A method, device and system or kit treat a lesion by injecting a contrast agent into a body area to distinguish an osteolytic lesion for imaging; and delivering an effective amount of a debridement fluid to debride the distinguished lesion.
IMAGING METHOD, DEVICE AND SYSTEM

BACKGROUND OF THE INVENTION

[0001] The invention relates generally to medical imaging and particularly to highlighting an osteolytic lesion and debridement of an imaged highlighted lesion. In an aspect, the invention relates to a method, device and kit for distinguishing and imaging a lesion for debridement.

[0002] Osteolysis is a common complication in total hip arthroplasty and the most common cause of component failure. Osteolysis is a response to wear debris. It can develop around a hip or knee implant as a result of generation of wear debris, access of the particles to the implant-bone interface and the biologic response of the implant host to the particles. Osteolysis is mediated primarily by macrophages. Fibroblasts and endothelial cells also play a role. These cells are activated by the wear debris, primarily polyethylene, but also metal and polyethylene/ethylenelate particles. The biologic reaction to these particles is a nonspecific foreign-body reaction. Particles in the submicron size range undergo phagocytosis by macrophages and release a variety of cytokines which ultimately stimulate osteoclasts to resorb bone. The most common source of wear debris is adhesive-abrasive wear between a femoral head and polyethylene liner. This wear can produce as many as 500,000 particles per gait cycle.

[0003] Osteolysis can be asymptomatic until the lesions become very large. While some osteolytic lesions may be cleansed by washing and conventional debridement, surgery is a typical treatment. The surgery both treats the lesions and removes particles that could generate recurrence. With a stable acetabular component in acceptable alignment and with a modular liner, debridement and bone grafting of the lesions with retention of the acetabular shell and replacement of the polyethylene liner can be successful. However, if the acetabular shell is loose or malpositioned, then revision of the component is indicated.

[0004] While washing and debridement procedures are preferred approaches to lesion management, these less invasive procedures are not always available. First, osteolytic lesions are not easily diagnosed because they can be hidden well within tissue near an implant. They can be hidden from x-ray visualization because they are near obscuring metal implant structure or the like. Or, simply the lesions are not sufficiently distinguished from adjacent tissue and structure to be visualized by usual detection mechanisms such as fluoroscopy. Successful substantially noninvasive treatment of osteolytic lesions requires that the lesion location including location and extent in an implant area be identified and imaged during debridement. Currently there are few strategies for reliably noninvasively locating and identifying lesions for debridement. There is a need for a method, device and system or kit for diagnosing osteolytic lesions and for visualizing the location and extent of an osteolytic lesion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIGS. 1 through 4 are schematic representations of osteolytic lesion areas nearby hip and knee implants;

[0010] FIG. 5 is a schematic elevation of a lesion debridement device;

[0011] FIG. 6 is a cross-sectional side view of a tubular flexible delivery tube end of the FIG. 5 device;

[0012] FIG. 7 is a schematic side elevation of a pulse-generating mechanism for the debridement device;

[0013] FIG. 8 is a schematic perspective view of a user using a system or kit including a lesion debridement device and monitoring fluoroscope; and

[0014] FIG. 9 shows the hip joint of FIG. 1 in need of treatment for a lesion and placement of a debridement device to effect irrigation of the lesion.

DETAILED DESCRIPTION OF THE INVENTION

[0015] The invention provides a method and kit for substantially noninvasively diagnosing an osteolytic lesion and a method and kit for distinguishing the location or extent of an osteolytic lesion for substantially noninvasively debride-ment of the lesion. According to the invention, a method for treatment of a lesion comprises: injecting a contrast agent into a body area to distinguish an osteolytic lesion for imaging; and delivering an effective amount of a debride-ment fluid to debride the distinguished lesion.

[0006] A system or kit for treatment of a lesion comprises: a delivery device for injecting a contrast agent into a body area to distinguish an osteolytic lesion for imaging; a fluid reservoir; a debridement fluid contained within the fluid reservoir; a tubular conduit having a pickup end and delivery/aspirator end and first and second cannulas extending with one another longitudinally as part of the tubular con-duit; the first cannula having at least one orifice at the delivery/aspirator end of the tubular conduit to deliver or aspirate debridement fluid to or from the distinguished lesion; and the second cannula substantially open at the delivery/aspirator end of the tubular conduit to deliver or aspirate fluid to or from the distinguished lesion; and an imaging device to monitor delivery of the debridement fluid to the distinguished lesion.

[0007] In another embodiment, a diagnostic procedure comprises: injecting a contrast agent into synovial fluid in a body area in need of treatment; and imaging a location or extent of a lesion in the area that has been distinguished by the contrast agent.

[0008] In still another embodiment, a method of imaging an osteolytic lesion comprises injecting a contrast agent into synovial fluid in a vicinity of the osteolytic lesion; permitting contrast agent injected synovial fluid to circulate to the lesion; positioning an imaging device responsive to the contrast agent adjacent the vicinity of the osteolytic lesion; and imaging the osteolytic lesion distinguished by the contrast agent from adjacent tissue.
The injected material can distribute evenly within the cavity space by way of diffusion. The distribution can be enhanced by external ultrasound application, or mechanical motion of the cavity space. For example, after injection into a knee, a patient can be asked to walk a number of paces to help distribute the injected material.

[0016] In the case of a knee or hip replacement, lesions can form behind or around the implanted medical device. These lesions otherwise may be undetectable by conventional non-invasive imaging techniques. The injected contrast agent distributes within the fluid cavity. If a lesion communicates with the cavity, the material will also distribute to the previously un-identified lesion. The inventive method identifies a lesion that communicates with the fluid filled anatomic cavity, either by natural flow of the fluid around an implanted device or through emplaced voids in a device such as the holes in an implanted cup. For example, osteolytic lesions can communicate with the normal anatomic synovial joint space either around an implant or through holes in a hip implant. According to the invention, the synovial fluid is injected with a contrast agent, which then flows to the lesion and distinguishes to make it identifiable by non-invasive imaging. The agent can identify the lesion location and extent to permit debridement.

[0017] Debridement can be by any suitable procedure for wound or lesion management including lavage, particularly pulse lavage or pulse irrigation is one. In pulse lavage, a pulsating water jet, is directed toward the wound or lesion area. This procedure is effective in removing debris and bacteria from wound and lesion areas. Pulse irrigation is used as part of a number of orthopedic procedures such as prosthetic joint replacement, in which it is used to remove bone fragments from an area of prosthesis.

[0018] The debridement fluid of the invention can be water and other aqueous compositions, including any other typical irrigating or debridement solution. Preferably the fluid is a clear biocompatible debridement fluid such as warm isotonic saline or normal saline in combination with an antibiotic. However, many variations are possible. The solution may include buffers and a bicarbonate, citric acid and tannic acid in very low concentrations. Or the fluid can be a gas and liquid mixture. The gas can be oxygen or carbon dioxide or hydrogen peroxide useful for sterilization purposes. The fluid can include steroid and anti-inflammatory medicaments.

[0019] A preferred debridement fluid comprises a mixture of inorganic salts and minerals, compounded to mimic an electrolyte concentration and a body fluid mixture in an isotonic state. The fluid typically comprises a halide salt of lithium, sodium, potassium, calcium, and other cations. Typically the halide is fluoride, chloride, bromide, or iodide, and most typically chloride. A typical electrolyzed solution has a pH within the range of about 2 to about 5, an oxidation reduction potential within the range of about -600 mV to about +1200 mV, and hypochlorous acid concentration in the range of about 10 ppm to about 200 ppm. The solution can have bactericidal, fungicidal, and sporicidal properties.

[0020] In this specification, “biosorbable” means capable of being harmlessly taken up by the body and “biocompatible” means capable of harmlessly persisting in the body. The term “biocompatible” includes biosorbable materials. The debridement fluid of the invention can include a biocompatible particulate abrasive, which can be a biosorbable material that dissolves within several days. Preferably, the abrasive is biosorbable and capable of passing through small gauge needles under lavage pressure. Calcium sulfate (CaSO₄) is a preferred material and may be obtained as MIGIT™ from Wright Medical Technology, Inc. of Arlington, Tenn. The particulate abrasive can be present in the debridement fluid in a percent by weight between 0.1 and 65; desirably between 1 and 40 and preferably between 3 and 15. Other possible particulate materials disclosed in copending application, Shimko et al., (attorney docket P23148). For example, these include injectable forms of: calcium phosphate, tri-calcium phosphate, hydroxyapatite, coral hydroxyapatite, demineralized bone matrix, and mineralized bone matrix. Further, the biosorbable material can be an injectable solid form of a biopolymer, for example, polyactic acid, polyglycolic acid, polylactic acid, polycaprolactone, polyeftylene oxide, polypylene oxide, polysulfone, polyethylene, polypolypropylene, hyaluronic acid or bioglass.

[0021] An embodiment of the invention comprises following progress of the lesion debridement by fluoroscopy. In this embodiment, contrast agent is injected into the lesion area through a catheter, or preferably through the inner expression cannula of the device of the invention along with debridement fluid. The contrast agent migrates so that the lesion can be radiographically imaged with a fluoroscope. The fluoroscope produces a planar (or two dimensional) image of the lesion area that can be evaluated to monitor the debridement method. This embodiment is discussed in further detail in conjunction with the drawings.

[0022] These and other features of the invention will become apparent from the drawings and following detailed discussion, which by way of example without limitation describe preferred embodiments of the invention.

[0023] FIG. 1 and FIG. 2 are views of a hip joint implant and FIG. 3 and FIG. 4 are respectively a tibia implant and a femur implant. These figures illustrate the difficulty of diagnosing an osteolytic lesion and determining its location and orientation, particularly when in proximity to a metal implant as shown in FIG. 4. In these figures, like structures are identified by the same part number.

[0024] FIG. 1 and FIG. 2 are anterior to posterior views of pelvis 212. FIG. 3 is an anterior to posterior view of a knee implant into tibia 214 and FIG. 4 is a medial to lateral view of an implant into femur 216. FIG. 1 and FIG. 2 show osteolytic lesions 218, 220 buried deep within the pelvis 212 behind acetabular cup 122 of implant 224. The acetabular cup 222 is also shown in detail in FIG. 1. In FIG. 2, synovial fluid 228 within joint capsule 230 is in fluid communication with the lesion 220 around the cup 222. In FIG. 1, the lesion 218 is completely buried behind the acetabular cup 222. However, the fluid 228 is in communication with the lesion 220 through holes 226 in the cup 222. Injector 232, which can be a syringe or other slender non-invasive delivery instrument is shown injected into the synovial fluid cavity 234 in each of the FIG. 1 and FIG. 2.

[0025] In operation, a contrast agent is injected into the synovial fluid 228 by the injector 232. The contrast agent is delivered as a dissolved or suspended fluid that in turn is either dissolved or suspended in the synovial fluid 228 and is transported by the fluid 228 to the lesion 218, 220 site where it radio-opaquely contrasts the lesion 218, 220.
FIG. 3 and FIG. 4 illustrate other lesion locations that can be identified and controllably treated according to the invention. FIG. 3 is an anterior to posterior view of tibia 214 with implant 242 with screw holes 244 and upper polyethylene articular surface 246. Lesion 248 has formed beneath the implant, substantially removed from view of any imaging technique. A contrast agent is injected by injector 232 into synovial fluid 228 above the polyethylene articular surface 246. The contrast agent migrates with the fluid 228 through screw holes 244 and around the implant to the location of the lesion 248. The lesion is stained for identification, again as described hereinafter with reference to FIGS. 5 through 9.

In FIG. 4, femur 216 is shown to a particularly pernicious lesion 252. The lesion 252 is situated within an outline of metal femur implant component 254 and is unobservable by any imaging technique. In this case, the contrast agent is injected by injector 232 into synovial fluid 228, and then migrates to the lesion 252 with flow of the fluid 228 around the implant component 254 to highlight the lesion 252.

The contrasted lesions 218, 220, 248 and 252 are amenable to imaging diagnoses and fluoroscopic controlled debridement as described hereinafter with reference to FIGS. 5 through 9.

The contrast agent is a biocompatible material that is capable of being detected or monitored by fluoroscopy, x-ray photography, CAT scan, ultrasound or other such imaging techniques that can be used to detect and locate contrast distinguished tissue. The invention may be used as a diagnostic tool to identify and define previously unknown or undetected hard or soft orthopedic and skeletal lesions that communicate with normally occurring fluid filled anatomic spaces in the body, such as the synovial capsule surrounding articulating joints.

The contrast agent is suspended or dissolved into a carrying fluid and is injected into the vicinity of a joint implant with suspected osteolytic lesions. Preferred contrast agents are radio-opaque materials. The contrast agent can be either water soluble or water insoluble. Examples of water soluble contrast agents include metrizamide, iopamidol, iothalamate sodium, iodamide sodium, iohexol and meglumine. Examples of water insoluble contrast agents include tantalum, tantalum oxide, and barium sulfate, each of which is commercially available. Other water insoluble contrast agents include gold, tungsten, and platinum powders. Some radio-opaque contrasting agents are available in liquid form. These include, for example, OMNIPAQUE from Nycomed, Inc., Princeton, N.J. Preferably, the contrast agent is water insoluble (i.e., has a water solubility of less than 0.01 mg/ml at 20°C.).

The carrying fluid for the contrast agent can be water or other aqueous compositions. Preferably the fluid is a clear biocompatible fluid such as warm isotonic saline or normal saline. However, many variations are possible. The solution may include materials such as an antibiotic, a buffer or a bicarbonate, citric acid and tannic acid in very low concentrations.

As with the debridement fluid, a preferred carrying fluid comprises a mixture of inorganic salts and minerals, compounded to mimic an electrolyte concentration and a body fluid mixture in an isotonic state. The fluid typically comprises a halide salt of lithium, sodium, potassium, calcium, and other cations. Typically the halide is fluoride, chloride, bromide, or iodide, and most typically chloride. A typical electrolyzed solution has a pH within the range of about 2 to about 5. An oxidation potential potential within the range of about +600 mV to about +1200 mV, and hypochlorous acid concentration in the range of about 10 ppm to about 200 ppm. The solution can have bactericidal, fungicidal, and sporicidal properties.

The contrast agent can be dissolved or suspended in the carrying fluid in a weight percent from 0.001 mg/ml to 1000 mg/ml, desirably 0.01 mg/ml to 800 mg/ml, and preferably 0.1 mg/ml to 600 mg/ml.

FIG. 5 shows a debridement device 10 for the washing and debridement of wounds and lesions of a patient. The system 10 includes housing 12 with conduit 14 for the delivery of fluid under pressure. With reference to FIGS. 1 and 2, inner expression cannula 18 and outer aspirator circumferential cannula 20 are shown longitudinally form the conduit 14. The conduit 14 includes a flexible pickup section 22 and a rigid delivery section 24. The system 10 includes a pressurized fluid reservoir 40 and a fluid transfer pump 50, which is in fluid communication with inner expression cannula 18 and outer aspirator cannula line 20.

The conduit 14 has a pickup end 16 at fluid reservoir 40 to operatively connect the inner cannula 18 from the reservoir 40 (through fluid transfer pump 50) to fluid aspirator/expression end 26 of rigid section 24. The outer aspirator cannula 20 is operatively connected from the fluid transfer pump 50 to fluid delivery/aspirator end 23 to fluid aspirator/discharge end 26 of rigid section 24. In this example, the fluid within the reservoir 40 is a saline solution. The saline solution comprises 10 weight percent suspended calcium sulfate particulate having a particle size of about 150 microns.

Fluid transfer pump 50 includes a drivable motor 52 having an elongated rotor shaft 54. A fluid pressure generating pump 58 is arranged at a first end 56 of the rotor shaft 54. The pump 58 provides fluid pressure to the dual cannula flexible tube 22 from reservoir 40. A second end 60 of rotatable shaft 54 is attached to a suction pump 62, also located within the housing 12. Suction pump is in fluid communication with a screened disposable collection bottle 34 to provide a vacuum incentive for drainage of fluids to the bag 34. In this embodiment, a common powered motor 52 with an extended shaft 54 provides drive for both pressure pump 58 and suction source 62. The arrangement provides for a dual continuous pulsed feed of fluid to a patient lesion area shown in FIGS. 1 through 4 for a continuous withdrawal of fluid from the area after treatment of a wound or lesion.

FIG. 6 is a cut away depiction of rigid delivery section 24 of the conduit 14 including inner cannula 18 and outer cannula 20. Inner cannula 18 provides a passageway for fluid from fluid reservoir 40. The fluid is expressed from syringe end 70 of the inner cannula 18 to a wound or lesion area. An outer wall 30 of conduit 14 forms outer cannula 20 with wall 26 of inner cannula 18 to provide a fluid passageway for aspirating fluid from wound or lesion area after lavage treatment.

In an embodiment shown in FIG. 7, pulsating pump 84 has a rotating wheel 88 arranged to spin within sinusoidal
inner surface 90. The sinusoidal operation of the wheel 88 intermittently squeezes and releases flexible fluid feedline 92. Feedline 92 includes pickup end 16 at fluid source 40 (shown in FIG. 5). A fluid feed section 96 extends to form inner expression cannula 18, shown in FIG. 6. Rotation of wheel 88 within the sinusoidal surface 90 generates intermittent pulses that are discharged through the pressured inner expression cannula 18 to be expressed at syringe end 70. In an embodiment, the suction side of the fluid transfer pump 50 is effective in a pulsed manner similar to that at the pressure side. The suction or vacuum side 62 of the pump 50 can be in-phase or out-of-phase with the fluid pressure pulsating pump 58.

[0039] FIG. 9 shows the same pelvis 212 in need of treatment for a lesion 216 as described with reference to FIG. 1. Additionally, FIG. 9 shows placement of aspirator/expression end 26 of the debridement device 10 to effect irrigation of the lesion 218. Further, FIG. 8 illustrates fluoroscopic monitoring of the debridement.

[0040] First, referring to FIG. 8, a user 112 is shown using a system or kit (delineated by dashed outline 110) including a support member 114 supporting a monitoring fluoroscope 116, an image display 118 such as a flat panel television monitor and a lesion debridement device 10. The user 112 grasps the rigid delivery section 24 of the debridement device 10 and inserts it into a hip joint 124, shown interiorly in FIG. 8, of a patient (the patient’s outline beneath a sheet is indicated at 126).

[0041] FIG. 9 shows a hip implant 224 that has been surgically planted into the pelvis 212. The implant 224 may be of any form; for example, fixed, modular, primary, revision, ceramic head or metal head. In non-diseased portion of pelvis 212, implant 224 is well-fixed but in a diseased portion, osteolytic lesion 218 takes up space that would normally be filled with cancellous bone. Lesion 218 is soft and spongy. Though lesion 218 is depicted in this embodiment as being in the hip above acetabular cup 222, it could be in the area of the implant 224.

[0042] Typical treatment to debride the lesion 218 is significant and invasive, sometimes involving removal of the implant 224, open debridement of the lesion 218 (which enlarges the intramedullary area even further), and implantation of a revision implant. In another typical treatment, location of the lesion 218 is identified by fluoroscope or other imaging process, first and second holes are bored to access the lesion area and lavage fluid is expressed through one hole and is suctioned out the second hold. This procedure operates blindly without assurance that fluid expressed through the first hole delivers lavage to the lesion area. Additionally, the lesion can be tough and resistant to a typical fluid that would be used in the first and second hole procedure.

[0043] The present invention provides a minimally-invasive and accurate approach to treating lesions without removal of implants and revision and without two hole bodily invasion. The invention accurately delivers lavage to assure complete debridement of the lesion. In the present invention, a lavage fluid is utilized that comprises abrasive particles that completely debride even an osteolytic lesion that may be filled with resistant gelatious masses of nectotic and fibrous tissue. Additionally, in an embodiment of the invention, insertion of the rigid delivery section 24 of the debridement device into the hip joint, the orientation of the syringe expressing end 70 of the delivery section 24; impingement of expressed debridement fluid the lesion and aspirating fluid containing the nectotic and fibrous tissue and spent fluid and particles can be monitored to assure complete debridement.

[0044] The lesion debridement is monitored in FIG. 8 by viewing a fluoroscopic image of the hip joint 124, lesion area 136, and inserted rigid delivery section 14. The patient 126 resides on table 120, which is essentially transparent to x-rays. A support member 122 supports a fluoroscope and a television monitor 118. The fluoroscope 116 can be supported by a C-shaped arm 142 device, as shown. Table 120 and patient 126 are positioned within the C formed by arm 142. Fluoroscope 116 is an x-ray tube unit at a lower end of the C-shaped arm. The x-ray tube unit 116 emits an x-ray beam in a generally upward vertical direction through a diaphragm 146. The x-ray beam is directed upward through the table 120 and the hip joint 124 of patient 126. The x-ray beam received by image intensifier 148, which includes a television camera (not shown). A fluoroscopic field of view received by the camera at image intensifier 148 is projected on television monitor 118.

[0045] In operation, patient 126 is aligned between tube unit 116 and image intensifier 148 so that the internal patient’s hip joint 124 is visible on television monitor 116. User 112 performs a puncture of the patient’s hip area toward the joint 124 with the elongated rigid delivery section 24 of debridement device 10. The user 112 positions the puncture so that the inserted delivery section 24 syringe end is generally perpendicular to a central axis of an x-ray beam, which is directed upward from fluoroscope x-ray tube unit 116 to image intensifier 148. The fluoroscopic field of view of fluoroscope 116 is then narrowed to display an image on monitor 116 to permit positioning aspirator/expression end 26 of delivery section 24 within the cancellous bone 134 of hip joint 124 at a location of the osteolytic lesion 136.

[0046] The user 112 manipulates the aspirator/expression end 26 of delivery section 24, while remaining outside of the path of the x-ray beam between x-ray tube unit 116 and image intensifier 148, as shown in FIG. 4. The user 112 views the location and orientation of aspirator/expression end 26 of delivery section 24 on television monitor 116 while activating the pulse lavage action of the debridement device 20. Throughout the procedure, the user 112 monitors the location and orientation of the aspirator/expression end 26 to express the particulate abrasive-containing lavage fluid from reservoir 40. In an embodiment, the user 112 delivers the debridement fluid and aspirates the fluid by alternating pulse lavage. This procedure effectively debrides the lesion 136 and intermittently aspirates resistant osteolytic lesion constituents including nectotic and fibrous tissue and spent particulate abrasive-containing lavage fluid.

[0047] While preferred embodiments of the invention have been described, the present invention is capable of variation and modification and therefore should not be limited to the precise details of the above examples. For example, the invention relates to a kit that is packaged to include the above-described components for sale, shipment. The invention includes changes and alterations that fall within the purview of the following claims.
What is claimed is:
1. A method for treatment of a lesion, comprising:
   injecting a contrast agent into a body area; and
   allowing the contrast agent to migrate to an osteolytic
   lesion area to distinguish the osteolytic lesion for
   imaging.
2. The method of claim 1, further comprising delivering
   an effective amount of a debridement fluid to debride
   the distinguished lesion.
3. The method of claim 1, comprising injecting the
   contrast agent into synovial fluid in the body area that is in
   fluid communication with the osteolytic lesion, wherein the
   contrast agent migrates to the lesion by flow or diffusion.
4. The method of claim 1, comprising injecting the
   contrast agent into synovial fluid in the body area that is in
   fluid communication with the osteolytic lesion, wherein the
   contrast agent migrates to the lesion by flow or diffusion;
   and imaging a location or extent of a lesion in the area that
   has been distinguished by the contrast agent.
5. The method of claim 1, comprising injecting the
   contrast agent into synovial fluid in the body area that is in
   fluid communication with the osteolytic lesion, wherein the
   contrast agent migrates to the lesion by flow or diffusion;
   imaging a location or extent of a lesion in the area that has
   been distinguished by the contrast agent; and controlling
   debridement of the osteolytic lesion according to the imaging.
6. The method of claim 1, comprising injecting the
   contrast agent into synovial fluid in the body area that is in
   fluid communication with the osteolytic lesion, wherein the
   contrast agent migrates to the lesion by flow or diffusion;
   imaging a location or extent of a lesion in the area that has
   been distinguished by the contrast agent; and controlling
   debridement of the osteolytic lesion according to the imaging;
   wherein the debridement comprises delivering a debrin,
   dement fluid and intermittently aspirating the fluid by pulse
   lavage.
7. The method of claim 1, comprising injecting the
   contrast agent into synovial fluid in the body area that is in
   fluid communication with the osteolytic lesion, wherein the
   contrast agent migrates to the lesion by flow or diffusion;
   imaging a location or extent of a lesion in the area that has
   been distinguished by the contrast agent; and controlling
   debridement of the osteolytic lesion according to the imaging;
   wherein the debridement comprises delivering a fluid
   with suspended particulate abrasive and the delivering is
   adjusted according to the imaging to direct the fluid with
   suspended particulate to the lesion area.
8. The method of claim 1, further comprising:
   emitting x-rays toward the lesion area, detecting x-rays that have
   traversed the lesion area, constructing a real-time fluoro,
   scopie image of delivering fluid and the lesion area from
   signals that are responsive to the detected x-rays; adjusting
   the delivering of the debridement fluid according to the
   fluoroscopic image to debride the lesion.
9. The method of claim 1, wherein the contrast agent
   comprises a biosorbable material that is capable of being
   detected or monitored by fluoroscopy, x-ray photography,
   CAT scan or ultrasound.
10. The method of claim 1, wherein the contrast agent
    comprises a biosorbable material that is capable of being
    detected or monitored by fluoroscopy, x-ray photography,
    CAT scan or ultrasound suspended or dissolved in a carrying
    fluid.
11. A system for treatment of a lesion, comprising:
    a delivery device for injecting a contrast agent into a body
    area to distinguish an osteolytic lesion for imaging;
    a fluid reservoir;
    a debridement fluid contained within the fluid reservoir;
    a tubular conduit having a pickup end and delivery/aspirator
    end and first and second cannulas extending with one another
    longitudinally as part of the tubular conduit; the first cannula
    having at least one orifice at the delivery/aspirator end of the
tubular conduit to deliver or aspirate debridement fluid to or from
the distinguished lesion; and the second cannula substan-
tially open at the delivery/aspirator end of the tubular
conduit to deliver or aspirate fluid to or from the
the distinguished lesion; and
an imaging device to monitor delivery of the debridement
fluid to the distinguished lesion.
12. The system of claim 11, wherein the imaging device
    comprises a fluoroscopy imaging device that includes an
    x-ray source oriented to emit x-rays toward the lesion area;
    a radiation detector that detects x-rays from the source that
    have traversed the lesion area; an image display to generate
    a real-time fluoroscopic image showing the relationship of
    the delivery/aspirator end of the tubular conduit to the area
    on a display monitor from signals that are responsive to the
detected x-rays.
13. The system of claim 11, wherein the contrast agent
    comprises a biosorbable material that is capable of being
    detected or monitored by fluoroscopy, x-ray photography,
    CAT scan or ultrasound.
14. The system of claim 11, wherein the contrast agent
    comprises a biosorbable material that is capable of being
    detected or monitored by fluoroscopy, x-ray photography,
    CAT scan or ultrasound suspended or dissolved in a carrying
    fluid.
15. The system of claim 11, wherein the contrast agent
    is water soluble and comprises metrizamide, iopamidol,
    iothalamate sodium, iodamide sodium or meglumine.
16. The system of claim 11, wherein the contrast agent
    is water insoluble and comprises tantalum, tantalum oxide,
    barium sulfate, gold powder, tungsten powder or platinum
    powders.
17. The system of claim 11, wherein the contrast agent is a
    liquid.
18. The system of claim 11, wherein the contrast agent is
    suspended or dissolved in an aqueous carrying fluid.
19. The system of claim 11, wherein the contrast agent is
    suspended or dissolved in a clear biosorbable fluid.
20. The system of claim 11, wherein the contrast agent is
    suspended or dissolved in warm isotonic saline or normal
    saline.
21. The system of claim 11, wherein the contrast agent is
    suspended or dissolved in a carrying fluid that includes an
    antibiotic, a buffer, a bicarbonate, citric acid or tannic acid.
22. The system of claim 11, wherein the contrast agent is
    suspended or dissolved in an aqueous carrying fluid
    comprising a mixture of inorganic salts and minerals,
    compounded to mimic an electrolyte concentration and a body
    fluid mixture in an isotonic state.
23. The system of claim 11, wherein the contrast agent is suspended or dissolved in an aqueous carrying fluid comprising a halide salt of sodium, potassium, calcium or magnesium.

24. The system of claim 11, wherein the contrast agent is suspended or dissolved in an aqueous carrying fluid comprising an electrolyzed solution having a pH within 2 to about 5, an oxidation reduction potential within +600 mV to +1200 mV and an hypohalous acid concentration within 10 ppm to about 200 ppm.

25. The system of claim 11, wherein the contrast agent is suspended or dissolved in an aqueous carrying fluid that has bactericidal, fungicidal or sporocidal properties.

26. The system of claim 11, wherein the contrast agent is suspended or dissolved in the carrying fluid in a weight percent from 0.001 mg/ml to 1000 mg/ml.

27. The system of claim 11, wherein the contrast agent is suspended or dissolved in the carrying fluid in a weight percent from 0.01 mg/ml to 800 mg/ml.

28. The system of claim 11, wherein the contrast agent is suspended or dissolved in the carrying fluid in a weight percent from 0.1 mg/ml to 600.

29. A diagnostic procedure, comprising:

   injecting a contrast agent into synovial fluid in a body area in need of treatment; and

   imaging a location or extent of a lesion in the area that has been distinguished by the contrast agent.

30. The diagnostic procedure of claim 29, further comprising determining a treatment for the lesion according to the imaged location or extent.

31. A method of imaging an osteolytic lesion, comprising:

   injecting a contrast agent into synovial fluid in a vicinity of the osteolytic lesion;

   permitting contrast agent injected synovial fluid to circulate to the lesion;

   positioning an imaging device responsive to the contrast agent adjacent the vicinity of the osteolytic lesion; and

   imaging the osteolytic lesion distinguished by the contrast agent from adjacent tissue.

32. The method of claim 31, wherein the osteolytic lesion is fluoroscopically imaged and a location and orientation of a debridement delivery device is adjusted according to location or extent of the fluoroscopically image.

33. The method of claim 31, wherein the vicinity is a knee or hip joint space.

34. The method of claim 31, wherein injecting the contrast agent comprises: positioning an injection catheter into the vicinity of the osteolytic lesion; and injecting the contrast agent into synovial fluid in the vicinity through the injection catheter.

35. The method of claim 31, further comprising debriding the distinguished lesion by a pulse lavage process.

36. The method of claim 31, further comprising: emitting x-rays from the imaging device toward the distinguished lesion, detecting x-rays that have traversed the lesion, constructing a tomographic image from signals that are responsive to the detected x-rays to generate a real-time fluoroscopic image on a display monitor depicting the distinguished lesion and the relationship of a delivery/aspirator end of a debridement device to the area; and adjusting the location and orientation of the delivery/aspirator end of the debridement device according to the display monitor image to debride the lesion.

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