, clinical-stage pharmaceutical company that developed VT-X7. VT-X7, said that this "novel drug/device combination product is designed to deliver therapeutic concentrations of vancomycin and tobramycin, well-established, broad-spectrum antibiotics, directly to the joint space and surrounding tissue to treat PJI."

The FDA granted the Breakthrough Therapy Designation based on results from a "Phase 2b, prospective, multicenter, randomized controlled clinical trial evaluating the safety and efficacy of VT-X7." In a Phase 2 clinical study of VT-X7, "100% of patients were treated and received a new permanent joint prosthesis in seven days with 93% remaining infection free at one year."

Osteal Therapeutics'® lead therapeutic candidate, VT-X7 / Source: Osteal Therapeutics, Inc.

The Breakthrough Therapy Designation follows Orphan Drug, Qualified Infectious Disease Product, and Fast Track designations. It also coincides with the completion of enrollment in APEX-2, the "pivotal clinical trial" for the drug.

Judson Cooper, a founding principal of Prism Ventures LLC and a member of Osteal Therapeutics Board of Directors, said, "We are pleased to see VT-X7 receive Breakthrough Therapy Designation from FDA. In this market where there are no FDA approved products for treatment of PJI, Osteal offers one of the most compelling advances in PJI treatment we have ever seen."

Cooper continued, "By virtually eliminating the interstage period associated with traditional two-stage exchange arthroplasty, VT-X7 could put patients on the path to normal life sooner without the morbidity and mortality associated with this lengthy period of limited mobility." ♦

COMPANY

Medacta Doubles Production Capacity and More

Medacta Headquarters / Source: Medacta

Medacta, the Castel San Pietro, Switzerland supplier of orthopedic and spine implants, instruments, and a comprehensive suite of digital solutions including the market leading NextAR augmented reality platform for both shoulder and knee arthroplasty indications is doubling its production capacity.

The new construction plan will include adding to its Castel San Pietro location as well as its current manufacturing operations in Rancate, Switzerland.

Medacta CEO Francesco Siccardi said, "Today we celebrate another important milestone for Medacta."

Siccardi continued, "Built on strong values, our growth confirms our dedication to fostering our international expansion to meet patients, medical professionals, and healthcare systems' needs and expectations. We are excited to keep making investments in our future here in Switzerland, Ticino, where our company was founded."

Castel San Pietro and Rancate are both located in the canton of Ticino in Switzerland.

According to Medacta, Medacta new manufacturing plants in Ticino will cover more than 36,800 square meters. This investment and expansion is "fundamental for the Company's forecasted growth."

The Castel San Pietro expansion will add nearly 5,300 square meters to the production area. This expansion will be operational by the first quarter of 2024 and is expected to generate a number of new jobs.

The Rancate construction will take three years to complete and includes an additional 9,500 square meters. This expansion is in addition to Medacta's previously announced opening of its 2,100 square meters of new offices in Rancate.

Medacta isn't just focused on growth in Switzerland. It is also expanding in the United States and Italy. These other offices house Medacta's logistics and distribution infrastructure to support the global delivery of its products.

This year, Medacta opened a new distribution center in Memphis, Tennessee, called Medacta Americas Operations. According to an earlier press release, Medacta Americas Operations includes more than 108,000 square feet in a newly constructed facility dedicated to serving the market in the United States.

Medacta may also be expanding in northern Italy where it has identified a potential location for a second distribution center called Medacta Europe Operations to serve the European market. Medacta indicated in its most recent press release that it expects the new facility to have up to 10,000 square meters of space and anticipates that it should be operational by mid-2025.

From 16th Largest Supplier to 12th Largest in One Year

For 2022, Medacta Group SA ended the year at $513 million in sales (471 million Euros) and a profit margin (EBITDA) of 27.6% of sales—which would be about $142 million.

For the first half of 2023 (Medacta only reports six-month figures—not quarterly as most U.S. based public companies do—U.S. firms should seriously consider thinking and reporting on a more long term basis), Medacta reported $278 million in sales (255.1 million Euros), up an industry leading 21.4% from the prior year. Profit margin (EBITDA – Earnings Before Interest, Taxes, Depreciation and Amortization) was 21.4%.

At this rate, Medacta should end 2023 reporting $560-580 million in sales—making it the 12th largest manufacturer of orthopedic and spine products in the world—up from 16th largest in 2022. — *KD*

LEGAL

FDA Clears ZimVie's Implant for Use With BrainLab's NAV System

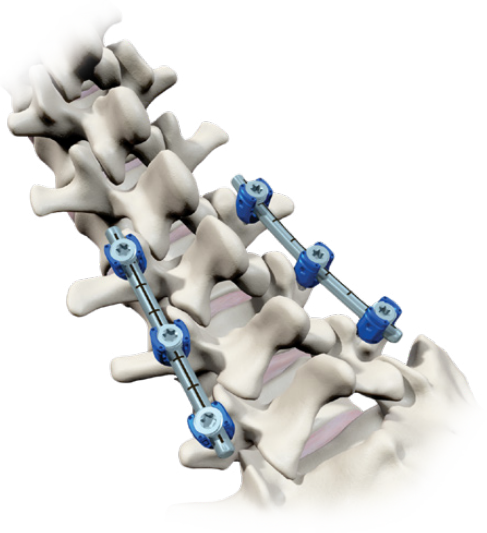
The U.S. Food and Drug Administration (FDA) has granted 510(k) clearance to the use of ZimVie Inc.'s spinal fixation system with BrainLab AG's spine and trauma navigation system.

According to the FDA summary document, ZimVie's navigation system instruments are used during the preparation and placement of the system screws during spinal surgery to "precisely locate anatomical structures in either open or minimally invasive procedures." The navigation system instruments are designed for use with two software systems. The reference arrays can only be used with one of the two software systems.

The device is the Vital™ Spinal Fixation System and its instruments. ZimVie Spine is the manufacturer. The predicate device is ZimVie's Vital Navigation System. The Vital Spinal Fixation System and instruments have been cleared for use with Brainlab Spine & Trauma Navigation software.

ZimVie and Brainlab executed a Development Cooperation Agreement earlier this year. The agreement was the driving force behind the compatibility of Brainlab Spine & Trauma Navigation with the Vital system and also with ZimVie's Virage system.

According to ZimVie, the plan is to submit a 510(k) application to the FDA for its Virage system in 2024. It is also expected that the first Vital sets will launch in the United States early 2024.



Vital™ Spinal Fixation System / Source: ZimVie Inc.

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ZimVie Spine Global President Rebecca Whitney said, "This is a positive milestone for both teams and the first of what we hope will be many FDA clearances for compatibility. The strong collaboration between our organizations resulted in an expedited project timeline."

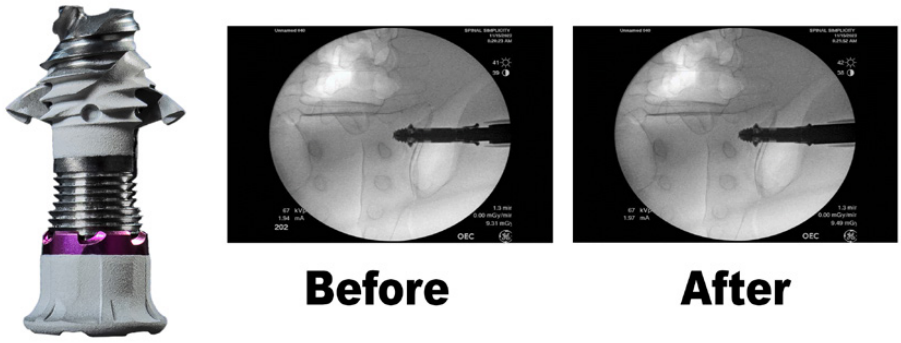
Whitney continued, "We have been focused on expanding our portfolio with enabling technologies to drive greater adoption, and I am excited to see the team advance toward the launch."

According to Brainlab, its Spine Navigation system helps surgeons plan and perform spinal surgeries and supports implant placement. It also helps reduce radiation exposure. That compatibility allows "navigation during bone preparation and placement of pedicle screws during spinal surgery to assist the surgeon in precisely locating anatomical structures in either open or minimally invasive procedures." — *KD*

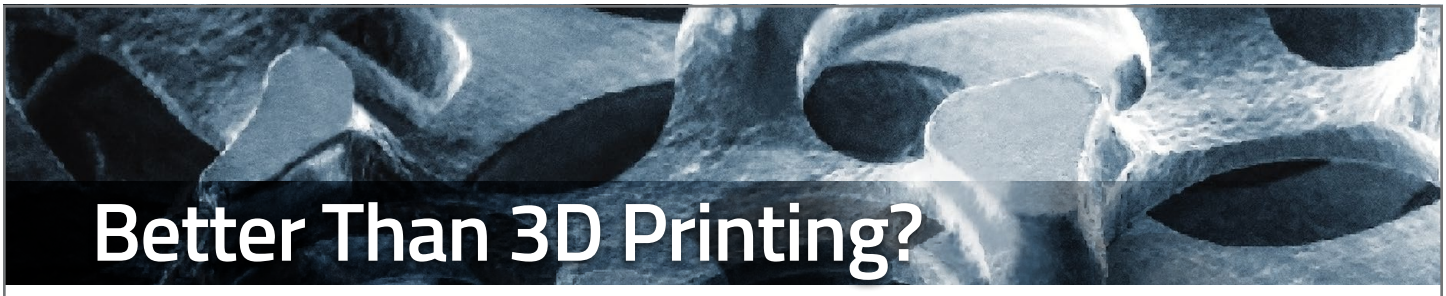
Novel SI Joint System 510(k) Cleared

The U.S. Food and Drug Administration (FDA) has granted 510(k) clearance to a novel sacroiliac joint system—brand named Liberty-SI Lateral Implant System, manufactured by Overland Park, Kansas-based Spinal Simplicity, LLC.

According to the 510(k) summary document, the device is "a minimally invasive sacroiliac joint fusion implant that is intended for implantation across the joint space (i.e., the implant transfixes the SI joint)."



X-Ray of Liberty before the SI joint is compressed / Courtesy of Spinal Simplicity, LLC



Advertisement

The new SI joint implant is "composed of Ti-6AI-4V ELI titanium alloy per ASTM F136 and is partially coated with hydroxyapatite (HA)."

Additionally, to accommodate varying patient anatomy, the implants are "available in multiple diameters and length offerings," and consist of a "cannulated central threaded body that has deployable Wings and a Compressive Body."

While "using the designated instrument system, one or two implants may be inserted across the SI Joint to apply a compressive force across the joint and to provide stabilization and fusion."

The indication is "sacroiliac joint fusion for conditions including sacroiliac joint disruptions and degenerative sacroiliitis."

In order to qualify for the shorter and earlier 510(k) clearance the device must be substantially equivalent to a predicate device. The predicate device is the SI-LOK® Sacroiliac Joint Fixation System. The devices have the same indications for use.

The folks at Spinal Simplicity are planning to bring Liberty-SI to market in a focused, soft market launch early in the first quarter of 2024 and unveil the full market release in the second quarter of 2024.

Neurosurgeon Larry Khoo, M.D. said of the announcement, "As a spine surgeon, the clearance of the Liberty-SI Lateral System gives me the option to use one implant on my patients with a safe, lateral trajectory."

Dr. Khoo continued, "This is great for patients with SI joint pain as it could potentially be a procedure where they aren't under anesthesia as long, and the implant will compress and fuse the joint as well." —*KD*

Orthopedic Surgeon Convicted in Opioid Health Care Fraud Case

Olarewaju James Oladipo, M.D., an orthopedic surgeon based in Canton, Massachusetts, has been convicted of 10 counts of health care fraud.

Dr. Oladipo engaged in the fraudulent billing scheme from January 2016 through December 2019. During that time Dr. Oladipo would use billing codes for services that were not provided. These billing codes often corresponded to more complex and thus more expensive services.

Also during that time period, Dr. Oladipo would falsify patient medical records by documenting examinations and services that he did not perform. According to the Department of Justice press release, Dr. Oladipo "frequently billed for more than 60 patients per day and sometimes more than 90 patients per day." For most patients, this would have generally resulted in visits of five minutes or less. However, the billing codes that he used typically corresponded to longer visits of 15, 25, 30, and even 45 minutes.

During the time of his scheme, Dr. Oladipo was one of the leading prescribers of opioids in Massachusetts. According to the Department of Justice press release, Dr. Oladipo "ensured this high flow of patients to his practice by prescribing powerful, highly addictive opioids at a rate that made him one of the top prescribers of such drugs in Massachusetts."

Jodi Cohen is the special agent in charge of the Federal Bureau of Investigation, Boston Division. In the press release, Cohen said, "Dr. Oladipo is no longer just one of the top prescribers of highly addictive opioids in Massachusetts—he is now a convicted felon—for cheating federally funded health care programs, taxpayers, and patients, for work he did not do."

Cohen continued, "The unscrupulous tactics used in this scheme are what drive our investigators on a daily basis to combat healthcare fraud."

Dr. Oladipo's sentencing is scheduled for March 12, 2024. Each charge of health care fraud and conspiracy to commit health care fraud can carry a sentence of, according to the Department of Justice press release, "up to 10 years in prison, one year of supervised release, and a fine of up to $250,000." — *KD*

Source: Pexels and Xiaoyi

SPINE

'Ventana' – An Interbody Implant With a Lid Launches

It's called "Ventana", and it comes a "lid." Why didn't someone think of this earlier?

This 3D implanted interbody implant is both familiar and clearly, cleverly, unique.

Created and manufactured by Carlsbad, California-based Spinal Elements, Inc., the Ventana portfolio of 3D-printed interbody implants include:

- The Ventana C Anterior Cervical Interbody System,
- Ventana P/T Posterior Lumbar Interbody System and
- Ventana L Lateral Lumbar Interbody System.

The systems are part of Spinal Element's MIS Ultra® platform of products and procedural solutions.

"The Ventana family of implants have a 3D-printed architecture that allows for clear radiographic visualization during imaging. The implant's window (looks like a 'lid') allows for a large amount of bone graft to be securely placed within the disc space to ensure contact with the endplates, which I believe is essential for the fusion process," said Neel Anand, M.D., Anand Spine Group, Los Angeles, California.

Spinal Elements CEO Ron Lloyd told *OTW*, "The Ventana architecture was developed by a talented team of engineers here at Spinal Elements to combine many of the desired benefits of interbodies. The architecture is a 3D-printed, titanium lattice structure designed to secure a large volume of bone graft inside the implant, while providing radiographic visualization."

He added, "The Spinal Elements team is dedicated to bringing innovative products to market that when combined with our Orbit discectomy instrument set and our fixations systems, like Karma®, Overwatch® or Sapphire X®, they successfully work together to achieve spinal fusion."

"Ventana represents another major milestone in our mission to redefine spinal healthcare."

The entire Ventana concept was an organic development process which combined the talents of the Spinal Elements team with input and guidance from multiple spine surgery thought leaders.

And, naturally, 3D printing processes have revolutionized interbody designs, creating a wide variety of open architectures and therefore maximizing bone grafting. Now, with the window/lid, Spinal Element's Ventana design family improves each surgeon the ability to access the interior of the implant and to maximize bone grafting for, to repeat:

- TLIF [transforaminal lumbar interbody fusion],
- PLIF [posterior lumbar interbody fusion] and
- lateral indications.

Finally, as CEO Lloyd told *OTW*. "The unique architecture distributes the surface area contact with the vertebral bodies in a snowshoe effect." — *EH*

Ventana 3D-Printed Interbody Portfolio / Courtesy of Spinal Elements, Inc.

PEOPLE

Sigurd H. Berven, M.D. Wins NASS's David Selby Award

Sigurd H. Berven, M.D. / Courtesy of University of California–San Francisco

Sigurd H. Berven, M.D., one of the global deans of orthopedic spine surgery has been selected as the 2023 David Selby Award winner by the North American Spine Society (NASS).

What makes this honor so unique, is that it is bestowed by one's own spine surgery peers. The David Selby award is presented to spine surgeons and researchers who have been outstanding contributors to the science, art, and practice of spine care.

When presenting the award, NASS specifically called out Dr. Berven for "his unwavering commitment to advancing the art and science of spinal disorder management through dedicated service to NASS in various roles."

An active member of NASS since 2002, Dr. Berven has served on numerous committees and was a NASS 2022 program co-chair. Dr. Berven's body of work which spans published papers, textbooks, podium presentations and active mentoring of hundreds of fellow surgeons in the sub-specialties of pediatric and adult deformities, degenerative conditions of the spine, spinal tumors and spinal trauma, and clinical research is unparalleled.

Among Dr. Berven's many, many research interests is the critical but complicated subject of patient selection, assessment, and connecting those decisions and attributes to outcomes.

"David Selby was an exceptional teacher, a compassionate clinician, and an innovative and pioneering researcher," Dr. Berven told *OTW*. "I consider it a great honor to be recognized by my peers and by the Board of the North American Spine Society with the David Selby Award this year."

"I have participated in the David Selby conference for the past decade, and that event is organized in Dr. Selby's memory, with a focus on critical assessment of new technologies in spine surgery, and interdisciplinary education. The conference extends the legacy of Dr. Selby's teaching to the next generation of surgeons and spine care providers. I am committed to continuing to be guided by Dr. Selby's principles of compassionate care, innovative research. and teaching in my career as a spine surgeon."

OTW asked Dr. Berven about his view of the coming decade in spine care and how his own research and the pace of new technology might change the practice of spine surgery. "In the next decade, the innovation that I think will be truly disruptive to our practice of spine surgery is the application of principles of precision medicine to patient care."

"Our best efforts to pursue an evidence-based approach to the management of spinal disorders remain characterized by uncertainty and significant variation in care patterns. The development of useful algorithms based upon large datasets will empower informed patient choice and guide the appropriate use of non-operative and operative options."

"Payment reform and the transition from fee for service payments models to outcomes-based payment and capitated care will likely be important drivers toward patient-centered appropriate care."

"My career as an academic spine surgeon has been focused on a single practice in a university setting, and that has been terrifically rewarding."

"As I enter the next phase of my career, my focus will remain patient care and surgical management of a broad spectrum of spinal disorders. I will continue to be active in teaching and research, and I look forward to the opportunity to contribute more to new technology and innovation in spine care with academic and industry partnerships." — *EH*

REMEMBRANCES

William S. Bundrick Sr. M.D. Dies at Age 85

William Stewart "Billy" Bundrick, Sr., M.D., 85, a Shreveport, Louisiana orthopedic surgeon and sports legend at more than one of his alma maters, passed away on Tuesday, December 9, 2023.

Dr. Bundrick, a graduate of LSU School of Medicine in New Orleans, began his life-long love of practicing orthopedics and sports medicine in 1964. In 1969, he joined the Bone and Joint Clinic in Shreveport where he served countless patients. Bundrick received many accolades for his life of service including the American Sports Medicine Institute naming its Distinguished Lecture Series in his honor.

He was also selected to the Herodicus Sports Medicine Society that has members from around the world.

"Billy's life was one well-lived in service to others. He was beloved by his family, his many friends, and the many patients and athletes of all ages for whom he provided care over the years," his family wrote.

Dr. Bundrick was born and raised in Shreveport. He graduated from C.E. Byrd High School and then received his bachelor's degree from Louisiana Tech University. He excelled in sports while in school and that started his passion for sports medicine. He played football and baseball in high school and was a member of the 1956 State Championship C.E. Byrd High School baseball team.

In 1996, Bundrick was inducted into the C.E. Byrd Hall of Fame as one of the school's most distinguished alumni. The school also dedicated the Dr. William S. Bundrick Football Field in his honor.

At Louisiana Tech University, he played football and was selected to be the team's co-captain. After his medical training, he returned to the university and served as team physician for over 40 years and was inducted in this school's Hall of Fame as well. The softball field is ALSO named in his honor.

Bundrick was preceded in death by his parents, William Cecil and Dennie Inez Bundrick, his brother, Ray and his wife, Carol Tollett Bundrick. He is survived by his wife of 19 years, Linda Collins Bundrick; and his children, Dr. William Stewart Bundrick, Jr., Margaret B. Davison, John M. Bundrick, Dr. Courtney L. Bundrick and Dr. Karen C. Soul. He also leaves behind his many grandchildren and great-grandchildren. — *TR*

Leonard Alan Goddy, M.D., Dies, Age 90

Leonard Alan Goddy, M.D., an orthopedic surgeon who was a leader of the Louisville Jewish community, and a champion of underserved children, passed away on December 10, 2023, in Louisville.

Goddy, 90, was known for pioneering new medical technologies including the use of the external fixator to treat difficult fractures, lengthen legs, and realign legs and arms. He held orthopedic clinics at Kosair Crippled Children's Hospital on Eastern Parkway and Norton Children's Hospital that served thousands of children.

Goddy graduated from the University of Louisville medical school in 1958 and began his orthopedic practice in 1963. Early in his career he treated many boxers including Muhammad Ali.

He also served as a lieutenant colonel and surgeon at the U.S. Army's 8th Field Hospital in Na Trang, Vietnam. After saving his field command who broke his leg on a parachute jump, Goddy was made an honorary Green Beret, which is a rare honor.

Supporting younger Jewish families was also important to him. As president of Congregation Adath Israel, he led its merger in 1977 with Brith Sholom and oversaw the construction of a new Temple building and pre-school.

After he retired, Goddy served on the Board of Governors of Family Health Centers of Louisville, a not-for-profit center with seven clinical locations which provides primary and preventive care regardless of a person's ability to pay from 2005 to 2018.

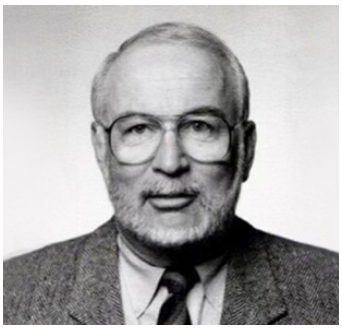
Goddy was born in Pittsburgh, Pennsylvania, and graduated from Taylor Allderdice High School. He received his bachelor's degree from Washington & Jefferson College in Washington, Pennsylvania.

Goddy was preceded in death by his parents, Abe and Jeannette "Shankey" Fineman Goddy; his sister, Carol Tobin Lewis; and his wife, Lynn Francis Cassen Goddy. He leaves behind his loving partner of 10 years, Donna Stone; his children David Goddy; Karen Goddy; Suzanne Weintraub; and his grandchildren Sonya Goddy, Julian Goddy, Alec Palchikoff, and Jordan, Adam and Jillian Weintraub. — *TR*

Henry Michael Bell, M.D., Dies at Age 89

Henry Michael Bell, M.D., a Vancouver pediatric orthopedic surgeon, passed away on November 29, 2023, at the age of 89.

Dr. Bell was born left-handed but was forced in school and throughout his childhood to use his right hand. By the time he entered medical school. Dr. Bell had learned to be ambidextrous. That, and his natural talent as a surgeon, led to his wide-ranging reputation for surgical skill, dexterity, and speed—particularly because he used both his hands equally.



"Stories abound of this legendary talent, with anecdotal evidence to suggest that, if you were in the operating room with him, 'you had better watch your fingers!'" his family wrote.

During his career as a pediatric orthopedic surgeon, he was known for pioneering important programs, among them, a program to screen all newborn children for hip dysplasia.

After earning his medical degree at the University of British Columbia, Bell completed an internship at the Montreal General Hospital and was Chief Resident in Orthopedics at the Children's Hospital Medical Center in Boston.

During his medical training, he also served patients at Radcliffe Infirmary in Oxford and the Princess Margaret Rose Hospital in Edinburgh.

He completed a research fellowship at the Hospital for Sick Children in Toronto before returning to Vancouver.

Bell was born in Vancouver, British Columbia, Canada on September 30, 1964, to Dr. CHC and Elspeth Bell. He attended Prince of Wales Secondary School before commencing his study of medicine at the University of British Columbia. While at UBC, he played rugby. Dr. Bell loved sailing and spending time on Hernando Island. He was predeceased by his wife Lindsey Chambers, his parents and his sister Jan Scott. He leaves behind his daughters, Sarah, Susannah, Kate, and Molly, and his grandchildren, Alexander, Charlotte, Joe, Lola, and Ruby. — *TR*

Denver Based Spine Surgeon. Stephen Pehler, M.D., Dies at Age 39

Stephen Pehler, M.D., a Denver-based spine surgeon passed away on October 9, 2023, at the too-young age of 39.

Pehler had a thriving spine surgery practice in Denver, Colorado, becoming a partner just a year after moving to Colorado.

Dr. Pehler's great goal in life was to become an orthopedic spine surgeon. A gifted student of math and science, he graduated at the top of his high school, university, and medical school classes. He was also an accomplished drummer in high school band and went on to be in the drum line at his alma mater Auburn University.

Over his too short-lived career, Dr. Pehler served a broad range of patients with spinal disorders and was highly regarded by his patients and colleagues alike. His perspectives were sought out by the medical suppliers because, in addition to a sharp mind, he brought innovative thinking to tough spine surgical problems and contributed to advancing the science of spine and orthopedic surgery.

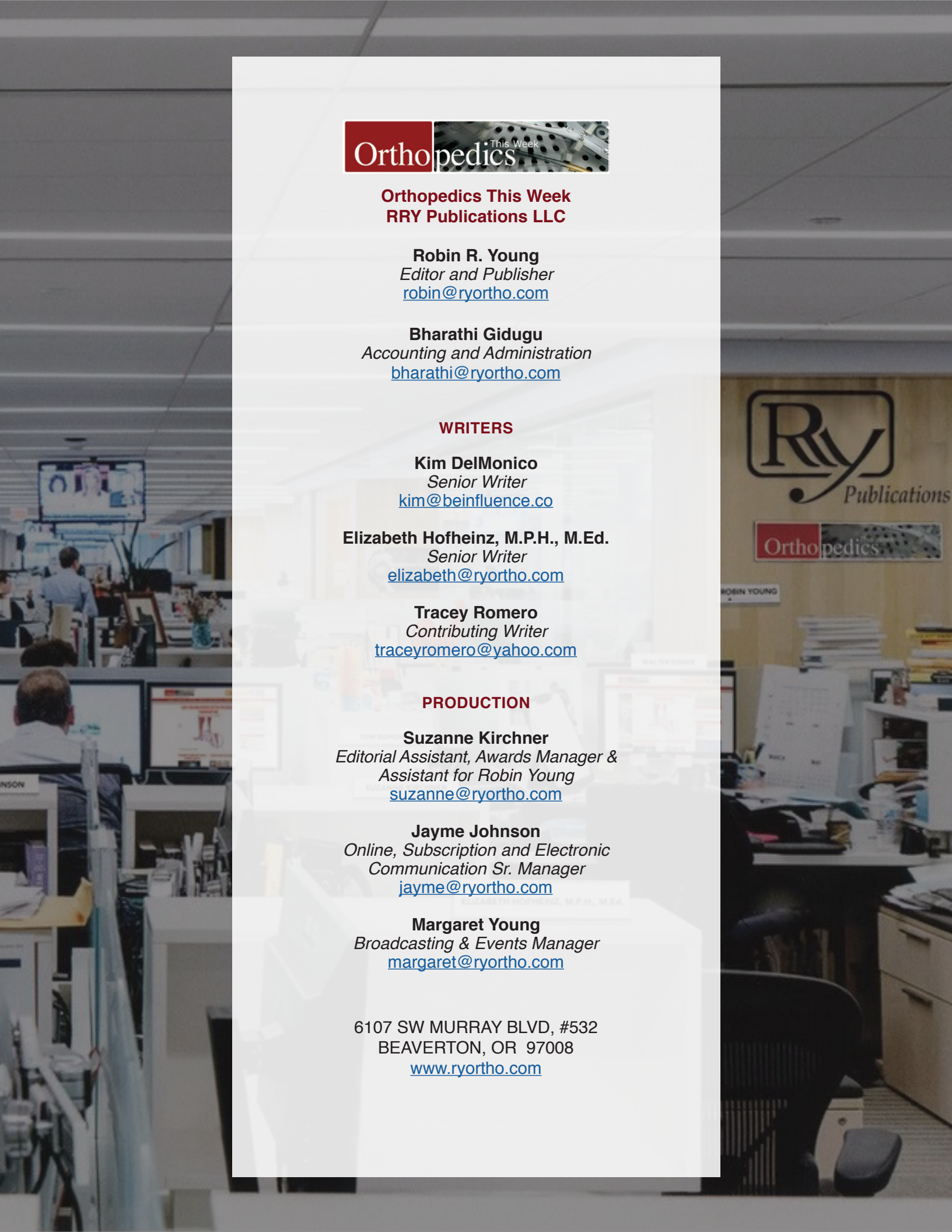
Dr. Pehler earned an undergraduate degree in Biomedical Sciences from Auburn University, then went directly into medical school at University of Alabama, where he was inducted into the AOA medical honors society.

Dr Pehler stayed at the University of Alabama to train in orthopedic surgery at the U of A Birmingham Medical Center.

Dr Pehler then was accepted into the spine surgery fellowship program at arguably the best spine fellowship in the country at the University of Utah in Salt Lake City under the direction of Dr. Darrel Brodke.

Besides his passion for medicine, Pehler, who was born on May 27, 1984, in Port Arthur, Texas, loved music and running—eventually participating in marathons and Iron Man triathlons.

Pehler leaves behind his son Jack, his parents, Frederick and Rebecca and his sister Katie. He also leaves behind his brother-in-law and close friend Anthony and many family members and close friends. — *TR*



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