FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

MULTIPLE ALLELES

•When a given gene has several alleles, not just two

•A diploid individual still has a maximum of 2 alleles, one on each homologous chromosome

•ABO Blood Groups

- •Discovered in early 1900s
- •Important when considering tranfusions
- •4 types; 3 alleles

ABO Blood Groups

- •A: I^AI^A; I^ai
- •B: I^BI^B; I^bi
- •AB: I^AI^B
- •O: ii

Phenotype (Blood Group)	Genotype
O	i/i
A	I^A/I^A or I^A/i
B	I^B/I^B or I^B/i
AB	I^A/I^B

ABO Blood Groups

I^A : specifies the 'A' antigen; antibodies against 'B' and will clump onto the I^B

I^B : specifies the 'B' antigen; antibodies against 'A' and will clump onto the I^A

AB : have both antigens, but no "anti-" antibodies

O (ii) : have no antigens and no "anti-" antibodies

Safe Transfusions:

A (I^AI^A /I^Ai) – can receive A or O

Can give to A or AB

B (I^BI^B /I^Bi) – can receive B or O

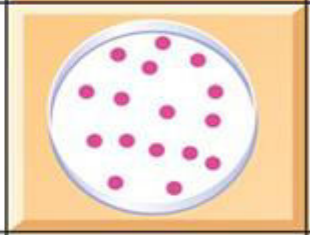
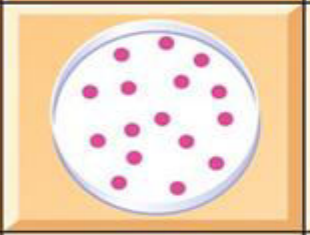
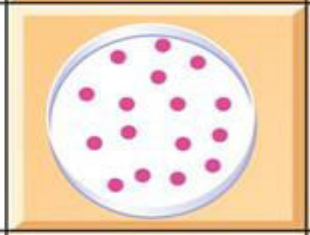
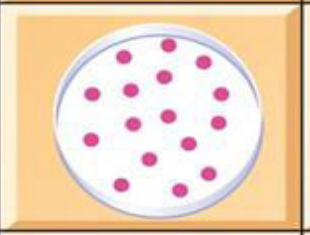
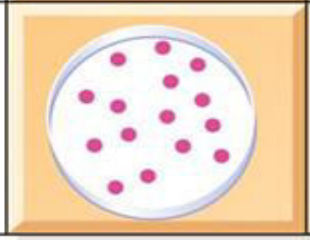
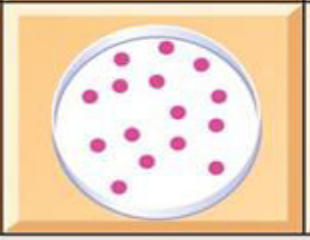
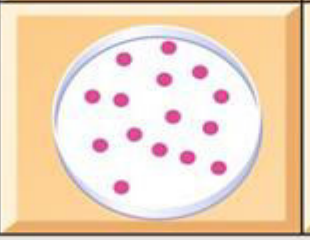
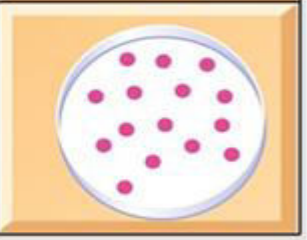
Can give to B or AB

AB (I^AI^B) – can receive AB or O

Can give to only AB

O (ii) – can receive only O

Can give to any blood group, A, B or O

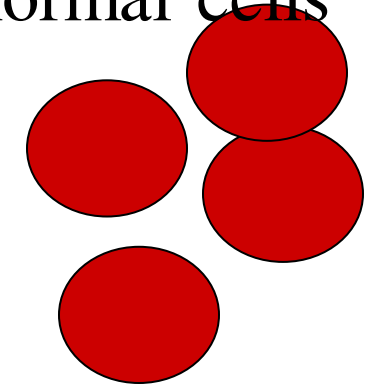
Serum from blood type	Antibodies present in serum	Cells from blood type			
		O	A	B	AB
O	Anti-A Anti-B				
A	Anti-B				
B	Anti-A				
AB	—				

Codominance

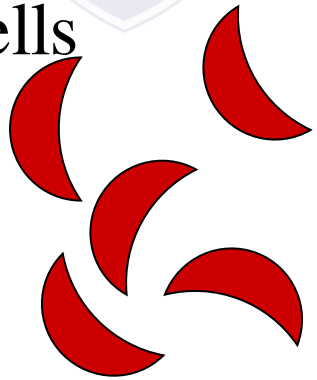
- The heterozygous condition, **both** alleles are expressed equally

- Sickle Cell Anemia in Humans

NN = normal cells



SS = sickle cells



NS = some of each