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激光多普勒血流仪使用注意事项

Using ML191 Laser Doppler Blood FlowMeter

连接激光多普勒血流仪

Connecting the Blood FlowMeter

连接之前确认外接电源和电源适配器已经关闭。连接电源适配器到血流仪，确认接口已经完全插好。连接血流仪的输出到记录仪，血流仪有2个输出端口：LDF和BSC信号。无需全部连接，只要将需要记录的信号输出连接到记录仪即可。

Before connecting anything make sure that the power outlet and the switch on the external power supply are turned off.

Connect the power supply output of the external supply to the power input of the Blood FlowMeter. Make sure that this connector is pushed all the way in, as it does not have a locking facility.

Connect the outputs of the Blood FlowMeter that you wish to record to the signal inputs of your recording device. Note that the Blood FlowMeter has outputs for both LDF and BSC signals (see Signal Output Connectors, p. 15). Both signal outputs do not need to be used. You only need to connect the output signal that you wish to record.

打开激光多普勒血流仪

Switching on the Blood FlowMeter

电源连接完毕就可以打开外接电源以及适配器电源。血流仪前面板上的指示灯呈现绿色，并伴随一次“哗哗”声，表明仪器完成初始化。

使用前预热至少五分钟使仪器温度达到稳定。

When the power has been connected, turn on the power outlet and then turn on the power switch of the external power supply, if it has one. The Power indicator on the front of the Blood FlowMeter should glow green and you should hear a double beep from the unit to indicate that it has initialized.

Wait at least five minutes before making any measurements to allow the instrument's temperature to stabilize.

连接激光多普勒探头

Connecting the Laser Doppler Probe

把探头从盒子中小心取出，并确认接口处是清洁并且没有灰尘的。将探头以正确的方向插入血流仪前面板上的探头接口。接口设计只允许探头以唯一正确的方向插入。一旦对准，小心插入直至位置锁定。

如果以上步骤均正确完成，指示灯将呈现橙色，如果探头本身或者连接有问题，指示灯将仍然呈绿色。

Very carefully remove the probe from its protective case and check that the probe connector is clean and free from dust. To connect the probe to the probe connector on the front of the Blood

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Flowmeter, orientate the plug with respect to the socket until it is aligned correctly. The socket is designed to only accept the plug in one particular orientation. Once aligned, carefully push the plug into the socket until locked in position.

If everything is OK then the status indicator for the probe will glow amber. If there is something wrong with the probe or connection then the status indicator will remain green.

探头应用

Probe Application

警告：针式探头(可植入的)只能用于动物。只有表面探头可以安全用于人体。

表面探头可以通过探头粘合环固定到组织上。探头粘合环是具有双面粘性的中心有小孔的粘贴纸。针式探头可以使用微操纵器或者类似装置固定。

控制组织与探头的相对移动(通常是由于呼吸产生的)是十分重要的。相对移动会对关注流量产生人为干扰。将探头轻微的接触组织表面可以相应减少这些干扰,但是在这种情况下可能需要手持探头。这是为了确保在组织上施加的压力最小,以避免闭塞微脉管系统。

探头周围过多的照明会干扰血流灌注的读取。尽量避免测量部位的直接照明,特别是直接阳光照射。如果不确认外部光线对测量部位的影响,可以使用不透明的材料将探头以及测量部位罩起来。

Warning: Needle (implantable) laser Doppler probes are ONLY for use in animals. Only surface laser Doppler probes are safe for use on humans.

Surface probes can be attached to tissue using a self adhesive ring. These have adhesive on both sides with a small hole in the center. Needle probes can be secured by using a micro-manipulator or some similar device.

It is important to control the relative movements of the tissue (especially that induced by breathing) with respect to the probe. Relative movements will produce artifacts in the perfusion signal. These can be reduced by allowing the supported probe to lightly contact the surface of the tissue. Under some conditions it may be desirable for the probe to be held in position by hand. It is essential to ensure that the pressure on the tissue is minimal, otherwise local occlusion of the microvasculature may result.

Excessive ambient lighting at the probe site can disturb the blood perfusion reading. Avoid direct illumination of the measurement site, especially direct sunlight. If erroneous readings of the measurement site from external lighting levels are suspected, cover the attached probe and measurement area with a light piece of opaque material.

探头警示

Probe Warning

如果新的或者未被识别的探头连接血流仪,将会有每两秒一次的“哔哔”声。指示灯呈红色、橙色闪烁状态。这种情况下,探头需要校准才能使用,校准步骤后面具体。

If a new or unrecognized probe is connected to the Blood FlowMeter, you will hear a double beep every two seconds. The probe status indicator will also flash amber/red. The probe must be recalibrated in order to use it — refer to Probe Calibration, p. 20.

温度警示

Temperature Warning

如果血流仪内部温度上升超过仪器最高工作温度,仪器将会每五秒发出一次“哔哔”声。如果出现这种情况,需要将仪器转移到合适的环境下使用。如果温度超出范围,仍然会有信号输出,但

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是信号可能不在系统接受的误差范围内，并且被认为是警告。如果在温度低于25°C的情况下反复发生这种错误，仪器可能有故障，请立即与埃德仪器国际贸易(上海)有限公司联系。

If the internal temperature of the Blood FlowMeter rises above the maximum operating temperature range of the device, then it will emit a double beep every five seconds. If this occurs, the instruments should be moved to a cooler environment for proper operation. With the temperature out of range, output signals will continue to be generated but may no longer be within the calibrated tolerance of the system and should be interpreted with caution. If the environmental temperature is below 25 °C and this error occurs repeatedly soon after power-on, then a fault may have occurred and you should contact your ADInstruments representative for further advice.

探头校准

Probe Calibration

激光多普勒血流仪具有自动配置和校准新探头的功能。这个操作需要MLA191校准套件，其中包含一瓶含有固定浓度微小乳胶球的溶液。没有这个套件是不能进行定标的，也不要进行尝试。开始校准前需要一个避震的稳定工作台。使用夹子把探头固定在校准套件提供的溶液中。将探头置于溶液中心，使探头到容器边缘的距离达到最大。根据下面的步骤进行定标。注意，在任何时间关闭电源可以终止校准。

The Blood FlowMeter is designed to automatically configure and calibrate itself for a new probe. This operation requires a MLA191 Calibration Kit, which includes a controlled concentration of latex spheres in solution. Calibration of probes is not possible without this kit and should not be attempted. Before starting this it is advisable to have a stable workbench free from vibration. A clamp to hold the probe reliably in the solution is provided in the calibration kit. Set up the probe in the center of the solution, with the measuring surface of the probe at a maximum distance from all edges of the vessel. Follow the procedure below to calibrate the probe. Note that calibration can be abandoned at any time by simply turning off the power.

1. 将需要定标的探头连接到血流仪上。

Plug the probe to be calibrated into the probe input.

2. 按一次CAL按钮。血流仪发出“哔哔”声，指示灯呈红色、橙色闪烁时，将探头放入溶液的中心。注意，在发出“哔哔”声之前可能有一次较长的“哔”音，无论是否有，都属正常；“哔哔”声不会一直持续，当听到该声音时，请尽快将探头放入溶液的中心。

Press the CAL button once. A single beep (maybe not) followed by a double beep will sound and the indicator flashes red and amber. During this time place the probe into the center of the container. The double beep just last about several second, so please place the probe into solution as quick as you can.

3. 将探头置于溶液中后，立即再次按CAL按钮。血流仪发出“哔”的长声，指示灯呈红色、橙色闪烁。

After placing the probe in the solution press the CAL button again. A long beep will sound and red and amber lights flash.

4. 数秒后，血流仪发出“哔哔”声，表明校准结束。大约五秒后，指示灯由红色转变为橙色，血流仪已经完成校准，可以使用了。

After thirty seconds, a double beep indicates the end of the calibration. After five seconds, the

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red indicator light returns to amber and the unit is ready for use.

校准过程中请避免操作台震动和移动，这有可能导致校准失效。只有在使用全新探头或者更换探头时才需要进行校准。

During calibration keep the bench free of vibration and movement as this may invalidate the result. Generally a probe does not require recalibration unless a new or replacement probe is introduced.

血流仪储存

Storage

不使用时，血流仪需要在5°C到50°C的环境下保存，但是我们建议在室温下保存。在非室温下保存后，开始使用前需要将仪器在室温环境下稳定一段时间。

When not in use, the Blood FlowMeter should be stored at room temperature, although it may be stored between 5 °C and 50 °C. When returning from extremes of temperature, it is important to allow the instrument to stabilize at room temperature before use.

血流仪清洁

Cleaning

警告：切勿喷撒、倾倒或溅射任何液体到血流仪以及它的附件、接口、开关以及任何开口部位。切勿将仪器浸入到液体中。

可以使用柔软的纱布擦拭血流仪表面，或者擦去水滴。切勿使用酒精或者研磨剂类清洁剂，这可能损坏仪器的外表面。

Warning: Do not spray, pour or spill any liquid on the Blood FlowMeter, its accessories, connectors, switches or openings in the enclosure. Do not submerge the instrument in liquid. To clean the outside cover of the Blood Flowmeter or to remove spills, wipe the device with a soft, lint free cloth. Do not use alcohol or abrasive-based cleaners as this may damage the external surfaces of the device.

探头操作

Handling the Probes

警告：请小心使用血流仪配套探头。任何疏忽有可能导致内部光纤损坏、探头光亮末端擦损或者探头末端/接口与导线分离。

探头使用的光纤为直径125µm的玻璃，尽管光纤是柔软，并且可以弯曲的，仍然建议不要以小于30mm半径进行弯曲。

探头的接口要保持清洁，避免灰尘附着。每次使用之前都必须检查接口，可以使用吸耳球吹的方式清除灰尘。

完整的探头可以通过将探头末端对准明亮光源(例如日光灯)，查看接口末端的方式来检测。可以在接口末端的两针看到两个亮度相同的亮点。

Caution: Probes for the Blood FlowMeter must be handled with care. Failure to do this may result in breakage of the internal optical fibers, scratching the polished probe ends or separation of the cable from the probe ends or connectors.

The optical fibers used in the probes are glass and have a diameter of 125 µm. Although the fibers are flexible and can be bent, it is recommended that they are not subjected to bends with a radius less than 30 mm.

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The probe connectors must be kept clean and free from dust. Connectors should be inspected before each use. Dust can be removed from the connectors using an air-duster.

The integrity of probes may be checked by holding the probe end to a source of bright diffuse light, for example a lamp, and inspecting the connector end. Two bright spots of light of equal intensity should be visible from the pins within the connector.

探头储存

Storing the Probes

不使用时, 探头需要保存在存放探头的盒子里, 或者在消毒后保存在为打开过的消毒用的包装中。储存时需要保证光纤整洁的盘绕。

When not in use, probes should be stored either in the probe box or, following sterilization, stored unopened in the packaging in which they were sterilized.

Probes should be stored with the optical fiber coiled neatly.

探头清洁

Cleaning

探头在包装和派送之前都已经被清洁。建议使用柔软的、不会留下纤维的布, 蘸取70%酒精擦拭探头末端。

建议在使用完后立即清洁探头, 这样可以在污染物和微粒变干之前比较容易的除去它们。

Probes are cleaned prior to packing and dispatch. It is recommended that the probe end on all new probes be wiped with a soft cloth, preferably one that does not shed fibers, impregnated with 70% alcohol in water.

It is recommended that after use probes are cleaned immediately as it is easier to remove soiling and particulate matter before it dries onto the probe surfaces.

1. 查看探头末端、导线和接口。如果没有可见的污染物, 使用柔软的、不会留下纤维的布, 蘸取70%酒精擦拭探头末端和导线。在使用探头前需要酒精完全变干。

Visually inspect the probe end, cable and connector. If there is no visible soiling, wipe the probe end and cable with a soft cloth impregnated with 70% alcohol in water. Allow the alcohol to dry completely before using the probe.

2. 如果含有可见污染物, 采用含有温和清洁剂的温水清洁探头。

If there is visible soiling, clean the probe with warm water containing a mild detergent.

3. 用软布或者软刷小心擦, 以确保除去污染物和微粒。这个步骤必须在清洁溶液表面之上进行。

注意: 避免将接口浸入清洁溶液。

Careful rubbing with a soft cloth or brush should be employed to ensure that all soiling and particulate matter is removed. These actions should be carried out beneath the surface of the cleaning solution.

Note: Avoid immersing the probe connector in the cleaning solution.

4. 在干净的水中漂洗探头末端和导线。

Rinse the probe end and cable in clean water.

5. 用吸水纸擦拭探头末端和导线, 并自然晾干。

Wipe the probe end and cable with an absorbent cloth and leave the probe to dry completely.

消毒

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Disinfection

浸泡探头末端和导线到如下溶液可以进行消毒:

- 2% 戊二醇, 或者
- 70% 酒精

浸泡时间根据消毒剂生产厂商的建议。

Probes can be disinfected by immersion of the probe end and cable in:

- 2% glutaraldehyde, or
- 70% alcohol in water

The disinfectant manufacturer's recommended immersion times should be used.

灭菌

Sterilization

只有部分专用的血流灌注探头可以使用湿热(蒸汽)灭菌方法进行灭菌。如果需要更多信息, 请与埃德仪器国际贸易(上海)有限公司联系。

Only some of the dedicated perfusion probes may be sterilized by moist heat (steam). For further details please contact your ADInstruments representative.