Evaluation of the Factors Contributing to Levonorgestrel Binding in Addition Cure Silicone Elastomer Vaginal Rings

EVALUATION OF THE FACTORS CONTRIBUTING TO LEVONORGESTREL BINDING IN ADDITION CURE SILICONE ELASTOMER VAGINAL RINGS

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With the dapivirine (DPV)-releasing silicone elastomer (SE) vaginal ring (VR) now in Phase III clinical studies, there is now considerable interest in developing next-generation rings that could additionally provide contraception. Levonorgestrel (LNG, Fig. 1) is a second generation synthetic progestin used as an active ingredient in various hormonal contraceptives, including oral pills, intrauterine devices, and contraceptive implants. It is also the lead progestin candidate for use in future multipurpose prevention technology (MPT) products. Despite having previously been incorporated into SE devices, LNG’s propensity to react with addition cure SE VRs was first noted with oral pills, intrauterine devices, and contraceptive implants. It is the active ingredient in various hormonal contraceptives, including oral pills, intrauterine devices, and contraceptive implants. It is also the lead progestin candidate for use in future multipurpose prevention technology (MPT) products.

LNG materials with different particle size characteristics (e.g. non-micronised, micronised) have potential to undergo hydrolysis reactions, similar to the SE cure reaction (Fig. 2). To test this hypothesis, we investigated this phenomenon and offer some solutions.

A problem with LNG-loaded SE VRs was first noted with oral pills, intrauterine devices, and contraceptive implants. It is also the lead progestin candidate for use in future multipurpose prevention technology (MPT) products. Despite having previously been incorporated into SE devices, LNG’s propensity to react with addition cure SE systems has scarcely been reported. Here, we investigate this phenomenon and offer some solutions.

SEs are available with different cure chemistries. Addition-cure SEs involve the platinum-catalysed reaction between two types of silicone polymer – one containing silane groups (Si-H) and the other containing vinylsilane groups (Si-C=Si=O) (Fig. 2). These systems are preferred for medical and drug delivery applications, since they do not produce reaction by-products. However, certain constituents are known to inhibit the addition-cure reaction.

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