Dosage schedules for antibiotics should be based upon pharmacokinetic studies. Such studies provide knowledge about serum, tissue, and urine levels which may be obtained in a patient with various dose sizes or with different routes of administration of an antibiotic. The dosage schedule should also take into account the sensitivity pattern of the infecting organism. Thus, the appropriate dosage for each patient should be the one which will produce antibiotic levels in serum and tissues sufficiently high to combat an infection caused by microorganisms with a sensitivity pattern that renders them amenable to treatment with the antibiotic in question. The pharmacokinetic studies on which dosage recommendations are based have been carried out in healthy volunteers as well as in patients with various diseases, but for obvious reasons they are never carried out in pregnant women.

However, it is well known that infections which require antibiotic treatment are far from uncommon during pregnancy. The infection may be confined to maternal tissues only as with pharyngitis, pyelonephritis, pneumonia, or, as in the case of syphilis, involve the fetus as well. In the first case the main concern in the choice of dose and route of administration should be to obtain adequate serum and tissue levels of antibiotic in the infected maternal tissue, not so low to be ineffective in which case the patient’s suffering from the infection will be prolonged, and not too high which might increase the risk of adverse effects and unduly expose the fetus. In the case where the fetus is infected as well it is vital that sufficiently high levels of antibiotic are reached and maintained in fetal tissues in order for the infection to be cured effectively. If, on the other hand, the pregnant woman has a genital infection which may rise and reach the amniotic fluid it is crucial that a satisfactory level of antibiotic is reached in the amniotic fluid following administration to the pregnant patient without any unnecessary delay.

When infections that require treatment occur during pregnancy most physicians will prescribe antibiotics in the same dosage as is used in the treatment of nonpregnant patients, or possibly they will even lower the dosage because of fear of harmful effects either to the pregnant woman or to the fetus. However, it is quite clear that the same ratio between the minimum inhibitory concentration (MIC) of the infecting organism and the tissue level of antibiotic is desirable in pregnant as in nonpregnant patients. Thus, if the
pharmacokinetics of an antibiotic is altered during pregnancy, thereby increasing or decreasing serum and tissue levels that result from a certain dose size, the dosage schedule will have to be adjusted accordingly as to size of the dose or route of administration, in order not to make the treatment of a pregnant woman less satisfactory than had she not been pregnant.

Considering the great physiological changes, that occur within most organ systems during the course of pregnancy, some very early and some progressing with time [1] it seems obvious that several pharmacokinetic parameters will be influenced, the reasons being the same for antibiotics as for other drugs [2, 3], and hence that dosage requirements will not be the same for pregnant as for nonpregnant women.

What is said above will hopefully illustrate why it is extremely important to gain extensive knowledge of pharmacokinetics of antibiotics in pregnancy, i.e. serum and tissue levels, excretion, as well as transplacental passage and possibly accumulation. Data obtained from studies carried out in men and nonpregnant women may not be applicable to pregnant women without thorough investigation and monitoring.

In spite of the obvious need for knowledge about the behaviour of antibiotics in pregnancy little has been published on this subject compared to what is known about pharmacokinetics of antibiotics in man by and large. Many articles on antibiotics in pregnancy fall into either of the three categories: 1) Retrospective studies of possible or definite harmful effects of an antibiotic to the pregnant woman or to the fetus, or 2) Prospective treatment studies, usually on urinary tract infections or 3) Studies that qualitatively demonstrate the transplacental passage of an antibiotic. Only rather few studies concern themselves with pharmacokinetics. The most extensive encyclopedia on antibiotics, the Antibiotika-Fibel by Walter and Heilmeyer [4] provides very little help as to dosage of antibiotics for the physician who wants to treat an infection in a pregnant patient.

The use of most new antibiotics is discouraged during pregnancy due to lack of knowledge of possible harmful effects, and some of the older ones are known or suspected of such effects. Therefore it is essential that the antibiotics which have either been in use for a long time without suspicion of increased toxicity during pregnancy or are known to be safe are handled and prescribed in such a skilled way as to compensate for the decreased antibiotic armamentum and provide optimal cure and protection of infections during pregnancy. This can be achieved only by gaining detailed knowledge of pharmacokinetics. The whole concept of pharmacokinetics as such is fairly new and the shortage of pharmacokinetic data in pregnancy is of course due to technical as well as to ethical problems related to such studies.