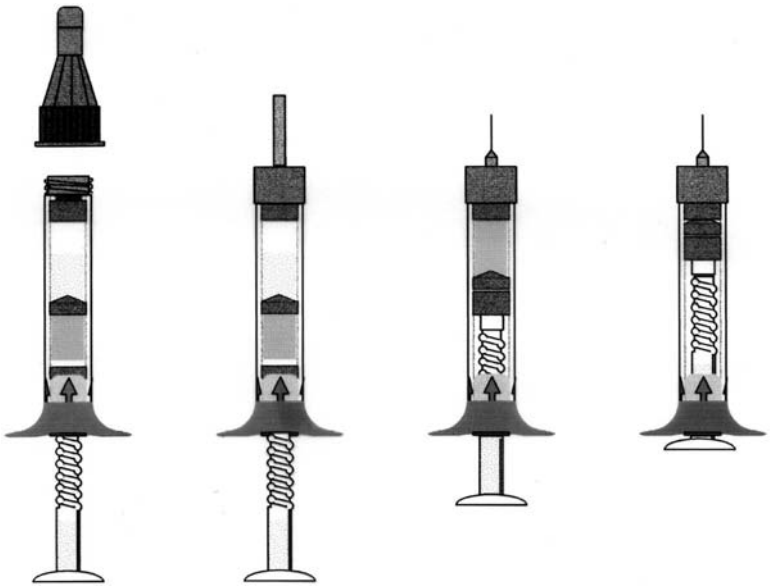

FIGURE 4 Use of dual chamber syringe (Genotropin MiniQuick).

performed by turning the plunger rod through a thread mechanism in the flange. There are approximately four steps prior to dosing the patient for the DCS (Fig. 4). These steps include removing the tip cap or disinfection of the rubber disk, attaching the luer or pen needle, attaching the plunger rod, and pushing/turning the plunger rod to move diluent from the rear to the front chamber to reconstitute the lyophilized cake. There are two DCS products that have been marketed: Cardizem, which is no longer on the market, and Genotropin Miniquick (Table 1).

FORMULATION DEVELOPMENT FOR THE ACTIVE-CONTAINING CHAMBER

It is critical to evaluate and gain an understanding of the fundamental relationships between the formulation, the process, and the package since all must work in unison for a successful product to be developed. Although formulation development activities for the lyophilized powder in the dual chamber package are similar to those for standard vial systems, there are some activities that are specific to package and process compatibility. Foremost, the formulator must consider the impact of moisture on product quality and ensure the cake mass is sufficient to withstand moisture ingress from the elastomer and diluent chamber. The formulator must also ensure the formulation is compatible with silicone and the selected elastomer. If the formulation is not compatible with silicone, either the formulation or the siliconization process needs to be optimized. Novel primary packaging, for example, silicone-free plastic, should be investigated in