Chapter 7
General conclusions

In this thesis data are presented on normal and abnormal (intra)thoracic and (intra)abdominal fetal development as studied by conventional two-dimensional real-time ultrasonography and/or colour coded Doppler ultrasonography, allowing the following conclusions to be made.

The fetal lungs can be visualized with ultrasound from the second trimester of pregnancy onwards. Fetal lung biometry seems to be of limited clinical value in the prenatal prediction of pulmonary hypoplasia. Hyperechogenic fetal lungs can be encountered in a variety of pathological conditions, though may regress spontaneously. Resolution does not always suggest an improvement in prognosis. Lung echogenicity is not useful as a prenatal predictor of pulmonary maturity. Modern colour Doppler equipment allows visualization of the peripheral pulmonary vasculature, and may contribute to the prenatal diagnosis of pulmonary hypoplasia, next to bronchopulmonary sequestration and congenital diaphragmatic hernia.

Sonographic characteristics of abnormal fetal (intra)thoracic development vary from hypoplasia and abnormal fluid collections, to cystic abnormalities and hyperechogenic masses. Prenatally diagnosed congenital cystic adenomatoid malformation of the lung may have a macrocystic or a more solid (microcystic) appearance and can be associated with secondary fetal hydrops and polyhydramnios. Both fetal hydrops and polyhydramnios suggest a poor outcome.

Congenital diaphragmatic hernia is most frequently associated with congenital heart disease. Overall mortality is high. Polyhydramnios and an intrathoracic position of the stomach are poor predictors of fetal outcome.

The normal fetal abdominal wall, gastrointestinal and renal tract can be reliably studied with ultrasound. Colour coded Doppler ultrasound contributes to the visualization of the intra-abdominal vasculature, in particular the renal artery and vein, common iliac vein, and ductus venosus.

Also the abnormal development of the fetal abdominal wall, gastrointestinal and renal tract can be accurately evaluated with prenatal ultrasound. The prognosis of omphalocele predominantly depends on the associated malformations and chromosomal anomalies. The prognosis of gastroschisis is mainly determined by prematurity and the associated intestinal damage. The predictive value of prenatally detected small bowel

thickening and dilatation for intestinal compromise and poor clinical outcome, is still subject to debate. Although colour coded Doppler may facilitate the diagnosis of an abdominal wall defect, it does not contribute to the accuracy of the diagnosis or obstetric management.

Gastrointestinal tract obstructions often present on ultrasound by one or more dilated parts of the digestive tract. This is not true for the fetal stomach and colon, because of their considerable variety in size, and the substantial overlap between physiological and pathological distension. Gastrointestinal tract obstructions are often associated with second and third trimester polyhydramnios. Especially, the ultrasonic "double bubble" sign is associated with an abnormal fetal karyotype. Although no reliable conclusion could be made with respect to the role of colour Doppler imaging in gastrointestinal tract obstructions, also in this group of anomalies its role seems limited.

Renal tract anomalies are usually detected through intraabdominal structural anomalies and/or a decreased amount of amniotic fluid. As the correlation between ultrasound findings and fetal renal function is poor, analysis of fetal urine biochemistry was expected to improve the selection of cases amenable to antenatal treatment. Both the impact of fetal urine analysis and in-utero intervention, however, are still subject to debate. Also, colour coded Doppler imaging of the renal vasculature in hydronephrosis does not seem to provide convincing information regarding renal function. Colour coded Doppler ultrasonography may be helpful in confirming the diagnosis of renal agenesis.

Fetal growth retardation is associated with an increased risk of congenital anomalies. To differentiate between growth retarded and small-for-gestational age (SGA) fetuses is of great clinical importance, though can be difficult in daily practice. Intrauterine growth retardation suggests a delay in progress and, by definition, requires longitudinal observations, whereas SGA is defined by certain thresholds of fetal size or birth weight. Our data and those from recent literature illustrate that the clinical relevance of the distinction between symmetrical (proportionate) and asymmetrical (disproportionate) SGA fetuses is not as clear as previously thought, as both types of SGA are at risk of structural and chromosomal anomalies, and perinatal death. Therefore, diagnosis of SGA should always be followed by a proper fetal anomaly scan as prenatal detection of structural abnormality and additional fetal karyotyping are essential to avoid obstetric interventions in those pregnancies which are destined to end in perinatal death. In our series, structural anomaly was confirmed postnatally in 8 per cent of correctly diagnosed SGA fetuses, the majority consisting of cardiac defects and renal tract anomalies. Especially triploidy should be excluded in case of combined SGA and

oligohydramnios, as this entity represented the main part of the numerically abnormal karyotypes.