

Intrauterine growth retardation

Small for gestational age

and

Premature newborns

The terms IUGR and small for gestational age (SGA), although related, are not synonymous. IUGR is a deviation from, or a reduction in, an expected fetal growth pattern and is caused by innate reduced growth potential or by multiple adverse effects on the fetus.

IUGR is the result of any process that inhibits the normal growth potential of the fetus. Fetal growth at term may be predicted by anthropometric analysis of fetal dimensions with second-trimester ultrasonography.

The term low birthweight refers to infants born weighing less than 2500 g. The neonatal mortality rate is directly related to the low-birthweight rate in a given population.

These high-risk infants are a heterogeneous group consisting of infants born preterm (less than 37 weeks) and those born at term but of reduced weight

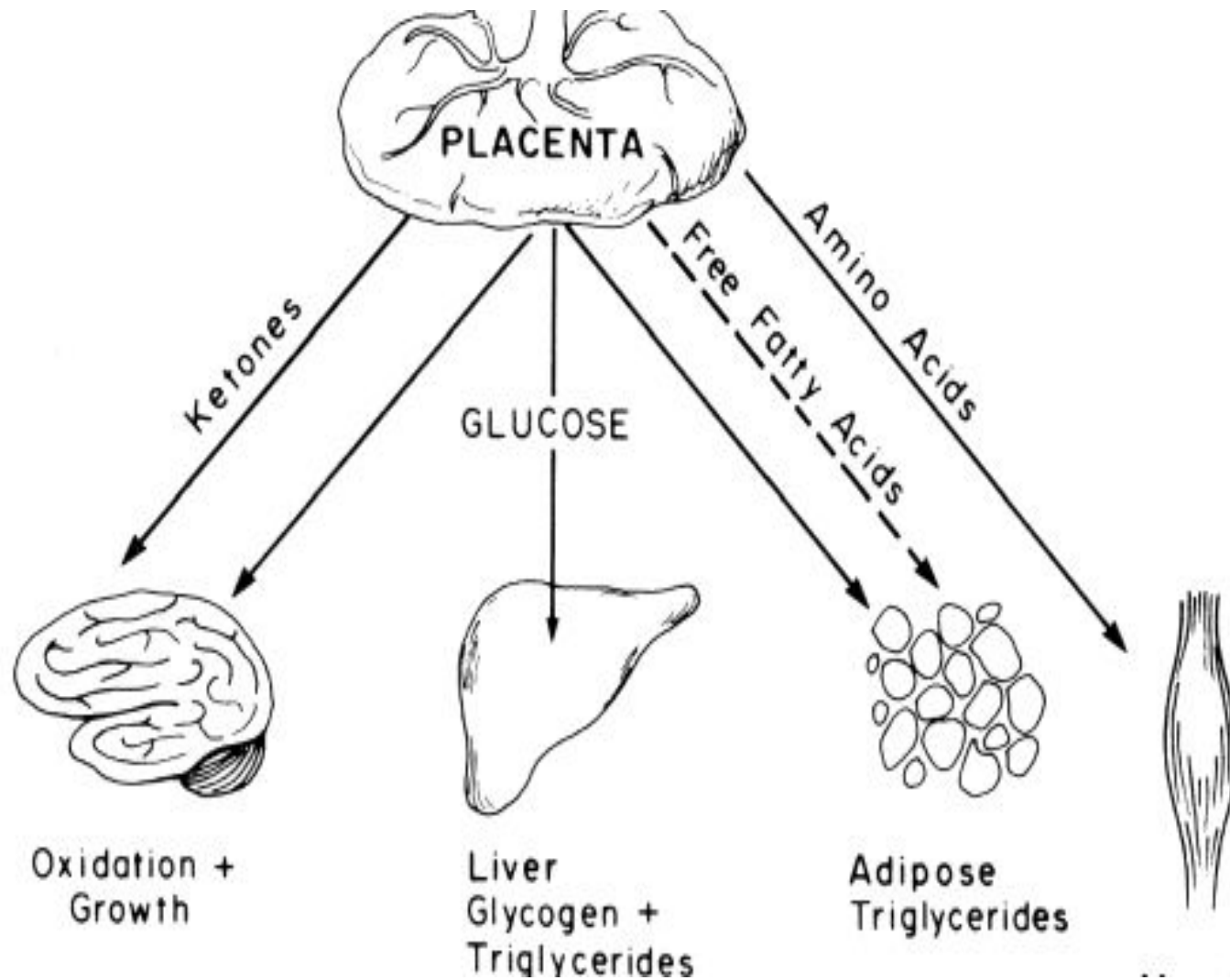
The infant with low birthweight (less than 2500 g) is not always premature (earlier than 37 weeks). Worldwide, more than 20 million infants are born weighing less than 2500 g. Between 30% and 40% of these infants are born at term gestation and are therefore undergrown (SGA status).

Contribution of Organs to Body Mass during Development

TISSUE	FETUS (20–24 WK) (%)	TERM BABY (%)	ADULT (%)
Skeletal muscle	25	25	43
Skin	13	15	7
Skeleton	22	18	18
Heart	0.6	0.5	0.4
Liver	4	5	2
Kidneys	0.7	1	0.5
Brain	13	13	2

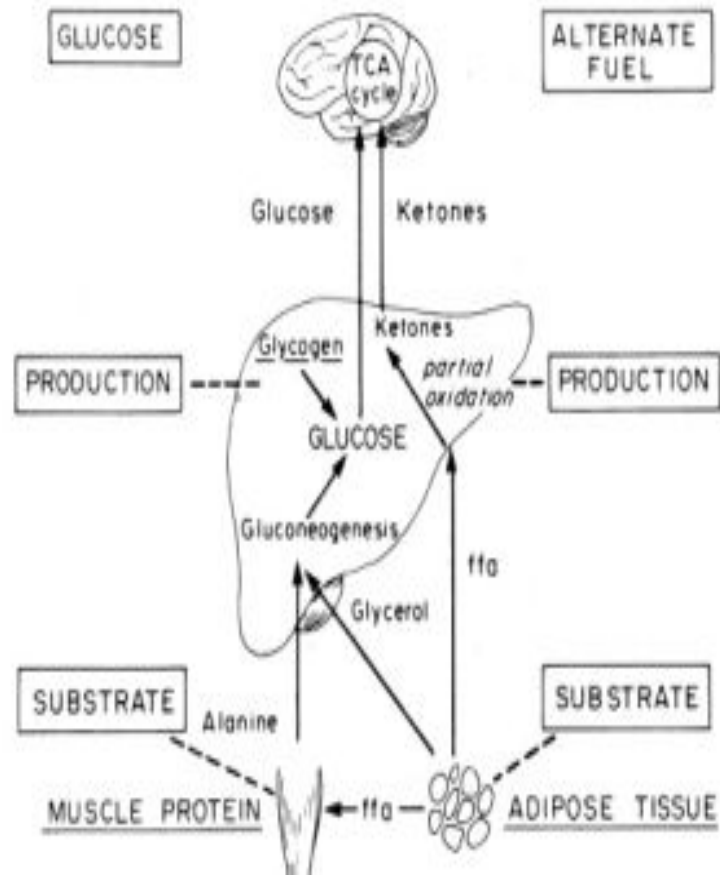
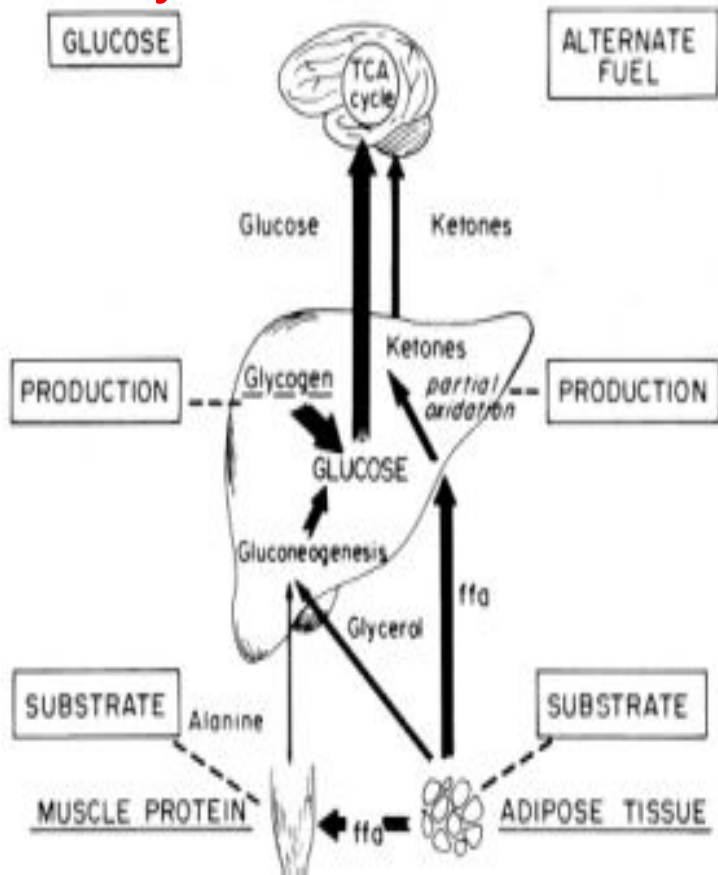
Pulsatile index = (peak velocity – end-diastolic velocity)/mean blood flow velocity.

OBSERVATION	COMMENT
50% ↓ Uteroplacental flow	¹¹³InCl to mother
↓ Uterine flow in malnutrition ↓ Placental nutrient transfer	Failure to increase cardiac output with pregnancy
↑ Uterine artery systolic/diastolic waveform ratio ↑ Umbilical artery velocity waveform	Suggests increased uterine artery resistance
↓ Fetal descending aortic pulsatile index * ↓ Fetal descending aortic end-diastolic velocity	Suggests increased peripheral vascular resistance
↑ Fetal descending aortic resistance index ↓ Fetal descending aortic peak velocity to brain, and fetal distress	Suggests decreased cardiac output, shunting away from descending aorta
Reversed diastolic flow	Suggests severe reduction in flow and fetal compromise
↓ Umbilical venous flow	Associated with impending fetal distress
↓ Placental prostacyclin production	May promote platelet aggregation or diminish uterine vessel dilation
¹¹³InCl, indium-113 chloride; IUGR, intrauterine growth restriction.	



Placental nutrient support and disposition of substrates.

Postnatal glucose and fatty acid metabolic relationships in neonates who are appropriate for gestational age (AGA) (**A**) and small for gestational age (SGA) (**B**). Arrows reflect magnitude of flux. Infants who are SGA demonstrate both diminished glycogen stores and gluconeogenesis. In addition, they may have attenuated fatty acid oxidation. ffa, free fatty acids; TCA, tricarboxylic acid.



Symmetric

		Early onset
		Constitutional or “normal” small
		Low profile biparietal diameter
		? Growth potential
		Normal ponderal index
		Low risk for perinatal asphyxia
		Brain symmetry to body size, short femur
		Normal blood flow in internal carotid artery
		Proportionate abdominal circumference
		Normal maternal and fetal arterial waveform velocity
		Glycogen and fat content relative
		Low risk for hypoglycemia

Asymmetric

Late onset

Environmental

Late-flattening biparietal diameter

Growth arrest

Low ponderal index

? Risk for asphyxia

Brain sparing, normal femur length

Redistribution to internal carotid artery bloodflow

Decreased abdominal circumference

? Maternal and fetal arterial waveform velocity

? Glycogen and fat content

? Risk for hypoglycemia





Term infant who is small for gestational age,
demonstrating
wizened facies and dry, desquamating, hanging skin.
Birthweight, 1500 g.



Diamniotic monochorionic twins, 36 weeks' gestational age, with birthweights of 1.3 and 2.0 kg.