an ultrasound probe and an actuator for moving the probe in a reciprocal action; a first arcuate slide; a second arcuate slide in sliding engagement with the first arcuate slide and a linkage to which the first arcuate slide is mounted; said linkage arranged to move the first and second arcuate slides within a vertical plane; said needling unit mounted to said first and second arcuate slides wherein the first and second arcuate slides are mounted perpendicular to each other so as to rotate the needling unit about respective first and second principal axes; and wherein the imaging module includes a probe sheath positioned on said probe and arranged to allow relative reciprocal motion with said probe.

There is also disclosed a biopsy and therapy device comprising: a needling unit for holding and inserting a biopsy needle; an imaging module comprising an ultrasound probe and an actuator for moving the probe in a reciprocal action; an arcuate slide mounted to a first linear slide; a rotational linkage in sliding engagement with the arcuate slide; said first linear slide arranged to move the arcuate slide parallel to a first principal axis; said first linear slide mounted to a second linear side, said second linear slide arranged to move the first linear side parallel to a second principal axis; said needling unit mounted to said rotational linkage wherein the arcuate slide and rotational linkage are mounted perpendicular to each other so as to rotate the needling unit about said first and second principal axes.

There is also disclosed a biopsy and therapy device comprising: a needling unit for holding and inserting a biopsy needle; an imaging module comprising an ultrasound probe and an actuator for moving the probe in a reciprocal action; an arcuate slide and a parallel linkage to which the arcuate slide is mounted; a rotational linkage in sliding engagement with the arcuate slide; said parallel linkage arranged to

move the arcuate slide and rotational linkage within a vertical plane; said needling unit mounted to said arcuate slide wherein the arcuate slide and rotational linkage are mounted perpendicular to each other so as to rotate the needling unit about respective first and second principal axes.

The design of the biopsy and therapy apparatus according to embodiments of the present invention enables the biopsy needling unit to move in both Cartesian and Polar coordinates. This concept may eliminate the need for multiple punctures on the skin when many samples of the tissues are required to be extracted from the organ for diagnosis. In addition lesser entry points for the needle mean that risk of infection for the patient may be greatly minimized.

The combination of Polar and Cartesian capabilities according to embodiments of this invention may allow multiple conical motion envelops to be developed depending on the needs of the operation. The ability of the apparatus to develop multiple conical envelopes is highly advantageous for operations especially in the prostate biopsy environment because insertion of the needle into the organ may be hindered by pubic bone.

In one embodiment, the pivot point for the conical envelope is located at the contact point of the needling unit, such that prior to insertion of the needle, the pivot point is effectively on the surface of the skin of the patient. In conventional methodology or previous invention, the pivot point is usually located inside the needling unit itself. When the pivot point is located inside the needling unit, slight movements in one end of the unit will result in movements in the other end of the unit which can be a major cause

CLAIMS

1. A biopsy and therapy device comprising:

a needling unit for holding and inserting a biopsy needle;

an imaging module comprising an ultrasound probe and an actuator for moving the probe in a reciprocal action;

a first arcuate slide;

a second arcuate slide in sliding engagement with the first actuate slide and a linkage to which the first arcuate slide is mounted;

said linkage arranged to move the first and second arcuate slides within a vertical plane;

said needling unit mounted to said first and second arcuate slides,

wherein the first and second arcuate slides are mounted perpendicular to each other so as to rotate the needling unit about respective first and second principal axes; and

wherein the imaging module includes a probe sheath positioned on said probe and arranged to allow relative reciprocal motion with said probe.

2. The biopsy and therapy device according to claim 1, wherein the first and second arcuate slides are concentric about a pivot point.

3. The biopsy and therapy device according to claim 2, wherein said pivot point is located at a contact point of the needling unit.

4. The biopsy and therapy device according to claim 1, wherein each arcuate slide comprises a pair of radial sliding bearings.

5. The biopsy and therapy device according to claim 1, wherein the first and second arcuate slides form part of a rotary head.

6. The biopsy and therapy device according to claim 1, wherein the needling unit includes a needle holder for holding a needle during insertion, said holder including a recess for receiving a needle in a direction transverse to the direction of insertion.

7. The biopsy and therapy device according to claim 1, wherein said needling unit includes a needle stopper arranged to set a pre-determined depth of penetration of said needle.

8. The biopsy and therapy device according to claim 1, further including a drape for covering said device, said needling unit including a recess with which the drape is arranged to engage.

9. The biopsy and therapy device according to claim 1, wherein said device is arranged to conduct a biopsy procedure based upon one or more of the parameters: a needle insertion point defined as a coordinate position within said vertical plane, a first angle relative to the first principal axis, a second angle relative to the second principal axis and a depth of penetration of the needle.