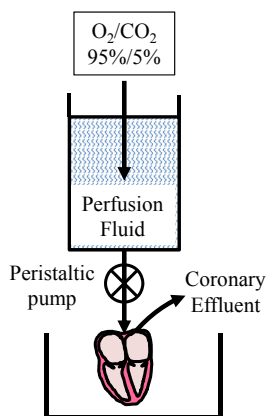


flow of fluid. The perfusion fluid is typically maintained at 37°C, contains a physiological salt mixture that mirrors plasma (pH 7.4), and is gassed with a 95%/5% O₂/CO₂ mixture (Figure 8.20). These conditions allow the heart to

FIGURE 8.20 Langendorff preparations provide an opportunity to study cardiovascular function in the presence of a candidate compound. A perfusion fluid containing a candidate compound is pumped through an isolated heart while monitoring for changes in cardiovascular function.



remain viable for several hours, providing an opportunity to study cardiovascular function in the presence of a test compound. Test compounds are simply added to the perfusion fluid at the desired concentration and the isolated heart is monitored for changes in function (contractility, heart rate, etc.). Since the heart has been isolated from all other organs and bodily system, the results of a Langendorff model are independent of any non-cardiac system. Neurohormonal modulation of the cardiovascular system in response to outside influences, for example, is not part of the equation in the Langendorff system. Any effects observed are directly related to the heart itself. This model has been successfully used with hearts from a number of different species including mice, rats, rabbits, dogs, pigs, and primates.⁴²

As useful as the Langendorff model may be, it is not without its disadvantages. First and foremost, no matter how well the model is established, it must still be considered a “dying” preparation. Cardiac function will naturally decay over time, and the heart will become less and less viable as time moves on (5–10% degradation of function per hour). It is, therefore, essential that Langendorff studies be accomplished quickly. In addition the advantage of working with an isolated heart is also a disadvantage, as it decreases the clinical relevancy of the model. Compensatory mechanisms from neurohormonal systems are absent, and compounds that might exert their effect through neurohormonal modulation may not elicit a change in cardiac function in this model. Although the Langendorff model can provide a wide range of information, it is not a substitute for *in vivo* study of candidate compounds.