

completed. Time action curves on changes in pupil size and the various scale scores indicate that the duration of action of butorphanol appears to be similar to that of morphine through the 12 hours (Fig. 8). Dose response curves (Fig. 9) were constructed on these same measures using the mean total 5 hour responses (sum of the first 6 responses). Compared to morphine (Fig. 9; Table 6, 7), butorphanol produced certain effects similar to morphine, including pupillary constriction, significant dose-related scores on Symptoms and Signs Scales, "Liking" Scales, and identification as an opiate by subjects and observers. Butorphanol, however, did not produce significant scores on the MBG Scale (a measure of drug-induced euphoria), but did produce significant LSD and PCAG Scales elevations (Fig. 9). Butorphanol was also identified as a barbiturate more frequently than morphine and produced "nervousness" and "drunkenness" more frequently than morphine (Table 6, 7). Thus, the overall profiles of butorphanol appear to resemble those produced by agents such as nalorphine and cyclazocine. Potency estimates meeting statistical criteria for validity were obtained on certain of the measures (Fig. 9) indicating butorphanol tartrate was 1/3 to 1/5 as potent as morphine sulfate.

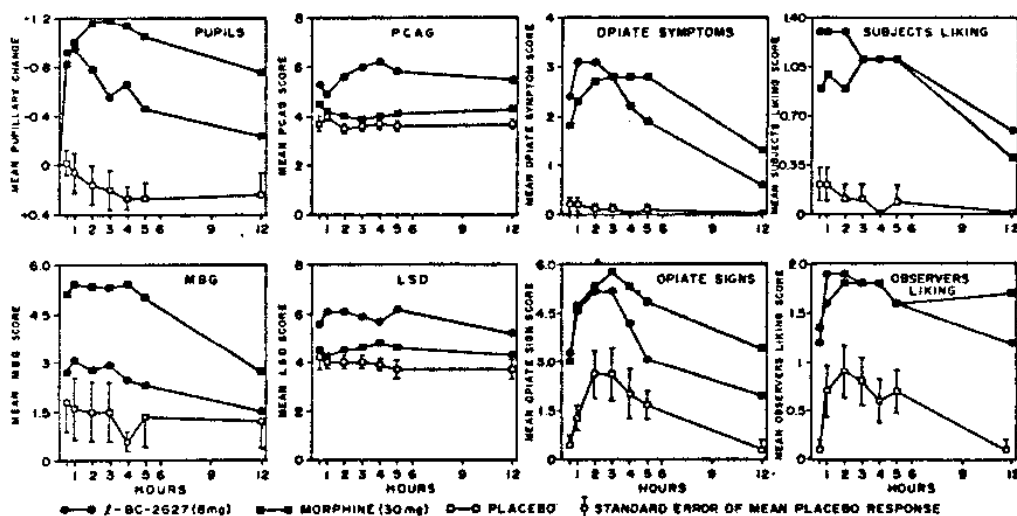


Figure 8. Time action curves for changes in pupil size and scores on scales for placebo, morphine, 30 mg, and butorphanol (z-BC-2627), 8 mg.