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Sox and Drugs: Baseball, Steroids and Physics

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The sports world is in an uproar over performance-enhancing drugs. In the United States steroids in baseball have received the most attention, in part because the purported effects are much more dramatic than in any other sport. From 1995-2003 a few players hit home runs at rates 20-50% higher than the best sluggers of the preceding century. Could steroids really increase home-run performance that much? I will describe a model that combines estimates of the physiological effects of steroids, known baseball physics, and reasonable models of batting effectiveness for highly skilled hitters. A 10% increase in muscle mass, which can reasonably be expected from steroid use, increases the speed of a batted ball by 3%. Because home runs are relatively rare events on the tail of a batter's range distribution, even this modest change in ball speed can increase the proportion of batted balls that result in home runs by 30 – 70%, enough to account for the record-shattering performances of the recent past. I will also describe some of the attention – both welcome and not – that comes to the unsuspecting physicist who wades into such emotionally troubled waters.