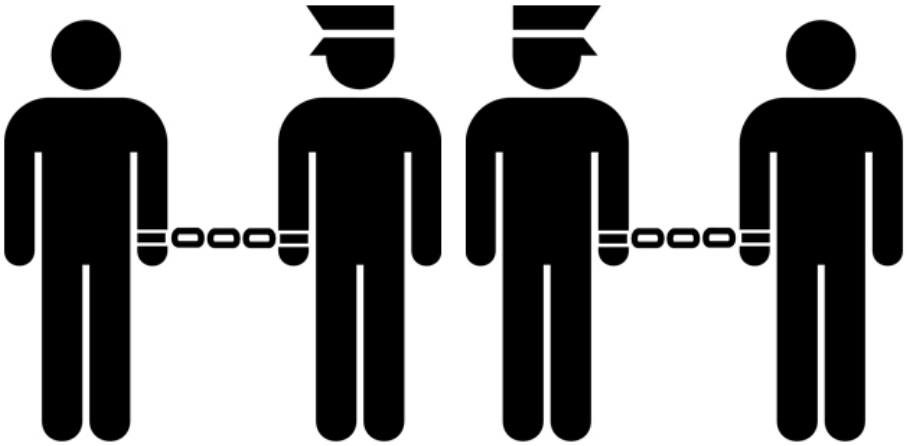
Orthopedics This Week

week in review

4 Former ArthroCare Execs Arrested ♦ Over a three year period, the government says former ArthroCare Corporation senior executives John Raffle and David Applegate inflated publicly reported revenues through fraudulent sales to DiscoCare. On August 22, the federales swooped in and arrested the pair. We've got all the allegations about DiscoCare and SpineWands right here.



9 Maloney vs. Haddad: Out With Metal-Metal Hips? ♦ "We have little indication for metal-metal articulations in total hip arthroplasty," says Bill Maloney. "You can't consider all metal-metal as one," counters Fares Haddad. "You must break it down into large head metal-metal, standard head sizes, and hip resurfacing."

13 100% Sensitive Test for Fracture Risk, New Competition for Level One Trauma Centers, and more… ♦ 100% Sensitive Test for Fracture Risk…Better Football Helmets: Refining Designs for the Littlest Players…New Competition for Level One Trauma Centers Emerging…New Awards Announced…and more.

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OrthoHelix SURGICAL DESIGNS, INC.
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breaking news

16 Researchers Dramatically Expanding **Study of Regenerated Tissues**

Bone Putty Recalled: **Danger of Ignition**

Blackstone Florida Whistleblower Lawsuit Dismissed

FDA Proposes Faster 510(k) Clearance Process

Journal Blasts **Unacceptable Hand Implants**

Medtronic's 1Q 2013: Has Spine Turned the Corner?

Tornier Scoops Up **OrthoHelix**

For all news that is ortho, read on.

Orthopedic Power Rankings

Robin Young's Entirely Subjective Ordering of Public Orthopedic Companies

THIS WEEK: It may be too much to hope for, but the EU is sounding like a decisive moment has arrived. At its core is a bond buying program which would keep borrowing costs in line. If, as appears likely, the Fed also follows through with monetary stimulus, then this new scheme has a real chance of success. Investors could use the good news, for sure.

RANK	LAST WEEK	COMPANY	TTM OP MARGIN	30-DAY PRICE CHANGE	COMMENT
1	1	Medtronic	28.65%	8.16%	Still soft in Spine but other divisions more than made up for it and with a new CEO, MDT has a kind of glow right now.
2	3	Integra LifeSciences	13.36	8.55	Institutional buyers are definitely bullish on IART having bought up a whopping 7.74% of the float in the last 90 days.
3	5	Stryker	23.68	4.82	New CEO on the way? We think so and we think it will be from outside SYK. Indeed, from outside orthopedics.
4	2	Symmetry Medical	5.63	21.28	Who is buying SMA? Sure the sales mix is changing, but profit margins still look like an OEM. Is stock ahead of itself?
5	9	Zimmer	26.37	0.44	Both SYK and ZMH found new buyers last week. Institutional portfolios may be re-calibrating and increasing their ortho weightings.
6	8	Smith & Nephew	21.36	3.13	Down earnings and flat sales. That pretty much sums up Wall Street's view of SNN. Probably moving up in SYK's slip stream.
7	7	Exactech	7.68	2.20	One of the most appealing aspects of EXAC is growth—8% revenue growth this year, same next year.
8	4	Johnson & Johnson	25.40	0.10	JNJ is really the company for people who are long-term greedy. Near-term buying interest has probably run out of steam.
9	6	Orthofix	16.23	2.06	Orthofix remains the least costly company in all of orthopedics. Without a catalyst it will likely remain an attractive bargain.
10	10	ArthroCare	(0.80)	(2.15)	It's becoming ancient history, but reverberations continue from ARTC's old accounting shenanigans.

Robin Young's Orthopedic Universe

TOP PERFORMERS LAST 30 DAYS

	COMPANY	SYMBOL	PRICE	MKT CAP	30-DAY CHG
1	TiGenix	TIG.BR	$0.73	$67	22.37%
2	Symmetry Medical	SMA	$9.46	$346	21.28%
3	RTI Biologics Inc	RTIX	$3.85	$215	13.91%
4	MAKO Surgical	MAKO	$14.61	$624	10.60%
5	Integra LifeSciences	IART	$39.60	$1,071	8.55%
6	Medtronic	MDT	$40.58	$41,596	8.16%
7	Wright Medical	WMGI	$20.18	$800	8.15%
8	CryoLife	CRY	$5.31	$146	6.41%
9	Stryker	SYK	$53.74	$20,445	4.82%
10	Smith & Nephew	SNN	$52.71	$9,465	3.13%

WORST PERFORMERS LAST 30 DAYS

	COMPANY	SYMBOL	PRICE	MKT CAP	30-DAY CHG
1	Tornier N.V.	TRNX	$17.93	$712	-14.58%
2	NuVasive	NUVA	$21.04	$915	-8.20%
3	Bacterin Intl Holdings	BONE	$1.50	$64	-7.98%
4	TranS1	TSON	$2.64	$72	-2.58%
5	ArthroCare	ARTC	$29.18	$809	-2.15%
6	Conmed	CNMD	$26.79	$761	-1.18%
7	Johnson & Johnson	JNJ	$67.60	$186,376	0.10%
8	Zimmer Holdings	ZMH	$61.27	$10,704	0.44%
9	Alphatec Holdings	ATEC	$1.70	$153	0.59%
10	Orthofix	OFIX	$41.19	$781	2.06%

LOWEST PRICE / EARNINGS RATIO (TTM)

	COMPANY	SYMBOL	PRICE	MKT CAP	P/E
1	Medtronic	MDT	$40.58	$41,596	12.01
2	Zimmer Holdings	ZMH	$61.27	$10,704	12.11
3	Johnson & Johnson	JNJ	$67.60	$186,376	13.41
4	Stryker	SYK	$53.74	$20,445	13.81
5	Orthofix	OFIX	$41.19	$781	14.06

HIGHEST PRICE / EARNINGS RATIO (TTM)

	COMPANY	SYMBOL	PRICE	MKT CAP	P/E
1	Wright Medical	WMGI	$20.18	$800	77.62
2	NuVasive	NUVA	$21.04	$915	63.76
3	Symmetry Medical	SMA	$9.46	$346	55.65
4	RTI Biologics Inc	RTIX	$3.85	$215	21.39
5	Exactech	EXAC	$16.74	$222	20.67

LOWEST P/E TO GROWTH RATIO (EARNINGS ESTIMATES)

	COMPANY	SYMBOL	PRICE	MKT CAP	PEG
1	Orthofix	OFIX	$41.19	$781	0.92
2	ArthroCare	ARTC	$29.18	$809	0.94
3	Zimmer Holdings	ZMH	$61.27	$10,704	1.26
4	Stryker	SYK	$53.74	$20,445	1.32
5	Conmed	CNMD	$26.79	$761	1.41

HIGHEST P/E TO GROWTH RATIO (EARNINGS ESTIMATES)

	COMPANY	SYMBOL	PRICE	MKT CAP	PEG
1	Wright Medical	WMGI	$20.18	$800	8.03
2	NuVasive	NUVA	$21.04	$915	6.24
3	Symmetry Medical	SMA	$9.46	$346	4.64
4	CryoLife	CRY	$5.31	$146	4.43
5	Smith & Nephew	SNN	$52.71	$9,465	3.74

LOWEST PRICE TO SALES RATIO (TTM)

	COMPANY	SYMBOL	PRICE	MKT CAP	PSR
1	Alphatec Holdings	ATEC	$1.70	$153	0.77
2	Symmetry Medical	SMA	$9.46	$346	0.96
3	Conmed	CNMD	$26.79	$761	1.05
4	Exactech	EXAC	$16.74	$222	1.08
5	CryoLife	CRY	$5.31	$146	1.22

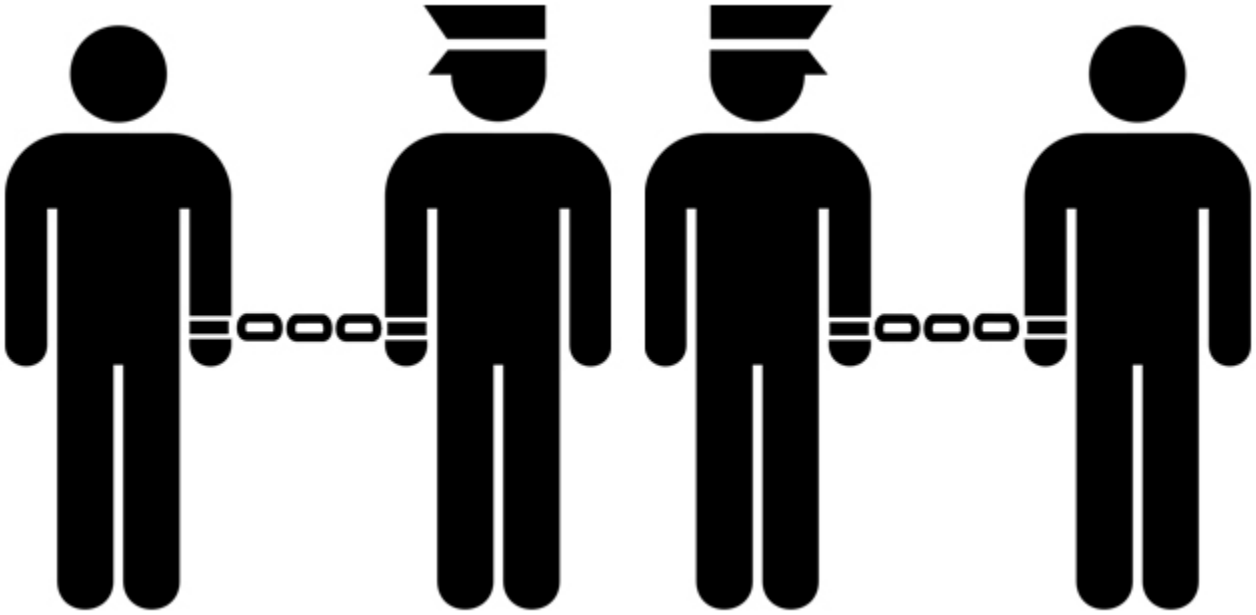
HIGHEST PRICE TO SALES RATIO (TTM)

	COMPANY	SYMBOL	PRICE	MKT CAP	PSR
1	TiGenix	TIG.BR	$0.73	$67	58.15
2	MAKO Surgical	MAKO	$14.61	$624	7.38
3	Globus Medical	GMED	$14.66	$1,314	3.96
4	TranS1	TSON	$2.64	$72	3.76
5	Johnson & Johnson	JNJ	$67.60	$186,376	2.87

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

Former ArthroCare Execs Arrested

By Walter Eisner



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On the morning of August 22, 2012, federal agents in Orange County, California and Morristown, New Jersey, arrested John Raffle and David Applegate on 16-count indictments for cheating investors.

Raffle and Applegate were both former senior vice presidents of Austin-based ArthroCare Corporation. Call it Rafflegate.

According to an August 22 U.S. Department of Justice (DOJ) press release, the pair allegedly schemed to defraud the company's shareholders by falsely inflating ArthroCare's earnings by tens of millions of dollars. The government says the loss to shareholders was more than $400 million.

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Conspiracy, Wire, Mail and Securities Fraud Charges

Both men were charged with one count of conspiracy to commit wire, mail and securities fraud; four counts of wire fraud; eight counts of mail fraud; and three counts of securities fraud. The indictment also seeks forfeiture of assets held by Raffle and Applegate.

The indictment charges that between December 2005 through December 2008, Raffle and Applegate inflated ArthroCare's sales and revenues through a series of end-of-the quarter transactions involving several of the company's distributors. We detail some of those transactions below.

"Parking" Devices

According to court documents, Raffle and Applegate determined the type and amount of product to be shipped to distributors based on the company's need to meet Wall Street analyst forecasts, rather than distributors' actual orders.

Raffle, Applegate and others then allegedly caused ArthroCare to "park" millions of dollars of medical devices at its distributors at the end of each relevant quarter. ArthroCare would then report these shipments as sales in its quarterly and annual filings at the time of the shipment, enabling the company to meet or exceed internal and external earnings forecasts.

According to the indictment, ArthroCare's distributors agreed to accept shipment of millions of dollars of product in exchange for substantial, upfront cash commissions, extended payment terms and the ability to return product, as well as other special conditions, allowing ArthroCare to inflate falsely its revenue by tens of millions of dollars. ArthroCare did not disclose the conditions of the purported sales to investors.

The indictment further alleges that Raffle, Applegate and others used DiscoCare, a privately owned Delaware corporation, as one of the distributors to cover shortfalls in ArthroCare's revenue. According to the indictment, ArthroCare, at Raffle and Applegate's direction, shipped product to DiscoCare that far exceeded DiscoCare's needs.

$37 Million Phantom Sales

According to court documents, between the fourth quarter of 2005 and the fourth quarter of 2007, ArthroCare reported more than $37 million in revenue in its publicly filed financial statements based on purported sales to DiscoCare. However, during the same time period, DiscoCare's actual net cash payments to ArthroCare for the products were less than $50,000. Court documents further allege that, to conceal the fact that DiscoCare owed ArthroCare a substantial amount of money on unused inventory, Raffle and Applegate caused ArthroCare to acquire DiscoCare on December 31, 2007.

In the third quarter of 2007, according to the indictment, Raffle and Applegate began a new program at ArthroCare, called "Son of DRS." Under the Son of DRS program, ArthroCare allegedly shipped medical devices from its sports division to its customers free of charge and recorded the revenue once DiscoCare had been invoiced for the product. According to court documents, DiscoCare never was required to pay ArthroCare for any of the product DiscoCare purportedly purchased because ArthroCare acquired DiscoCare before any payments came due.

The indictment further alleges that Raffle and Applegate caused ArthroCare to falsely report more than $7 million in revenue in its publicly filed financial statements based on purported sales to DiscoCare under this program.

$400 Million Share Loss

Between December 2005 and December 2008, ArthroCare's shareholders held more than 25 million shares of company stock. On July 21, 2008, after announcing that the company would be restating its previously reported financial results from the third quarter 2006

through the first quarter 2008 to reflect the results of an internal investigation, the price of ArthroCare shares dropped from $40.03 to $23.21 per share, an immediate loss in shareholder value of more than $400 million.

The arrests of Raffle and Applegate follow an announcement on November 28, 2011 that ArthroCare reached an agreement in principle to settle a private securities class action lawsuit filed by former shareholders. The settlement called for a $74 million settlement fund.

Start of Alleged Conspiracy

According to a June 2011 lawsuit filed by the Securities and Exchange Commission (SEC) against Raffle and Applegate, sales in ArthroCare's spine unit were stagnant in 2004 because health insurers were beginning to cut reimbursement for the unit's primary device, the SpineWand.

There was one customer however, whose sales increased. That customer, the Palm Beach Lakes Surgery Center (PBLSC), allegedly had a unique arrangement with a local personal injury law firm whereby they would provide wands and treatment to the firm's clients in return for assignment of rights in subsequent settlements with the liability insurers. PBLSC allegedly invoiced the law firm for the wand and associated medical services, which the law firm then used as part of settlement negotiations with liability and worker's compensation insurers. When the insurer settled, PBLSC got paid.

This arrangement, according to the SEC complaint, allowed PBLSC to move a high volume of SpineWands while circumventing reimbursement restrictions.

Birth of DiscoCare

The SEC says PBLSC's founders hoped to replicate this success on a broader scale and, with Applegate's assistance, founded DiscoCare. DiscoCare then allegedly hired a former top ArthroCare salesman and a number of other former ArthroCare employees to help run the company. Some remained on ArthroCare's payroll and insurance benefits program. DiscoCare also shared office space with an ArthroCare branch office, which was DiscoCare's only supplier.

The first distributor agreement between the two companies was executed on December 23, 2005, with an initial stocking order of $975,000. Because the sale was not contingent upon DiscoCare's ability to resell the devices or obtain collection, ArthroCare recorded the revenue immediately upon shipment.

Meeting Quarterly Projections

That order was ArthroCare's largest order of that quarter, by far, and allowed, according to the SEC, ArthroCare to meet is Q4 2005 revenue expectations. Raffle refused requests by ArthroCare finance personnel to check DiscoCare's background and credit and instead, gave DiscoCare lengthier payment terms than usually afforded to distributors.

Then the next quarter came along and ArthroCare realized it would fall short of Q1 2006 revenue projections. Because collections under DiscoCare's arrangement with the law firm were taking much longer than expected, the SEC says DiscoCare lacked cash to pay for any future orders, as well as for the initial stocking order which DiscoCare had not yet paid for.

Yet, ArthroCare expanded DiscoCare's territory and Raffle and Applegate alleg-

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edly asked DiscoCare to place another $975,000 order. DiscoCare agreed and ArthroCare reached its revenue target for Q1 2006.

The day before the end of the following quarter (Q2 2006), Raffle and Applegate asked DiscoCare to place a $500,000 order. The day after the quarter closed, the SEC alleges that Raffle realized ArthroCare really hadn't needed the previous order and decided to "move" half of the $500,000 order to the third quarter.

New DiscoCare Agreement

In November 2006, ArthroCare and DiscoCare executed a new distributor agreement whereby DiscoCare would receive a "monthly service fee." ArthroCare then credited half of the monthly service fee to pay for DiscoCare's outstanding receivable balance.

The new agreement, claims the SEC, also changed how ArthroCare recognized revenue from DiscoCare. Originally, ArthroCare recognized sales upon shipment of product to DiscoCare. Under the new arrangement, revenue was recognized only after the surgery had been performed.

Almost immediately, says the SEC, ArthroCare sought to circumvent this new requirement. With less than two weeks left in 2006, Raffle needed to find $2 million in revenue to meet the annual sales target. "As usual," said the SEC, "Raffle and Applegate looked to DiscoCare." But there wasn't enough time to complete $2 million worth or surgeries by year end. So, the duo convinced ArthroCare accounting personnel to record the sales as 2006 revenue on the assurance that the cases would be completed by the following quarter. They also negotiated a retroactive 10% price increase, increasing the company's total revenue by 1%.

There are further SEC allegations. We don't have space to note them all, but you get the picture.

ArthroCare Acquires DiscoCare

During the second half of 2007, the company realized that DiscoCare's accounts receivable balance had ballooned to $13 million (or 19% of ArthroCare's total accounts receivable) and the duo wondered if "this may force our hand [with regard to] buying them out early." So ArthroCare acquired DiscoCare, effective December 31, 2007. The acquisition would eliminate the receivables, but not erase prior sales.

Double Booking

"Raffle and Applegate, however, were not content with this outcome," stated the SEC complaint.

Before completion of the acquisition, Raffle and Applegate allegedly

Morguefile and mensatic

approved shipment of $1.5 million in SpineWands to DiscoCare. They then asked DiscoCare to delay selling the wands until after the acquisition was closed. Now ArthroCare could book the same sales twice. They also expensed the marketing fee, allowing, claims the SEC, ArthroCare to inflate revenue by $4.5 million.

As a result, the SEC claims ArthroCare overstated revenue by $19.3 million in 2006, $39.5 million in 2007, and $13.5 million in Q1 2008. They also overstated net income by $4.0 million in 2006, $42.7 million in 2007, and $7.0 million in Q1 2008.

David Applegate has a LinkedIn profile that says he had global profit and loss responsibility for the spine business unit and directly managed marketing, sales and R&D functions.

"In 2004, Spine sales were approximately $13 [million per year] and declining. I repositioned the product line as a highly profitable practice builder for orthopedic spine and neurosurgeons. I focused sales and product development efforts towards surgeons and away from interventional pain physicians. In addition, I implemented an innovative reimbursement model that was highly successful. Subsequently, Spine business unit sales nearly tripled over a three year period to $37 million in 2007 at a standard gross margin of [approximately] 95%," states his profile.

The SEC said the duo misled ArthroCare accounting staff and outside auditors about details of some of the DiscoCare arrangements.

In July 2011, the two former company executives settled inventory and sales-manipulation allegations with the SEC without admitting wrong-doing related to manipulation of ArthroCare's stock.

Raffle agreed to pay $175,000 of the $2.1 million that a court ruled he was liable for in profits and interest while Applegate agreed to pay $55,000 of the $728,224 for which a court ruled that he was liable. Both men reportedly agreed not to work as corporate officers for five years, and to cooperate in any future investigations related to the case.

ArthroCare Pledges Full Cooperation

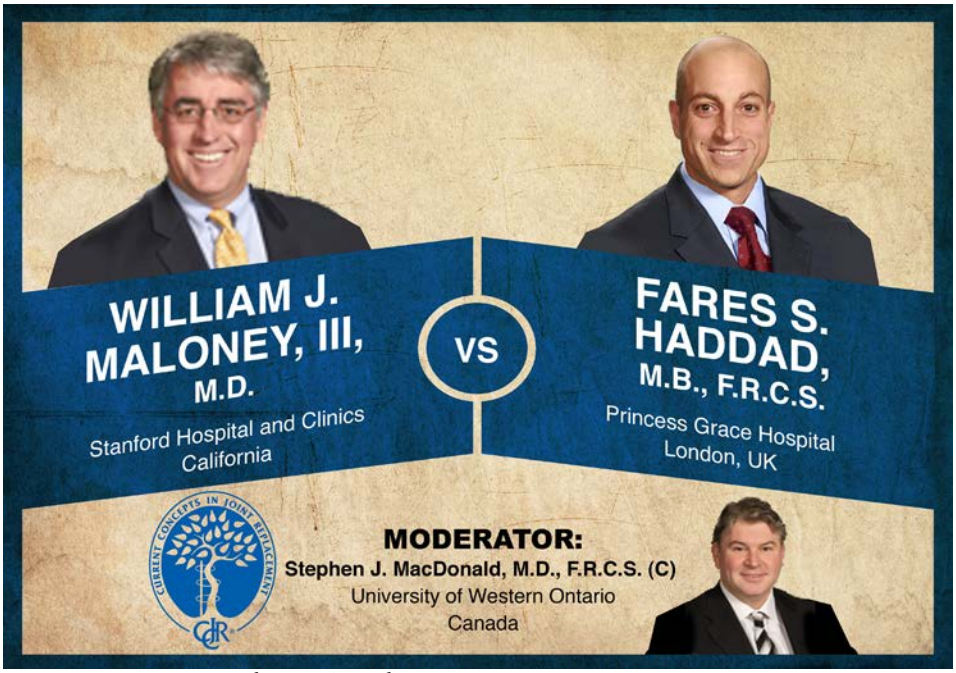
ArthroCare's current President and CEO David Fitzgerald has been in his position since 2009.

His office provided us with the following statement for this story: "We are aware of the recent indictment of two former ArthroCare executives. The DOJ investigation concerning the company is still ongoing and indictment of these two former executives does not change that fact. The Company will continue to provide its full cooperation to the DOJ in its ongoing investigation, as we have done since the inception of the investigation."

Raffle and Applegate could face a maximum prison sentence of five years for the conspiracy charge and 20 years for each count of mail and wire fraud. They also face a maximum sentence of 25 years in prison for each securities fraud count. ♦

Maloney vs. Haddad: Out With Metal-Metal Hips?

By Elizabeth Hofheinz, M.P.H., M.Ed.



Current Concepts in Joint Replacement/RRY Photo Creation

"Based on the data we have today there's little indication for metal-metal articulations in total hip arthroplasty," says Bill Maloney. "You can't consider all metal-metal as one," counters Fares Haddad. "You have to break it down into large head metal-metal, standard head sizes, and hip resurfacing."

This week's Orthopaedic Crossfire® debate is "Metal-Metal Hip Arthroplasty: Going, Going, Gone." For the proposition was William J. Maloney, III, M.D. from Stanford Hospital and Clinics in California. Against the proposition was Fares S. Haddad, M.B., F.R.C.S. of Princess Grace Hospital in London, UK; moderating was Steven J. MacDonald, M.D., F.R.C.S.(C).

Dr. Maloney: "Remember where we were in the '90s. Osteolysis was a terrible problem in conventional polyethylene in young patients; and we were having significant problems with fixation, at least in North America, with cemented femoral components."

"The goal was to reduce the particle load by reducing the wear volume. The hypothesis was that if you did that, you'd reduce the incidence of osteolysis and aseptic loosening; it's being tested and we have data now. Femoral component fixation is essentially solved with multiple cementless designs; we have 10-year data with new bearings, and we're seeing unique complications, especially with metal-metal articulations."

"These include adverse tissue reactions that can be simple foreign body reactions, toxicity secondary to cell necrosis, and hypersensitivity, and some cases of systemic toxicity (cobaltism). An Oxford article identified 17 patients, 20 hips, all women with pseudotumors—a reaction to cobalt and chromium particles, ions, and maybe corrosion products. These were all resurfacing patients, not large head metal on metal; they were associated with extensive necrosis, lower Oxford Hip scores, and higher serum cobalt levels."

"Take the case of a 65-year-old man who was four years post metal-metal hip resurfacing as part of an IDE [investigational device exemption] study. His cell count is low, whereas the cell count in infection is quite high. Histology: a combination of lymphocytic infiltration and fibrosis and tissue necrosis with the characteristic pattern…much different than what you see with polyethylene, titanium, or bone cement. When you're revising these the outcomes are not as good as typical revisions, especially when you're looking at revisions of failed surface replacements for femoral neck fracture."

"Large head metal-metal is an even bigger problem. In a patient that had bilateral large head metal-metal total hip arthroplasty…the pseudo tumor grew up the iliopsoas tendon sheath, up the iliac crest, displacing the bladder medially."

"Data from Keith Berend and Adolph Lombardi: they did almost 1,800 metal-metal total hip replacements. They had a 5% failure rate at 31 months; 3% were related to cup failures, they now have data at 43 months and that failure rate is up to 7%. They have stopped doing metal-metal."

"The large head metal-metal is more prone to this reaction than the small head metal-metal, but we have seen it with small heads. We did serial dilutions with cobalt and chrome versus titanium. If you look at the difference, titanium is inflammatory; the cells ingest the particles and release bone resorbing cytokines at the same particle concentration—cobalt is toxic and kills the cells."

"We have seen systemic toxicity; a Stanford patient, for example, probably has cobaltism, and there are some case reports in the literature of these patients having cardiomyopathy, cognitive impairment, auditory impairment, peripheral neuropathy, hypothyroidism and rashes. If you look at 2009 data from the Australian registry with head size less than or equal to 28mm, adjusted for age and gender… the metal-metal has a significantly higher failure rate than the other bearings. If you look at the larger heads the difference is even greater. 2011… all comers with different bearing surfaces…you see that the metal on highly cross-linked polyethylene (HCLP), ceramic on HCLP, ceramic on ceramic are all about the same. The metal-metal has a significantly higher failure rate; at about eight years the failure rate is about 8%—about double the failure rate of the other bearing surfaces."

"When you get into the large heads it's really a problem with the metal-metal… the failure rate rises significantly and you have a much higher rate of socket loosening and metal hypersensitivity or adverse local tissue reaction in the English and Wales registry, looking at survivorship and combining both fixation and bearing surface. The highest failure rate was large head metal-metal; second highest was metal-metal; at five years you've got almost a 10% failure rate with a large head metal-metal."

"Based on the data we have today there's little or no indication for metal-metal articulations in total hip arthroplasty."

Mr. Haddad: "The registry data is certainly worrying; the Medical Health Related Device Agency has told us that there are concerns about these cases."

"The use of large head metal-metal has decreased dramatically in the UK. But you have to break it down into large head metal-metal, standard head sizes, and hip resurfacing. Large head metal-metal is flawed…we're seeing black fluid in joints, soft tissue destruction, femoral osteolysis, and bony destruction on both sides of the joint. We have decreed in the UK that we should no longer perform large head metal-metal 36mm or above, except in a properly conducted and ethically approved research study."

"Standard head sizes? Migaud's prospective randomized study showed no difference or slight improvement with metal-metal. Kim…99.1% [survivorship] at six years. Grubl et al.…98.6% at 10 years. There are other studies like this…and there is still an argument for maintaining small head metal-metal, or at least not tarring it with the same brush."

"The issue becomes much greater with resurfacing. We know that the early results of hip resurfacing in appropriate centers when well-done were staggering. If we select the patients appropriately, it's much better in young males with large heads. In the Australian registry—under 55s—the outcomes of the BHR [Birmingham Hip Resurfacing] are better than those of total hip replacement. If you look at all comers in the UK for the resurfacings that had an ODEP 10A [Orthopaedic Data Evaluation Panel] rating, you'll see that those satisfy our criteria for 10 year survivorship."

"High volume people—someone like Ronan Treacy—his data with the removal of the septic cases at 10 years in the under 50s are 0%—100% survival. So there's got to be something to work with here. There's a higher failure rate when we extend the indications to women, those over 65, and to inflammatory arthritis, AVN [avascular necrosis] or DDH [developmental dysplasia of the hip]."

"We did a comparative study that started over 10 years ago looking at resurfacing and comparing cementless hip replacement. These were resurfacings of all sizes. Inclination and anteversion: the BHRs and THRs [total hip replacement] have pretty similar positions. We found that the hip resurfacings had better Oxford, UCLA, and Satisfaction Scores early, but then in the standard hip scoring systems that have a ceiling effect we found no difference beyond one year."

"When we probed further—looking at their single leg stance, hopping, stair climbing, we found differences. We haven't lost any patients to follow-up; we haven't seen any aseptic failures or osteolysis. There is a bit of neck narrowing, but they are doing well. If we look at function score at 10 years there's a statistically significant difference between the hip resurfacings and the hip replacements."

"In summary, there's no doubt we've got new clinical problems. But there's a danger that we could throw out the baby with the bathwater. Right now, large head metal-metal is out. With standard head metal-metal I wouldn't suggest you take it up, but we should continue to study it. Although hip resurfacing isn't for everyone, it works well in the right patient in a well carried out operation."

Moderator MacDonald: "I think we agree that all metal-metal isn't created equally, but that message seems to be lost…how do you turn that around?"

Mr. Haddad: "I think it all goes back to how you look at technology, how you introduce implants. We have an ODEP rating, so it's whether an implant has lasted the test of time in small studies in regulated cohorts. If an implant has a good 10 year survivorship, it doesn't matter what bearing it is then we can use it. We should be careful with 'me too' products, very careful not to translate."

Moderator MacDonald: "Did you help draft the British Hip Society statement?"

Mr. Haddad: "I did."

Moderator MacDonald: "Bill, the Australian registry says for young males—55 up to 65—metal-metal seems to be slightly better at this point in this time. What are your thoughts and does that sway you?"

Dr. Maloney: "Those graphs are pretty close together. It's not the same difference that you see with a large head metal-metal, and I think it's a risk/benefit analysis with the data you have at the moment. Maybe the outcomes are a bit better in terms of revisions. If you want to hop around on one leg a lot, resurfacing is a good operation. You've got to look at the operation in Fares' hands, who is meticulous about it and the difference in releasing it to the community where patients don't come in for follow-up."

Moderator MacDonald: "Do you agree?"

Mr. Haddad: "The first big paper everybody quotes was in the under 55s and everybody thought he was crazy…why is he looking at this high end population, active patients. But it's when we extend the indications that the problems start."

Dr. Maloney: "Steve, remember that these metal ions are going to hang around. What happens when the 55 year old is 70 and their creatinine goes from 1.2 to 3? Now their ion level is going to go up and the tissue concentration is going to go up, so I think the 10-year results are great, but they're not going to tell the whole story. In fact, Keith Berend and Adolph Lombardi have 10 year results on their smaller head metal on metal that were originally doing well and now they're seeing soft tissue reactions 10 years later."

Moderator MacDonald: "Tell the audience…how many resurfacings should they be doing to maintain their skills?"

Mr. Haddad: "You must be able to do the operation well. It's definitely more difficult than doing a hip replacement. I couldn't give you a certain number."

Moderator MacDonald: "How much time do you have to spend with patients talking about this before you operate? How much detail do you get into about the complications?"

Mr. Haddad: "Most of them have read the press so they're attuned to that idea. You just have to give them the pros and cons, give them your data and ultimately they make the choice. It's a 10-15 minute longer conversation than it is with a standard bearing."

Moderator MacDonald: "Bill, a lot of metal-metals were done in your area. Have you seen an increasing number of referrals to you with the complications now?"

Dr. Maloney: "We thought this was going to be an early complication based on the Oxford data, but we're actually seeing it five to seven to ten years out… and the smaller head metal-metals seem to present later. So if you look at the 10 year plus data we're seeing some of the 28mm Metasuls with soft tissue reactions that are adverse."

Moderator MacDonald: "Thank you, gentlemen." ♦

Please visit www.CCJR.com to register for the 2012 CCJR Winter Meeting, December 12 - 15 in Orlando, Florida.

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100% Sensitive Test for Fracture Risk, New Competition for Level One Trauma Centers, and more…

By Elizabeth Hofheinz, M.P.M., M.Ed.

Trauma in Flux? Dr. Robert Probe, president of the Orthopaedic Trauma Association (OTA) tells OTW, "It seems that the market is shifting such that whereas most of the volume in trauma traditionally went to level one inner city hospitals, more and more community hospitals are trying to step into that business. The concern is that we don't have an integrated, thoughtful system to support this trend. Only a few places in the country—like Shock Trauma in Maryland—have a state level plan for the diversion of major trauma. Then there is Chicago, where every hospital is pining to be a level one trauma center…so there is a dilution effect… and that is not an efficient way to spend resources."

"What does this mean for patient care? On the surface the fact that care would be closer to home is appealing; one of the maxims of trauma care is that patients have access to a major level one trauma center within an hour of the injury location. The downside is that if there are too many trauma centers that means that no one surgeon is doing enough trauma to maintain a high level of care. This is especially true given that trauma injuries are going down. The OTA can't and doesn't want to get into the business of restricting the number of trainees…our role is to help maintain the quality of fellowships. There are some responsible programs that are ahead of the game and are voluntarily reducing the number of trainees—but not many."

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Football Helmets: Refining Design for the Littlest Players Adam Bartsch, Ph.D. P.E. is the director of the Head, Neck & Spine Research Laboratory at Cleveland Clinic Center for Spine Health. Along with Edward Benzel, M.D., chairman of the department of neurosurgery at Cleveland Clinic, Dr. Bartsch is working on ways to reduce head, neck and spine injuries in young athletes with current interest in youth football. They are embarking on a three year project, which is funded by a grant from the Orthopaedic Research and Education Fund (OREF).

Dr. Bartsch tells *OTW*, "Dr. Benzel and I are spearheading an effort to understand the link between the orthopedic and neurosurgical aspects of head, neck and spine injuries. The fact is that children are wearing football helmets that are designed for adults. We can't treat kids as 'little adults,' and we hope to learn how we could alter the design of these helmets for kids. In our preliminary work we found that a seven-year-old child who weighs 50lbs was wearing a helmet that weighed 4 pounds. We have also seen kids place their facemask on their sternum during practice

because the helmet is too heavy to continuously lift and look straight ahead. It is obvious that youth helmets are 'little adult' helmets shrunken slightly to fit onto the child's head and not designed to the child's unique orthopedic or neurological development. We just don't know exactly what influence on head, neck and spine injury risk the heavy helmet has on little kids with big heads and skinny necks."

"We now have a clinical and engineering team working together and are measuring neck strength, range-of-motion and anthropometry in child players. At this point we have collected preliminary data and are in the process of going through the IRB [institutional review board] to conduct the next study phase under the OREF grant. Additionally, we are scanning helmets in our CT machine and doing crash test experiments. We'll be segmenting out the padding shell from the facemask so we can do experiments in the lab, either 'virtual experiments' done on the computer or in physical experiments by smashing helmets and crash test dummy heads. Our hope is that through this vigorous scientific investigation we may eventually make recommendations on youth helmet designs, including mass, center of gravity, moment of inertia and impact protection, as a function of player age. We hope at the conclusion of this work that child football players will no longer be wearing 'little adult' helmets."

Revolutionary New Way to Assess Fracture Risk Ara Nazarian, Dr.Sc., instructor in orthopaedic surgery at Harvard Medical School and Beth Israel Deaconess Medical Center is the recipient of a Prospective Clinical Research grant from the Orthopaedic Research and Education Foundation. He tells *OTW*, "We set out to address the issue of establishing a scientifically accurate and rigorous way to assess fracture risk in patients with skeletal metastasis. Our study, 'CT-based Prediction of Metastatic Fractures' offers a new approach, as current clinical guidelines based on radiographic data have proven to be inaccurate. We have employed basic engineering principles, essentially treating bone as a simple beam, to measure changes in bone density and geometry resultant from skeletal metastasis or any other local or systemic musculoskeletal pathologies. The idea is to calculate changes in axial, bending and torsional rigidities of bone to figure out whether the rigidity of bone has been reduced sufficiently enough to warrant prophylactic treatment, is it enough to simply maintain observation and non-invasive therapy."

"Our technique, called CT-based Rigidity Analysis (CTRA), can be used to upload a patient's CT data and run a 20 minute analysis on a regular laptop to inform us of the degree of reduction in any bone's rigidity when compared to the contralateral bone or the same bone form a healthy patient of the same age, sex and physical condition. To that end, the treating physician can inform the patient of the specific percentage of reduction in the bone's load bearing capacity compared to its healthy state, and whether this reduction falls below the threshold that warrants surgical stabilization. We think that this approach provides treating physicians with a scientific approach to help them make sound clinical decision. For instance, the specificity of current clinical guidelines to assess appendicular fracture risk is less than 35%, meaning that the strict application of these criteria will result in unnecessary surgeries in two-thirds of cases. There are also conflicting reports on sensitivity and specificity of these criteria in different anatomical sites and among different specialties, which emphasizes the need for a more objective and precise clinical tool to assess fracture risk in metastatic lesions. Our latest study of patients with appendicular metastasis has revealed that CTRA is 100% sensitive, 90% specific and 91% accurate to predict fracture risk in this population. This is in contrast to the currently used method, which is only 71% sensitive, 50% specific and 52% accurate."

Daniel Osei, M.D. and Aaron Chamberlain, M.D. Join Washington University There are two new assistant professors in the department of orthopedics at Washington University in St. Louis. **Dr. Daniel Osei** performs surgery of the hand, wrist and elbow, as well as microsurgical reconstruction of the upper and lower extremity, including free tissue transfer. He received his medical degree from the University of Pennsylvania and did a surgical internship at the New York Presbyterian-Weill Cornell Medical Center. He then did a residency at the Hospital for Special Surgery, followed by a fellowship in orthopedic reconstructive microsurgery as a visiting fellow at Chang Gung Memorial Hospital in Linkou, Taiwan. He then completed fellowship training in orthopedic hand and upper extremity surgery at the Lindenhofspital in Bern, Switzerland, as well as Washington University in St. Louis. **Aaron Chamberlain, M.D.** is a shoulder and elbow surgeon, and received his medical degree at the University of California San Francisco School of Medicine. He completed his residency in Orthopaedic Surgery and Sports Medicine at the University of Washington Affiliated Hospitals, and his fellowship in shoulder and elbow surgery at Washington University School of Medicine, Department of Orthopaedic Surgery. ♦

company

Tornier Scoops Up OrthoHelix

Tornier N.V. is acquiring OrthoHelix Surgical Designs, Inc. for $135 million plus additional payments over two years, based on revenue milestones.

Tornier made the announcement of the definitive merger agreement in an August 24, 2012, press release.

OrthoHelix develops and market specialty implantable screw and plate systems for the repair of small bone fractures and deformities predominately in the foot and ankle. Tornier focuses on extremities.

According to a company press release, OrthoHelix's sales for the calendar year 2012, which are all based in the U.S., are projected to reach approximately $29 million, an increase of over 30% compared to 2011. The addition of OrthoHelix is expected to more than double Tornier's lower extremity revenue and allow Tornier to increase its focus on foot and ankle surgeons.

Douglas Kohrs, Tornier's president and chief executive officer, said the transaction will enable the company to, "substantially expand our sales coverage of foot and ankle surgeons, significantly enhance our addressable lower extremity market opportunity, and position us to achieve more consistent growth across our upper and lower extremity product categories."

OrthoHelix's leading product is its MaxLock Extreme small bone screw and plate systems featuring proprietary anatomic contouring, low profile, and multiplanar fixation. "The combination of OrthoHelix's broad line of plate and screw systems with Tornier's ankle arthroplasty, biologics, and other foot and ankle implants is expected to create one of the broadest product and technology offerings to lower extremity surgical specialists in the orthopedic industry. In addition, Tornier plans to utilize its strong international distribution channel to accelerate OrthoHelix's geographic expansion beyond its current sales base in the U.S.," stated the company announcement.

Tornier N.V. and OrthoHelix Surgical Designs, Inc.

Under the terms of the agreement, Tornier has agreed to acquire OrthoHelix for $135 million, which will consist of $100 million in cash and $35 million in Tornier's stock. Tornier intends to use cash on hand and borrowings to pay for the acquisition. Upon closing, the transaction is expected to be dilutive to Tornier's 2013 earnings per share, excluding amortization and stock compensation expense, and acquisition and integration related charges, or cash earnings per share, but accretive to its cash earnings per share in 2014.

OrthoHelix will continue to operate under the OrthoHelix name, retain all of its product brand names in the market, and customers will continue to be served by OrthoHelix and their distribution partners. Central operations of the OrthoHelix business will remain based in Medina, Ohio, as will its 80 dedicated employees.

BMO Capital Market analysts Joanne Wuensch said the acquisition logic appears sound, with management looking to build the No. 1 extremities franchise in the world. She observed that OrthoHelix has almost no overlap in its distribution partners with Tornier, just 20% overlap in its customers, and zero revenue outside the U.S., providing the opportunity to drive revenue synergies and its global footprint.

Wuensch said the resulting size and scope of the combined companies will allow further specialization, with more reps dedicated to either the upper or lower extremities areas, creating a dedicated lower extremity effort. She said the price seemed a "bit high," but not too far above the average for high-growth medtech companies.

—WE (August 24, 2012)

Medtronic's 1Q 2013: Has Spine Turned the Corner?

Medtronic, Inc. reported a $4 billion dollar quarter on August 21, 2012. That's up 2% on a reported basis over last year. Analysts credited strong coronary stent sales as a major contributor to the overall sales gain.

Restorative therapies group sales, which include spine, neuromodulation, diabetes and surgical technologies, rose 3% to $1.893 billion.

Reported spine revenue was down 5% to $786 million. Biologics, a low margin line for the company, dropped 19%, while core spine was only down 1% on a reported basis.

Medtronic Spine 1Q13	Sales $ in million	% Change*
Total Reported Sales	**$786.0**	**down 5%**
Core Spinal	$645.0	down 1%
Biologics	$141.0	down 19%

Source: Medtronic, Inc.

Core Spine Improving

The company said the core spine business was improving (it was down 3% last quarter) as new products reached greater scale and new procedural innovation drove increased surgeon interest.

On a call with analysts on August 21, company President and CEO Omar Ishrak said spine sales were showing signs of stability in a flat U.S. market. "The business seems to be turning a corner," said Ishrak. Even the big drop in biologics was stable sequentially.

During the call analysts noted it was the best spine performance in some time. Ishrak attributed the stabilization to synergies with capital equipment purchases by hospitals and strong surgeon interest in new products, particularly the company's CD Horizon Solera Spinal System released in 2011. The system is integrated with Medtronic's surgical navigation and imaging systems and neuromonitoring system. Ishrak said he expected to see the company begin to take market share as new products are introduced at the North American Spine Society (NASS) meeting in Dallas in October and, hopefully, FDA approval is received for the Bryan cervical disc.

Mike Matson, analysts with Mizuho Securities observed that while Medtronic lost share in spine overall, it held share if you excluded BMP [InFuse] sales.

Wells Fargo analyst Larry Biegelsen said he thinks there is some near-term risk from two spine studies expected soon, including the Yale InFuse study and a study comparing kyphoplasty to vertebroplasty recently completed by David Kallmes, M.D. of the Mayo Clinic and could be presented as early as the NASS meeting.

Has Medtronic's spine business turned the corner? We'll find out after the next corner.

—WE (August 24, 2012)

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Blackstone Florida Whistleblower Lawsuit Dismissed

We reported on August 13, 2012 that a whistleblower lawsuit against Blackstone Medical, Inc. had been unsealed in a U.S. District Court in Florida on August 8, 2012.

We have learned that the lawsuit was dismissed by U.S. District Judge James Moody in Tampa on August 15, 2012. The case was dismissed without prejudice, all pending motions were denied as moot and the clerk was directed to close the case. Our August 13 story also appeared in our weekly email version of our publication on August 21, 2012 after the dismissal took place.

The Order of Dismissal was in response to the Relator's (Jon Schiff, the Whistleblower) Request for Voluntary Dismissal Without Prejudice. Such a request means that Schiff retains his right to come back before the Court at a future time.

Orthofix and Former Blackstone Owners Reach Settlement

We reported erroneously that Orthofix International N.V. had until September 22, 2012 to access a $50 million escrow account established when Orthofix acquired Blackstone in 2006. The former owners of Blackstone had agreed to indemnify Orthofix for "breaches of representations and warranties" under the sales agreement.

According to Orthofix's latest 10-Q filed with SEC on July 30, 2012, the company reached an agreement with the representative of the former shareholders of Blackstone in February 2012 resolving all outstanding escrow and indemnification claims under the Blackstone Merger Agreement. Under the agreement, approximately $42.5 million was distributed from the escrow fund to the company (which will be used, among other things, to fund the $32 million settlement in principle Orthofix has with the government regarding Blackstone).

—WE (August 26, 2012)

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legal

FDA Proposes Faster 510(k) Clearance Process

The FDA promised to improve its medical device application review times when industry agreed to double user fees to $595 million over the next five years in MDUFMA (Medical Device User Fees Modernization Act) III recently passed by Congress and signed into law by the President.

FDA.gov

The agency is now proposing a new basic administrative checklist to preassess submissions for a certain level of completeness and reject submission before passing them on for agency review. Submissions dubbed incomplete will be rejected.

A draft guidance released on August 13, entitled "Refuse to Accept policy for 510(k)s," states that the agency will only accept a premarket notification submission for substantive review it is deemed to be "complete." The document outlines the procedures and criteria it will use to determine completeness of an application.

"FDA agreed to performance goals based on the timeliness of reviews," the proposal reads. "Acceptance review there-

fore takes on additional importance in both encouraging quality submissions from sponsors of 510(k) notifications and allowing FDA to appropriately concentrate resources on complete submissions."

The agency provided an early version of the new checklist it plans to use to assess applications, which includes basic criteria such "Submission contains table of contents" and "All pages of the submission are numbered," as well as noting the inclusion of engineering drawings and identification of predicate devices.

Missing one or more organizational elements, such as the table of contents or page numbers, will not generally result in a "refuse to accept" decision, the FDA noted, but details outlined in the checklist's "Elements of a Complete Submission" area are individually grounds for rejection.

The draft guidance modifies the existing "Refuse to Accept Policy for 510(k)s" to include an early review against specific acceptance criteria and to inform the submitter within the first 15 calendar days of receipt of the submission if the submission is sufficiently complete to allow a substantive review, or if not, to identify the missing element(s). This guidance clarifies the necessary elements and contents of a complete 510(k) submission. The elements and contents outlined are applicable to all devices reviewed through the 510(k) notification process in CDRH and CBER and have been compiled into checklists for use by FDA review staff.

You may submit comments and suggestions regarding this draft document before September 27, 2012. Submit written comments to the Division of Dockets Management (HFA-305), Food and Drug Administration, 5630 Fishers Lane, rm. 1061, Rockville, MD 20852. Submit electronic comments to http://www.regulations.gov.

For more information, please see http://www.fda.gov/downloads/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/UCM315014.pdf.

—WE (August 26, 2012)

Bone Putty Recalled: Danger of Ignition

Look out. That bone putty could ignite!

A hemostatic bone putty made by Synthes, USA, Inc., before its merger with Johnson & Johnson, is the subject of a Class I Recall. According to an August 21, 2012 notification by the FDA, there is a potential for the putty to ignite if contacted with electrosurgical cautery systems under certain conditions during surgery.

LINDK and Wikimedia Commons

Hemostatic bone putty stops bone bleeding by establishing a physical barrier along the edges of bones that have been damaged by trauma or cut during a surgical procedure. The affected models and lot numbers can be found in the FDA Recall Notice.

Synthes issued a Medical Device Recall letter on July 5, 2012, requesting medical facilities to examine their inventory and immediately stop using the identified part and lot numbers of the hemostatic bone putty.

If a facility has the affected product in stock, they were asked to call 1-800-479-6329 to obtain a Return Authorization Number, complete the verification form and return both the form and identified product to Synthes.

Healthcare professionals and patients are encouraged to report adverse events or side effects related to the use of these products to the FDA's MedWatch Safety Information and Adverse Event Reporting Program:

Complete and submit the report online: www.fda.gov/MedWatch/report.htm. Download form or call 1-800-332-1088 to request a reporting form, then complete and return to the address on the pre-addressed form, or submit by fax to 1-800-FDA-0178.

The putty in question was manufactured between July 6, 2011 and December 14, 2011 and distributed from December 22, 2011 to June 25, 2012.

The product was submitted for 510(k) clearance on October 2011 and received a Substantially Equivalent designation by the FDA on December 13, 2011.

—WE (August 26, 2012)

biologics

Stem Cells Key to Blood Production

By using stem cells scientists have found a way to increase the production of red blood cells, according to Anthony Atala, editor of the journal *Stem Cells Translational Medicine*, in an August 2 news release. This discovery could significantly increase the blood supply needed for blood transfusions, the researchers said, and their methods can be used to produce any blood type. Currently, the blood needed for life-saving transfusions is obtained only through donations. As a result, blood can be in short supply, particularly for those with rare blood types.

"Being able to produce red blood cells from stem cells has the potential to overcome many difficulties of the current system, including sporadic shortages," said Atala, who is also director of the Wake Forest Institute for Regenerative Medicine. "This team has made a significant contribution to scientists' quest to produce red blood cells in the lab."

Researcher Eric Bouhassira, of the Albert Einstein College of Medicine in New York City, explained how the process works. "We combined different cell-expansion protocols into a 'cocktail' that increased the number of cells we could produce by 10 to 100-fold."

The researchers produced a higher yield of red blood cells by using stem cells from cord blood and circulating blood as well as embryonic stem cells, according to the release.

Bouhassira added, "The ability of scientists to grow large quantities of red

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blood cells at an industrial scale could revolutionize the field of transfusion medicine. Collecting blood through a donation-based system is serving us well but it is expensive, vulnerable to disruption and insufficient to meet the needs of some people who need ongoing transfusions. This could be a viable long-term alternative."

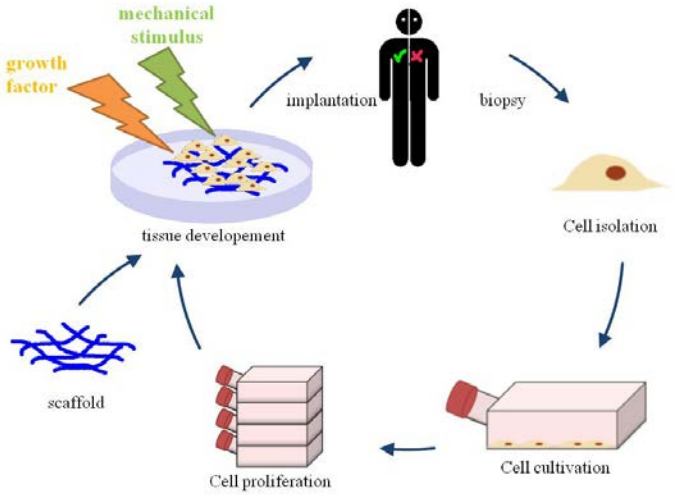
—BY (August 22, 2012)

Researchers Dramatically Expanding Study of Regenerated Tissues

Because the world's second experimental esophagus-replacement surgery—utilizing stem cells—to be performed in Pittsburgh, Pennsylvania, was a success, the surgeon involved will be starting clinical trials of the procedure this September. As reported August 10 by David Templeton of the *Pittsburgh Post-Gazette*, the surgery took place in 2010, the patient was 56-year-old Mike Wright who had esophageal cancer and the surgeon was Blair Jobe, M.D., with West Penn Allegheny Health Systems. The trial investigators will try to enroll about 40 patients who have Barrett's disease with dysplasia (abnormal cell growth) or early-stage esophageal cancer.

The study will attempt to test whether regrowth of the esophagus lining, as occurred with Mr. Wright, produces better results than the current practice of removing the entire esophagus and then creating a makeshift organ from a portion of the stomach. This invasive procedure, known as an esophagectomy, has been the treatment of choice for esophageal cancers. However, the results have been less than stellar, with a complication rate of 50% and major quality of life issues for the patients. Jobe said.

Jobe has succeeded in replacing the esophageal linings in six patients which represents "proof of principle" for this approach. The scaffolding, developed from pig tissue from which the pig's cells have been removed, is called an "extracellular matrix," or ECM. As Templeton explained in his report, the



Wikimedia Commons and HIA

ECM contains growth factors and proteins that appear to signal the recipient's adult stem cells to transform themselves into the kind of site-specific cells that are needed at that particular location of the body.

Jobe cuts the cylindrical tube of lining at either end of the damaged area and pulls it out of the throat in a way Templeton describes as being "similar to taking off a tube sock." Next, Jobe uses pig ECM to form a new esophageal lining. The ECM tube is soaked until it is flaccid and then slipped over a collapsed spring-like stent. He expands the stent until it presses the ECM against the esophageal wall where the lining had been removed. In a process doctors have called "wallpapering," the stent holds the ECM in place until it adheres to the wall.

In a matter of days the ECM fully attaches to the esophagus wall to serve as a framework for stem cells to migrate there and heed signals from the ECM or from neighboring esophagus cells to transform into esophageal lining. Soon after the surgery with the stent in place, the patient can consume liquids.

Stephen Badylak, M.D., deputy director of the University of Pittsburgh McGowan Institute for Regenerative Medicine, developed the esophagus-replacement strategy and led the research in removing cells from pig tissue to create a scaffolding that can regenerate damaged tissue. The scaffolding material, now available commercially, has reportedly been used 3 million times worldwide to repair linings, wounds and skin, with efforts presently under way to repair tendons. To date, researchers have reported 10 successful procedures to generate functional new tissue to repair tracheas. Badylak said, "We're batting a thousand, but the numbers are still very low and further studies are definitely warranted."

—BY (August 19, 2012)

Regenerative Science Appeals District Court Stem Cell Ruling

Colorado-based Regenerative Science lost the first round when a U.S. District Judge ruled in favor of the U. S. Food and Drug Administration's position that the company's stem cell therapy is a drug. Attorneys representing Regenerative Science filed a notice of appeal earlier this month. According to Stephanie Baum, writing August 3 for *Medcity News*, the case is being closely watched by everyone with an interest in the use of stem cells in medicine. The case has ramifications for stem cell entrepreneurs who do not believe their treatments, using stem cells, amount to the administration of a drug or a biologic.

Regenerative Science has promoted its Regenexx procedure as an alternative to traditional surgery that can treat fractures that have failed to heal, joint cartilage problems, partial tears of tendons, muscles, or ligaments. To treat its patients, a physician takes a small bone marrow sample from the back of the patient's hip through a needle and blood samples from a vein in the patient's arm. The samples are sent to the Regenerative laboratory where the mesenchymal stem cells are isolated from the bone marrow and grown to greater numbers using growth factors in the patient's blood. The stem cells are ultimately injected back into the relevant area in the patient.

In 2008 the FDA sent a warning letter to Regenerative after seeing its website. The company sued the FDA and, two years later, the FDA sought an injunction to shut it down. Andrew Ittleman of Fuerst Ittleman, part of the legal team representing Regenerative Science, said that the ruling doesn't really change

Courtesy of Regenerative Science

anything in the big picture of stem cell policy. "If anything [the decision] preserves the status quo, but the problem with that is that there's so much uncertainty regarding what doctors can do and can't do."

Baum notes that the source for the debate comes from the regulatory framework the FDA set up in 2001 in response to the growth of research and medical treatments using human cells and tissues. The stated purpose at the time was "to improve protection of the public health without imposing unnecessary restrictions on research, development, or the availability of new products," according to court documents quoted by Baum.

One of the restrictions imposed was that human cell or tissue could only be minimally manipulated, which the FDA defined as "processing that does not alter the relevant biological characteristics of cells or tissues." As Baum noted in *Medcity News*, if Regenerative Science ultimately loses it could lead to a significant decrease in the number of stem cell companies prepared to pay for the years of development needed to gain FDA approval for a drug or biologic. "Having members of the stem cell industry work with the FDA to hammer out some more coherent regulations could better fill the perceived gaps between the medical industry and drug and medical device companies," she wrote.

—BY (August 18, 2012)

large joints

Robotic Smart Drill Coming to U.S.

A hand-held robotic "smart drill" for use in partial-knee replacements is making its debut at the British Orthopaedic Association in September. Already approved for use in Europe, the Navio PFS system is aiming, next year, at the American market. Blue Belt Technologies, Inc. President and CEO Eric Timko, says the company has already applied for approval from the U.S. Food and Drug Administration and hopes to have approval by year's end "with full commercialization in the U.S. in 2013," according to Steve Twedt of the *Pittsburgh Post-Gazette* in the August 10 press release.

In the Navio system, the surgeon's orthopedic drill is placed inside a holder equipped with robotic and navigation software. This gives the surgeon detailed information about the positioning and anatomy of the patient's knee joint, as well as three-dimensional visualization on a computer screen. Company officials say that this prevents surgeons from cutting excess bone or damaging surrounding tissue as they shape the bone to fit the implant.

Twedt quotes Costa Nikou, Blue Belt's director of software development, saying, "The system allows you to get it right the first time." Timko added, "This is a tool for the mid-sized hospital, the community hospital. The goal with us is that the surgeon who does 10 [partial-knee replacement surgeries] a year will have the same outcomes as the guy who does 100 a year."

According to Timko, fewer than 500,000 partial-knee replacements are done worldwide each year, compared with 1.4 million full-knee procedures. But with the precision of the Navio system guiding the surgeon, he believes 20% to 30% of those full-knee operations could be done as partial procedures. "Then you're looking at a market that is almost $900 million." Currently, anywhere from 2% to 5% of partial-knee replacements have to be redone within a year.

HealthpointCapital, a New York-based private equity firm, purchased Blue Belt last year. Timko says the company plans to move production to Minneapolis later this year, but the research and development team will remain in Pittsburgh.

—BY (August 23, 2012)

Courtesy of Blue Belt Technologies, Inc.

To Age Well–Exercise

To age well, walking is not enough exercise, according to a study of physical activity in Australians over age 65. Lead author of the study Merom Dafna, M. D., from the University of Western Sydney, School of Science and Health, said that to maximize health gains in old age, the elderly need to engage in a range of activities that improve not only cardio respiratory fitness but also muscle strength, flexibility and balance.

"At age 65, Australian men and women are expected to live an additional 18 and 20 years respectively, and are facing the challenges of aging successfully," Dafna said in an August 8 press release. "Participation in regular physical activity, and the types of physical activity undertaken, may discriminate between adults who successfully age from those who do not."

Wikipedia Commons and Joe Mabel

Results from the study showed that of those surveyed, 32% had not exercised at all in the past year, and 40% participated in only one type of activity. Of those, 53% engaged exclusively in walking.

The top four prevalent sports for men and women combined after walking (45.6%) were bowling (9.9%), aerobics/

calisthenics (9.1%), golf (7.7%) and swimming (6.4%). Gym work, cycling, tennis, dancing, fishing, tai chi, weight lifting and yoga were reported by fewer than 5% of older adults.

"Walking may not provide optimal protection for prevalent adverse health conditions. For example, the most efficacious exercise programs for falls prevention were those that included high-challenge balance training, for example, or tai chi," Dafna said. "While those that only walked are one step ahead of those not participating in physical activity at all. To improve their health, they should increase their participation in a wide range of activities that will improve balance, coordination and reaction time."

—BY (August 22, 2012)

Vitamin E Blended With Knee Implant

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James Helgager, M.D., an orthopedic surgeon with the Tri-City Medical Center in Oceanside, California, and Medical Director of Joint Replacement for the Orthopaedic & Spine Institute at Tri-City Medical Center, implanted the first vitamin E Total Knee Replacement in San Diego County.

The E-plus substance, manufactured by Vista-based DFO Surgical, is a polyethylene blended with vitamin E, an antioxidant that was created for the 3DKnee. The manufacturers say the addition of the vitamin improves strength, stability and flexion in the implant.

Company officials note that polyethylene wear continues to be a weak point in total knee replacement. They claim that vitamin E improves the material's tensile strength while preventing polyethylene degenerating oxidation, helping the material hold up to the expectations of today's active patient. E-plus is the first blended vitamin e polyethylene, meaning that the vitamin E is blended into the resin and is homogeneous throughout the insert component.

The 3DKnee Data Driven Design is based on over a decade of research into total knee kinematics and over 30,000 have been implanted world-wide, according to company officials. "The cause of Total Knee Replacement failure is polyethylene wear and DJO's E-plus polyethylene bearing surface is very promising in addressing this issue," said Helgager, long-term studies will prove its longevity and performance benefits to the patient."

—BY (August 19, 2012)

extremities

Journal Blasts Unacceptable Hand Implants

Courtesy of ASSH

The Journal of Hand Surgery (JHS) editor-in-chief Grey Giddins has called for the profession to stop using implants with known poor outcomes. Citing several recent studies, the editorial asks why these implants—which perform worse than certain hip replacement implants that are now deemed unacceptable—are still widely used.

JHS is an online and print orthopedic surgery journal of the British Society for Surgery of the Hand and is the official publication of the Federation of European Societies for Surgery of the Hand It is published by SAGE.

The September issue reports on a number of thumb arthroplasties, which are joint replacement operations at the base of the thumb that are often used to treat arthritis. Giddins names those devices that failed to make the grade and recommends that they be withdrawn.

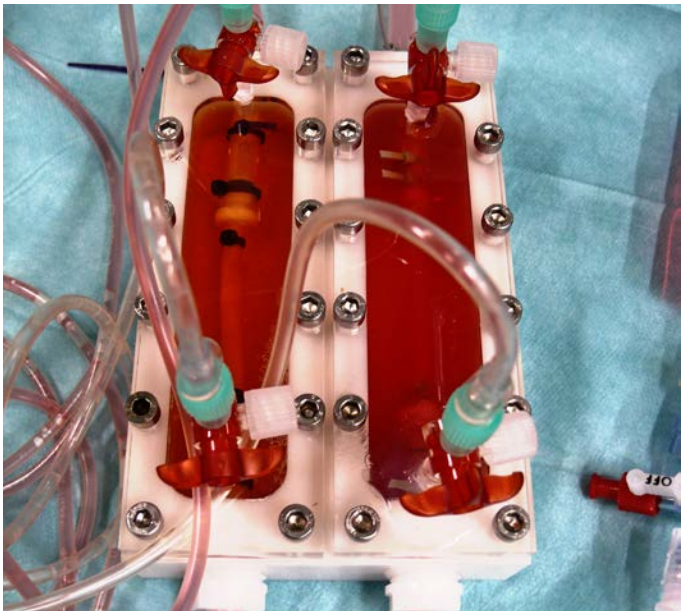
"We should make a stand as a profession and stop using implants with known poor outcomes unless other data is published to change our minds. Moreover, we should continue to be careful about being encouraged into using other new implants until adequate long term follow-up is available," Giddins wrote. He expressed approval of the de la Caffiniere implant, believing that with this device patients can expect good long-term outcomes following their surgeries. However, he was critical of the joint replacements by Moje, Elektra and the Pi2 thumb CMC.

—BY (August 23, 2012)

New Hope for Meniscus Tear Repair

High on the list of concerns for athletes, whether they are Olympic contestants, NFL football players or weekend warriors are injuries such as ACL and meniscus tears to the knee, rotator cuff injuries and Achilles tendon ruptures. Some recent innovations to improve care for these injuries have relied on scaffolds made from nano-sized fibers, which can guide tissue to grow in an organized way. Unfortunately, says Drs. Mauck and Baker, these approaches have not been very successful at colonizing cells because the scaffold fibers are too tightly packed.

Two Ph.D.s, Robert L. Mauck, professor of Orthopaedic Surgery and Bioengineering, and Brendon M. Baker, previously a graduate student in the Mauck lab at the Perelman School of Medicine, University of Pennsylvania, are tackling this problem of cell colonization and have developed and validated a new technology in which composite nanofi-



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brous scaffolds provide a loose enough structure for cells to grow and stay put. Moreover, the looser scaffold retains the ability to instruct colonizing cells how to lay down new tissue. Their findings appear online in the *Proceedings of the National Academy of Sciences*.

"These are tiny fibers with a huge potential that can be unlocked by including a temporary, space-holding element," says Mauck, in the August 7 news release. The fibers are on the order of nanometers in diameter and are made of a slow-degrading polymer together with a water-soluble polymer that can be selectively removed to increase or decrease the spacing between the fibers.

The fibers themselves are made by electrically charging solutions of dissolved polymers, spraying them onto a rotating drum and collecting them as a stretchable fabric. Researchers can then shape this textile for medical applications and they can add cells. Alternatively, doctors can implant it directly into damaged tissue for neighboring cells to colonize. In laboratory tests, the biologic material had tensile properties nearly matching that of human meniscus tissue.

"This approach transforms what was once an interesting biomaterials phenomenon into a method by which functional, three-dimensional tissues can be formed," says Mauck. He believes that this is a major step forward in the engineering of load-bearing fibrous tissues, and will eventually find widespread applications in regenerative medicine. Mauck and his team are currently testing their materials in a large animal model of meniscus repair and for other orthopaedic applications.

—BY (August 19, 2012)

trauma

Bones in Space: News From NASA

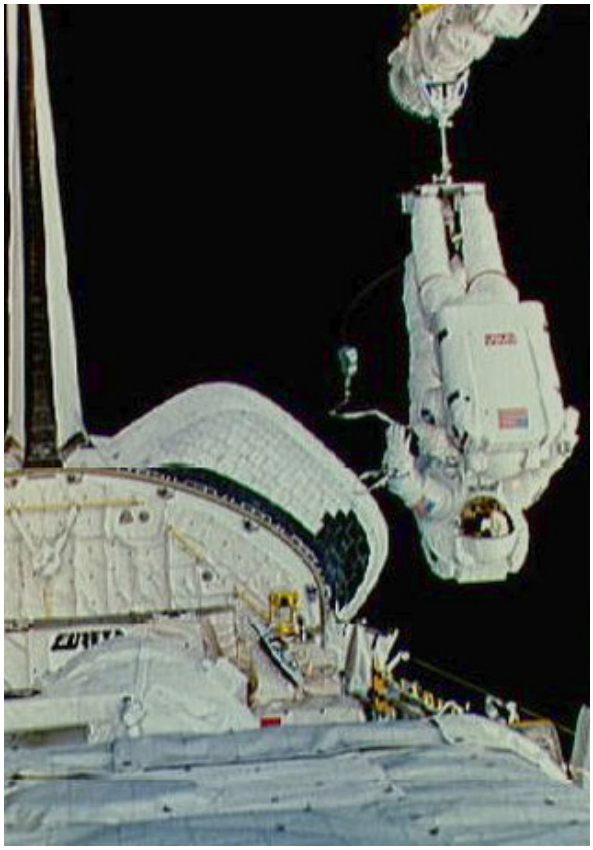
No, they're not dirty dancing in space…but they are lifting weights and watching their diets. New research from NASA indicates that eating the right diet and exercising hard in space helps protect International Space Station astronauts' bones.

The researchers, whose work is published this month in the *Journal of Bone and Mineral Research*, evaluated the mineral density of specific bones as well as the entire skeleton of astronauts who used the Advanced Resistive Exercise Device (ARED), a 2008 addition to the space station that can produce resistance of as much as 600 pounds in microgravity. Resistance exercise allows astronauts to "lift weights" in weightlessness.

Researchers compared data measured from 2006 until the new device arrived, when astronauts used an interim workout that offered about half the total resistance of the ARED. The astronauts using the advanced exercise system returned to Earth with more lean muscle and less fat, and maintained their whole body and regional bone mineral density compared to when they launched. Crew members using ARED also consumed sufficient calories and vitamin D, among other nutrients.

"After 51 years of human spaceflight, these data mark the first significant progress in protecting bone through diet and exercise," said Scott M. Smith, NASA nutritionist at the agency's Johnson Space Center in Houston and lead author of the publication, in the August 24, 2012 news release.

Earlier studies of Russian Mir space station residents found an increased rate of breakdown, but little change in the rate of regrowth that resulted in an overall loss in bone density. In the new study, researchers looked at preflight and postflight images of bone using X-ray densitometry, as well as in-flight blood and urine measurements of chemicals that reflect bone metabolism. In crew members who used the ARED device during spaceflight, bone breakdown



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still increased, but bone formation also tended to increase, likely resulting in the maintenance of whole bone mineral density.

"The increase in both bone breakdown and formation suggests that the bone is being remodeled, but a key question remains as to whether this remodeled bone is as strong as the bone before flight," said Dr. Jean Sibonga, bone discipline lead at Johnson and coauthor of the study.

There is no shortage of related research underway. Some scientists are evaluating bone strength before and after flight, while others are trying to determine the best possible combination of exercise and diet for long-duration crews. Dietary effects on bone are being studied on the space station right now, with one experiment evaluating different ratios of animal protein and potassium in the diet on bone health. Another is looking at the benefits for bone of lowering sodium intake.

—EH (August 24, 2012)

Nanoparticles Double Survival Rate in Trauma

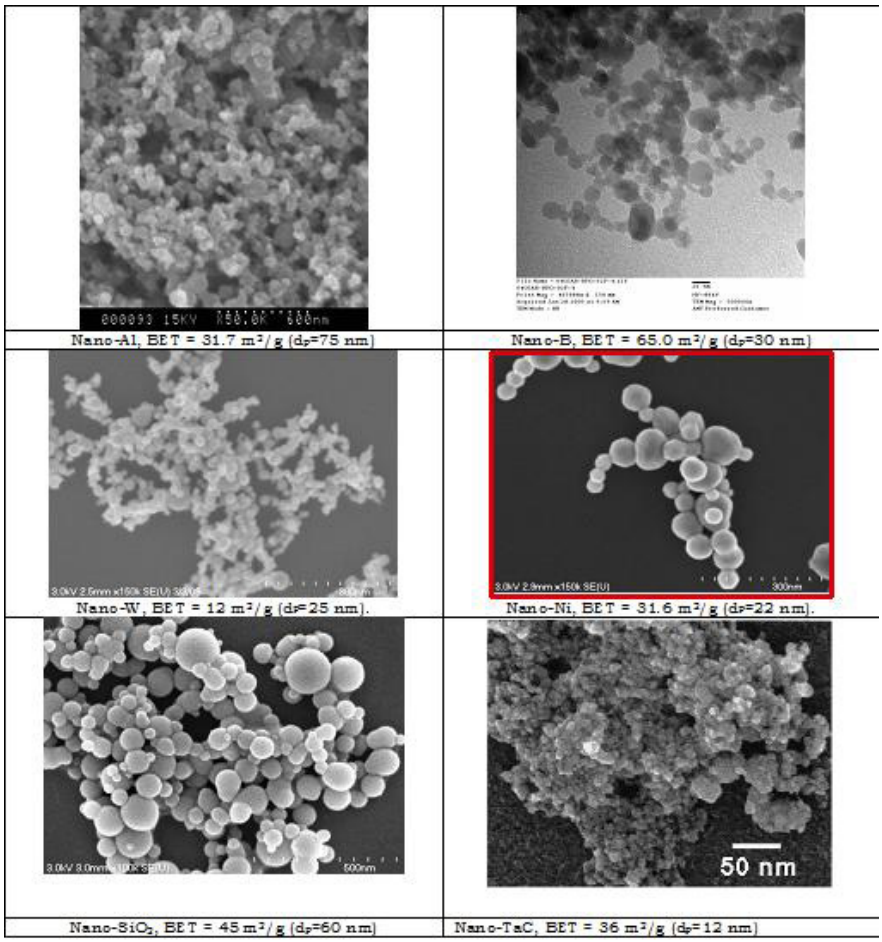
Researchers from Case Western Reserve University have homed in on some very interesting nanoparticles…ones that could save the lives of trauma patients every day. The team has found that the platelet-like nanoparticles, which are made of biodegradable polymers used in devices already approved by the FDA, rapidly create healthy clots and nearly double the survival rate in that critical first hour after injury.

"We knew an injection of these nanoparticles stopped bleeding faster, but now we know the bleeding is stopped in time to increase survival following trauma," said Erin Lavik, Sc.D., a professor of biomedical engineering and the person leading the team, in the August 21, 2012 news release.

If all goes as planned the researchers will have come up with synthetic platelets that first responders and battlefield medics could carry with them to stabilize car crash or roadside bomb victims. An injection could slow or halt internal bleeding until the victim reaches a hospital and receives blood transfusions and surgery.

This effort began when Lavik and her colleagues learned that the military has no equivalent of a tourniquet, pressure dressing or other easily transportable technology to stem bleeding from internal injuries. They then realized that their work would be applicable beyond military conflict.

Tested on a lethal liver injury model in lab rats, the one-hour survival rate of the models injected with the nanoparticles was 80%. For control groups treated with saline alone the survival rate fell to 47%, while control groups receiving scrambled nanoparticles totaled just 40%. Among the three, the models treated with the platelet-like nanopar-



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ticles exhibited the least blood loss. The researchers also found that the hybrid clots were as firm as natural clots. In additional testing, they found no complications following administration of the nanoparticles. Earlier tests showed these synthetic platelets can cut bleeding time by as much as half and that, a week later, the rats showed no ill effects from the materials,

—EH (August 21, 2012)

Prevent/Arrest Osteoporosis With Antibody

A new study from the Mount Sinai School of Medicine in New York suggests that a polyclonal antibody that blocks follicle-stimulating hormone (FSH) in mice without ovaries might offer a more effective way to prevent or arrest osteoporosis than currently available treatments.

The study, published online August 20 in the *Proceedings of the National Academy of Sciences*, used a mouse model of menopause to show that an injection of a polyclonal antipeptide antibody enhances bone regeneration by simultaneously slowing bone destruction and building bone. In addition, the monoclonal antibody is likely to be safer because it is cleared from the blood and is not retained in bone.

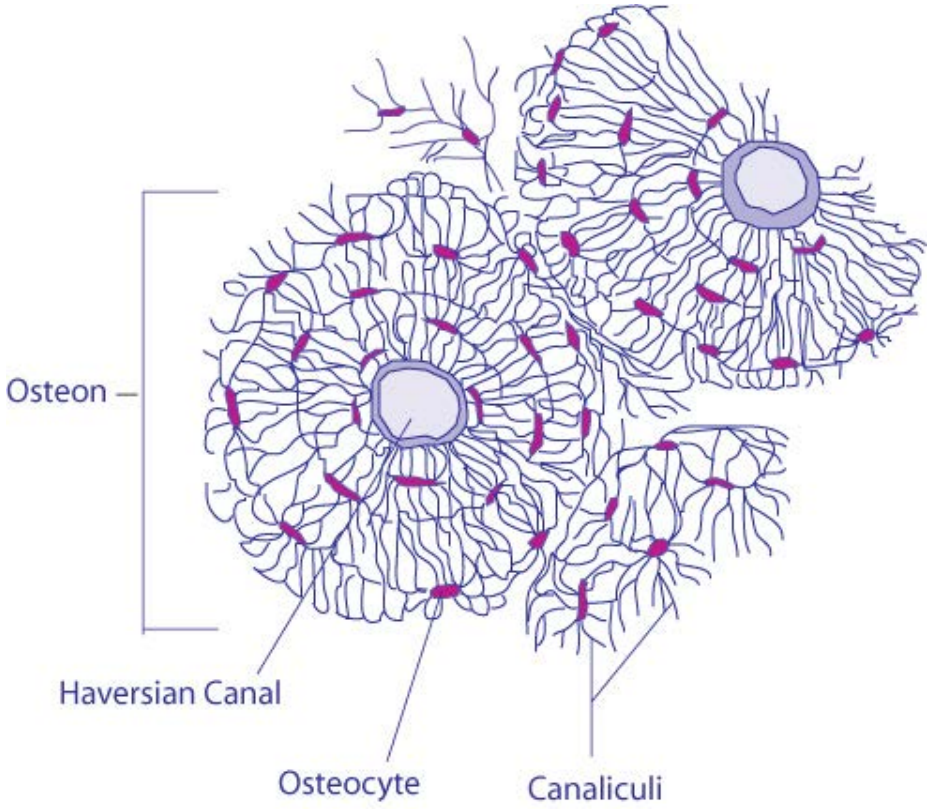
"Bone loss in women begins very early, at least two to three years before a woman's last period and within eight to ten years, a woman will lose 50% of her lifetime bone loss," says the study's senior investigator, Mone Zaidi, M.D., in the August 20, 2012 news release. Dr. Zaidi is professor of Medicine and of Structural and Chemical Biology, at Mount Sinai School of Medicine in New York. "It occurs painlessly, without notice up to a point where women fracture."

Dr. Zaidi, who is director of the Mount Sinai Bone Program at Mount Sinai School of Medicine, New York, is the senior investigator of the research that developed the polyclonal antipeptide antibody to FSH and tested it in mice whose ovaries were removed. Peptides are short chains of amino acids, and the FSH antibody is a highly specific antibody.

"A few years ago, we showed that directly regulates bone by bypassing the estrogen axis," says Dr. Zaidi. FSH rises early in menopause, stimulates bone removal and negatively regulates bone formation. "By blocking FSH with the FSH-specific polyclonal antibody, we were able to block bone resorption by osteoclasts and stimulate bone formation through osteoblasts cells."

Dr. Zaidi added, "Our aim is to find a way to prevent osteoporosis rather than simply treat established disease using medicines that are well tolerated. We believe that a future humanized monoclonal antibody to FSH is likely to be safer than existing treatments because it will not reside in the bone."

—EH (August 21, 2012)



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Head Trauma Speeds Up Brain Aging

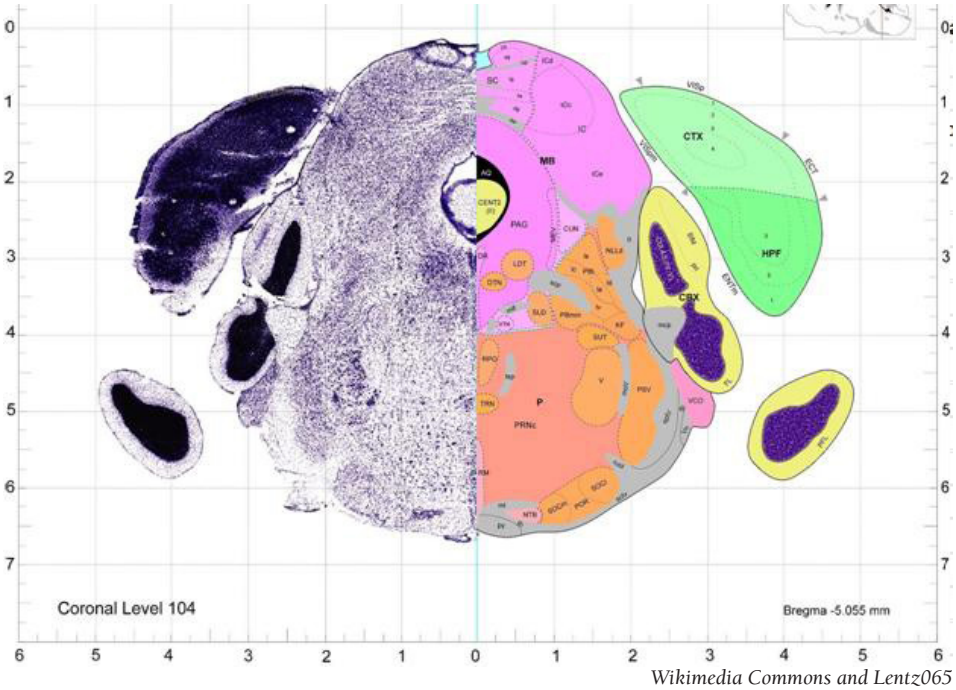
Concussions and even minor bumps to the head can speed up the brain's aging process, according to a University of Michigan study published in *Exercise and Sport Sciences Reviews* journal. The study results suggest that the brains of concussion sufferers have signaling pathways that deteriorate more rapidly than the brains of those who've never suffered a brain injury or concussion.

Of 224 college athletes asked to perform tasks in front of a computer while investigators took images of their brains, 162 of the participants had never had a previous head injury and 62 had had anywhere from one to four concussions.

Researchers found that there were differences in the brain's electrical activity, particularly in attention and impulse control, as well as general gait and balance in participants who had suffered a brain injury compared to those who had not. Though the differences between the study groups were subtle and none of the participants exhibited behavioral differences, brain declines were present in the participants in the brain injury group up to six years after injury, according to Christine Hsu, who reported on the study for *Medicaldaily.com* on August 2.

The researchers explained that younger brains transfer electrical signals rapidly. As people age, pathways in their brains break down and information, like traffic on old highways, cannot be transferred as quickly. They wrote that concussions and other impacts to the head may lead to "potholes" in the brain's highway, which may result in varying degrees of damage and speeding up of the pathway's natural deterioration. The findings suggested that the more head trauma a person experiences the higher the risk for accelerated brain aging and deterioration of their brain's signaling pathways.

—BY (August 18, 2012)



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spine

German Firm Introduces Spinal Implant

Ulrich medical USA, (the lower case and italics are part of the logo), is releasing into the U.S. market a German-designed spinal implant system for the anterior surgical stabilization of the thoracic and lumbar spine. Called the *golden gate* Lateral Plate System, the device has a two-part plate design

Courtesy of ulrich medical

which, company officials say, gives the surgeon an unobstructed field of vision and open access to the intervertebral space during surgery. The system's locking plate technology incorporates cannulated and conical polyaxial screws allowing for polyaxial movement to maintain proper balance and ease of insertion during surgery.

"This product is intended to provide anterior column stabilization after the removal of a vertebral body and can be used with an endoscopic or open approach," said Hans Stover, president

and chief executive officer, ***ulrich medical*** USA, in an August 7 press release.

According to Stover, the ***golden gate*** product is a perfect complement to the firm's existing premium cage technologies and is the first item to be introduced in the company's move to expand its spine market beyond corpectomy cages. The company is actively seeking additional sales distribution channels.

ulrich medical USA, Inc. is a privately-held subsidiary of ***ulrich medical®***, a 100 year old medical technology company headquartered in Ulm, Germany.

—BY (August 22, 2012)

people

Orthopedics Remains Male Dominated Specialty

Men dominate orthopedic surgery but women are catching up—sort of. Orthopedics has the lowest percentage of women in a surgical specialty—with women making up only 4.3% of board-certified orthopedic surgeons, according to Mary I. O'Connor, M.D., Chair of the Department of Orthopaedic Surgery at the Mayo Clinic in Jacksonville, Florida.

In a piece in the August 3 ***Huffington Post***, O'Connor notes that women used to avoid orthopedics under the impression that orthopedic surgeons required a great deal of physical strength to maneuver fractured or dislocated bones and joints back into place. While that might have been true decades ago, advances in medical equipment have shifted the primary requisites from brute strength to manual dexterity, mechanical ability and an aptitude for three-dimensional visualization.

So what is holding back women? An unpublished study by Charles Day, M.D., suggests that the "jock/frat culture" is the greatest detractor from women choosing an orthopedic surgical residency. Day observed that female orthopedic residents were more likely to choose a residency in general surgery because it would be "less physically demanding" and "easier to match into." At least that is what the male residents told the inquiring Day.

Women now account for almost half of all medical school graduates. The presence of women in orthopedic residency programs has increased nearly five-fold over the past 30 years, yet only 14% of today's orthopedic residents are female.

Both male and female respondents agreed that the lack of female role models in orthopedics is a barrier to women entering the field. And while residents of both genders identified the availability of a role model in the specialty as an important decision-making factor, females were twice as likely to cite the importance of a role model of the same gender or ethnicity. Women orthopedic residents were also twice as likely to cite a perceived lack of acceptance by senior faculty as a barrier to their entering the field.

As the population ages, the need for orthopedic surgeons will increase. According to O'Connor, in order to attract the best and the brightest, orthopedics needs to become more attractive to women students. She noted that several organizations have been created to increase the number of women in orthopedic surgery

The Ruth Jackson Orthopaedic Society, named after the first female orthopedic surgeon in the United States, was the first. It was organized as a support and networking group for women orthopedic surgeons and now includes both female and male orthopedic surgeons as well as orthopedists-in-training and interested medical students. It offers a mentoring program and has published a guide to assist women in their transition from medical school to residency and throughout their careers.

—BY (August 18, 2012)

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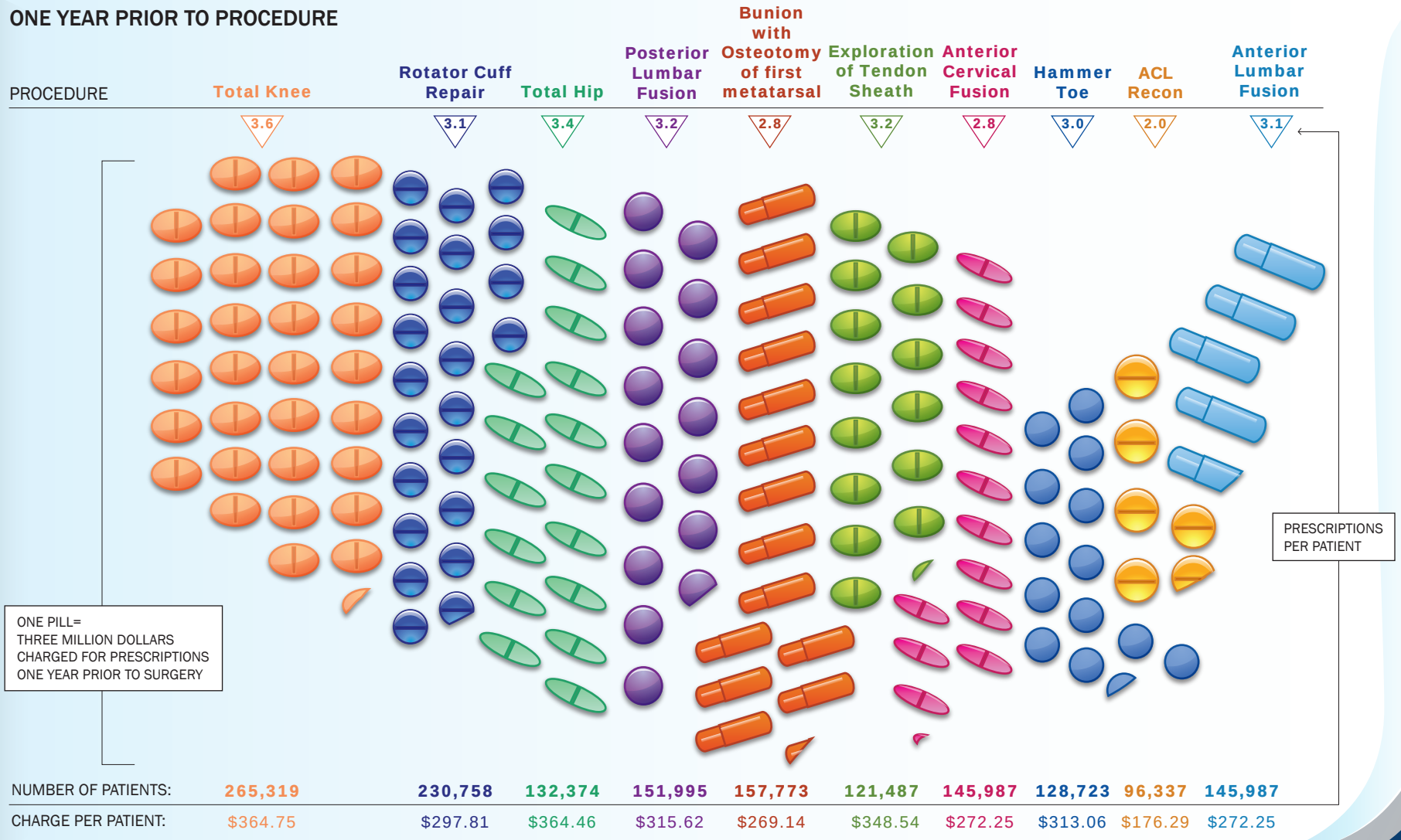

	Total Knee	Rotator Cuff Repair	Total Hip	Posterior Lumbar Fusion	Bunion with Osteotomy of first metatarsal	Exploration of Tendon Sheath	Anterior Cervical Fusion	Hammer Toe	ACL Recon	Anterior Lumbar Fusion
NUMBER OF PATIENTS:	265,319	230,758	132,374	151,995	157,773	121,487	145,987	128,723	96,337	145,987
CHARGE PER PATIENT:	$364.75	$297.81	$364.46	$315.62	$269.14	$348.54	$272.25	$313.06	$176.29	$272.25

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