

CLAIMS

1. An instrument holder for aligning an instrument for accessing a target within a subject, comprising:
 - a first layer;
 - a second layer;
 - an instrument guide having an entry point and an exit point, the instrument guide connecting between the first layer and the second layer and configured to guide the instrument from the entry point to the exit point;
 - wherein the first layer and the second layer include first layer markings and second layer markings that are visible by an imaging system; and
 - wherein the first layer markings are designed to form a predefined pattern with the second layer markings relative to the target as viewed on a display of the imaging system, when aligning the first layer and the second layer so that the instrument will collide with the target.

wherein the first layer markings include a first geometric shape comprising one or more pairs of arrows or arrowheads and the second layer markings include a second geometric shape distinct from the first geometric shape, the second geometric shape comprising two lines in the shape of a cross with the exit point at the center, and in the predefined pattern, the one or more pairs of arrows or arrow heads point at the lines of the second geometric shape such that each line is situated between the one or more pairs of arrows or arrow heads.
- ~~2. The instrument holder according to claim 1, wherein the first layer markings include a first geometric shape and the second layer markings include a second geometric shape distinct from the first geometric shape.~~
- ~~3. The instrument holder according to claim 2, wherein the first geometric shape comprises a line.~~
- ~~4. The instrument holder according to claim 3, wherein the second geometric shape comprises one or more pairs of arrows or arrow heads, and in the predefined pattern the one or more pairs of arrows or arrow heads point at the line, which is situated between the one or more pairs of arrows or arrow heads.~~

- ~~5. The instrument holder according to claim 4, wherein in the predefined pattern, there is a gap between the one or more pairs of arrows or arrow heads and the line.~~
- ~~6. The instrument holder according to claim 2, wherein the first geometric shape comprises lines representing linear graduations of a unit of measure.~~
- ~~7. The instrument holder according to claim 6, wherein the second geometric shape comprises a line, and in the predefined pattern the line of the second geometric shape aligns at a middle line of the first geometric shape.~~
- ~~8. The instrument holder according to claim 2, wherein the first geometric shape comprises one or more pairs of arrows or arrowheads.~~
- ~~9. The instrument holder according to claim 8, wherein the second geometric shape comprises two lines in the shape of a cross with the exit point at the center, and in the predefined pattern the one or more pairs of arrows or arrow heads point at the lines of the second geometric shape such that each line is situated between the one or more pairs of arrows or arrow heads.~~
- 10.2. The instrument holder according to claim 91, wherein in the predefined pattern, there is a gap between the one or more pairs of arrows or arrow heads and the lines of the second geometric shape.
- 11.3. The instrument holder according to claim 21, wherein the ~~first~~ second geometric shape comprises two or more sets of lines representing linear graduations of a unit of measure.
- ~~12. The instrument holder according to claim 11, wherein the second geometric shape comprises two lines in the shape of a cross with the exit point at the center, and in the predefined pattern each of the lines of the second geometric shape aligns with a middle line of each of the sets of lines representing linear graduations of a unit of measure.~~
- ~~13. The instrument holder according to claim 1, wherein the first layer markings include a cross with the entry point at the center and the second layer markings~~

~~include a cross with the exit point at the center, and in the predefined pattern the cross of the first layer marking and the cross of the second layer marking coincide.~~

~~14.4.~~ The instrument holder according to claim 1, further comprising a protuberance extending from the second layer.

~~15.5.~~ The instrument holder according to claim 1, wherein the instrument is a hollow needle.

~~16.6.~~ The instrument holder according to claim 1, wherein the instrument is an elongated tool.

~~17.7.~~ The instrument holder according to claim 1, wherein the instrument holder includes handles to fit a positioning arm.

~~18.8.~~ The instrument holder according to claim ~~177~~, wherein the handles are configured to enable the instrument holder to rotate relative to the positioning arm.

~~19.9.~~ The instrument holder according to claim 1, wherein the first layer or the second layer include additional markings, which are not part of the predefined pattern to identify the first layer or the second layer by a user when aligning.

~~20.10.~~ The instrument holder according to claim 1, wherein the target is located percutaneously.

~~21.11.~~ The instrument holder according to claim 1, wherein the instrument holder is transparent to the imaging system.

~~22.12.~~ The instrument holder according to claim 1, wherein the instrument guide is perpendicular to the first layer and the second layer.

~~23.13.~~ The instrument holder according to claim 1, wherein the instrument guide forms a preselected angle with the first layer and with the second layer.

~~24. A method for aligning an instrument to a target within a subject, comprising:~~
~~—— providing an instrument holder as in claim 1 on a positioning arm;~~
~~—— positioning an imaging system to show on a display the target and the instrument holder; and~~
~~—— aligning the instrument holder so that the first layer markings and the second layer markings form a predefined pattern relative to the target on the display of the imaging system.~~

~~25. The method according to claim 24, wherein the instrument is being aligned for percutaneous access to the target within the subject.~~

~~26. The method according to claim 24, wherein the positioning arm is an articulated arm positioned above the subject.~~

~~27.14.~~ An instrument holder for aligning an instrument for accessing a target within a subject, comprising:
a first layer;
a second layer, the second layer connected to the first layer by a column;
an instrument guide having an entry point and an exit point, the instrument guide located within the second layer and configured to guide the instrument from the entry point to the exit point;
wherein the first layer includes markings forming a first layer markings that are visible by an imaging system; and
wherein the first layer markings are designed to form a predefined pattern with the instrument visible by the imaging system within the second layer relative to the target as viewed on a display of the imaging system, when aligning the first layer and the second layer so that the instrument will collide with the target.

wherein the first layer markings further comprise a first geometric shape, the first geometric shape comprising one or more pairs of arrows or arrow heads, and in the predefined pattern, the one or more pairs of arrows or arrow heads point at the instrument, which is situated between the one or more pairs of arrows or arrow heads.

~~28. The instrument holder according to claim 27, wherein the first layer markings further comprise a first geometric shape.~~

29.15. The instrument holder according to claim 2814, wherein the first geometric shape comprises lines representing linear graduations of a unit of measure and in the predefined pattern the instrument aligns at a middle line of the first geometric shape.

~~30. The instrument holder according to claim 28, wherein the first geometric shape comprises one or more pairs of arrows or arrow heads, and in the predefined pattern the one or more pairs of arrows or arrow heads point at the instrument, which is situated between the one or more pairs of arrows or arrow heads.~~

31.16. The instrument holder according to claim 3014, wherein there is a gap between the one or more pairs of arrows or arrow heads and the instrument.

32.17. The instrument holder according to claim 2714, further comprising a protuberance extending from the second layer.

33.18. The instrument holder according to claim 2714, wherein the instrument is a hollow needle.

34.19. The instrument holder according to claim 2714, wherein the instrument is an elongated tool.

35.20. The instrument holder according to claim 2714, wherein the instrument holder includes handles to fit a positioning arm.

36.21. The instrument holder according to claim 3520, wherein the handles are configured to enable the instrument holder to rotate relative to the positioning arm.

37.22. The instrument holder according to claim 2714, wherein the first layer or the second layer include additional markings, which are not part of the predefined pattern to identify the first layer or the second layer by a user when aligning.

38.23. The instrument holder according to claim 2714, wherein the target is located percutaneously.

~~39.24.~~ The instrument holder according to claim ~~27~~¹⁴, wherein the instrument holder is transparent to the imaging system.

~~40. A method for aligning an instrument to a target within a subject, comprising:~~
~~—— providing the instrument holder of claim 27 on a positioning arm;~~
~~—— inserting the instrument into the instrument holder;~~
~~positioning an imaging system to show on a display the target, the instrument holder and the instrument; and~~
~~—— aligning the instrument holder so that the first layer markings and the instrument form a predefined pattern relative to the target on the display of the imaging system.~~

~~41. The method according to claim 40, wherein the instrument is being aligned for percutaneous access to the target within the subject.~~

~~42. The method according to claim 40, wherein the positioning arm is an articulated arm positioned above the subject.~~