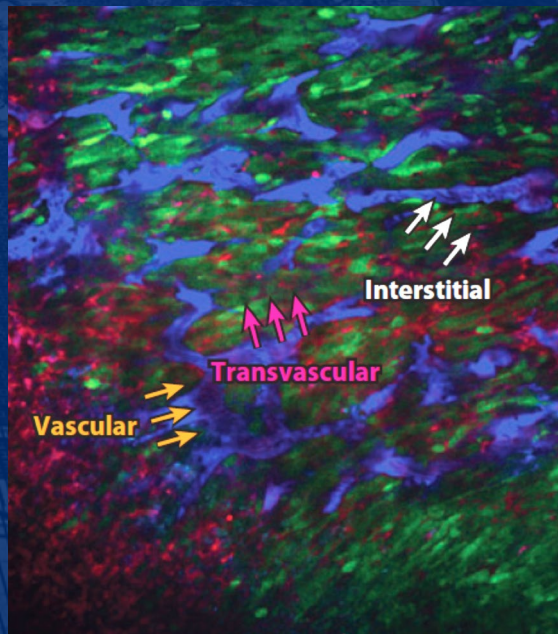
JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Cell and Tissue Engineering

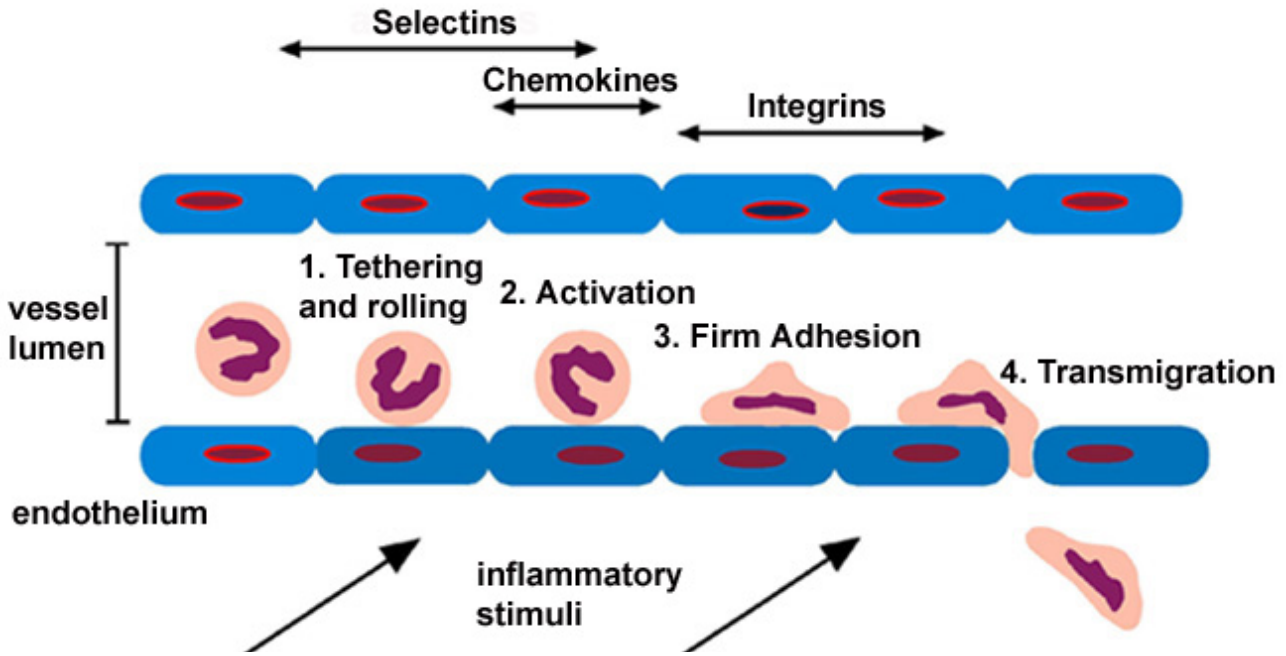
Cell Trafficking



Cell Delivery Through Layers of Cell (1)

Margination
Adhesion
Transmigration

The vascular wall is a barrier!

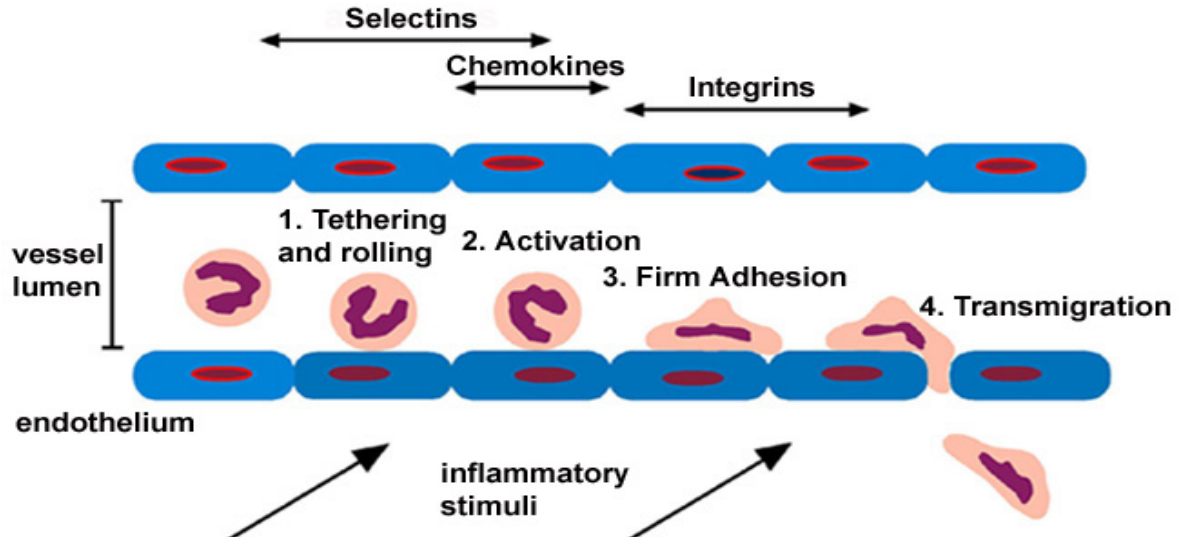


Mpi-muenster.mpg.de; Kanoch et al 2011

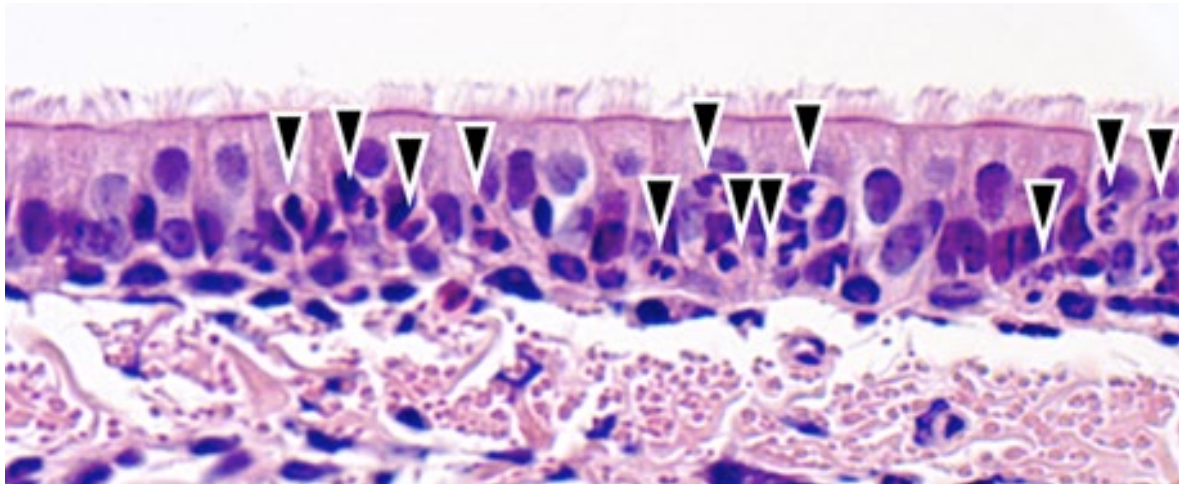
Cell Delivery Through Layers of Cell (2)

Margination
Adhesion
Transmigration

The vascular wall is a barrier!



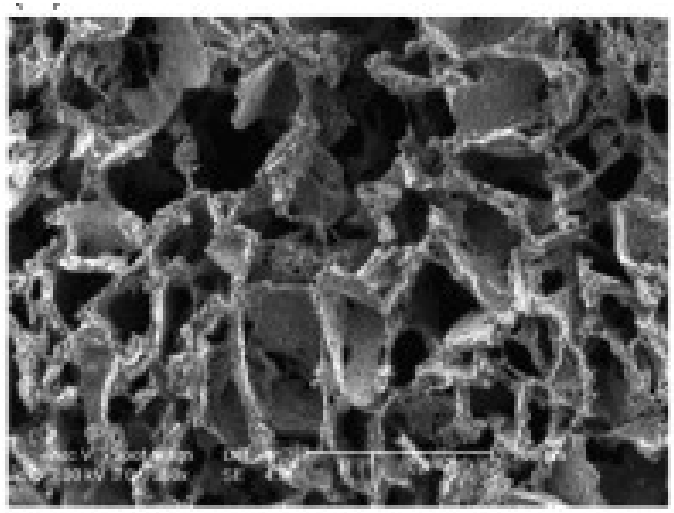
Arrow heads indicate infiltrating neutrophils

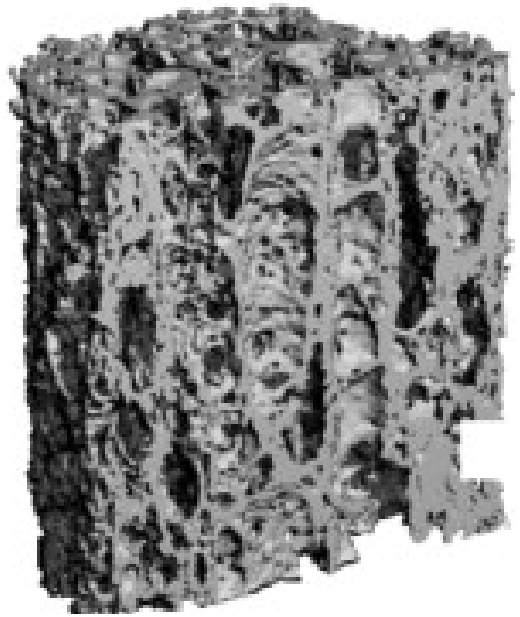


Mpi-muenster.mpg.de; Kanoch et al 2011

Cell Delivery Through Layers of Cell (3)

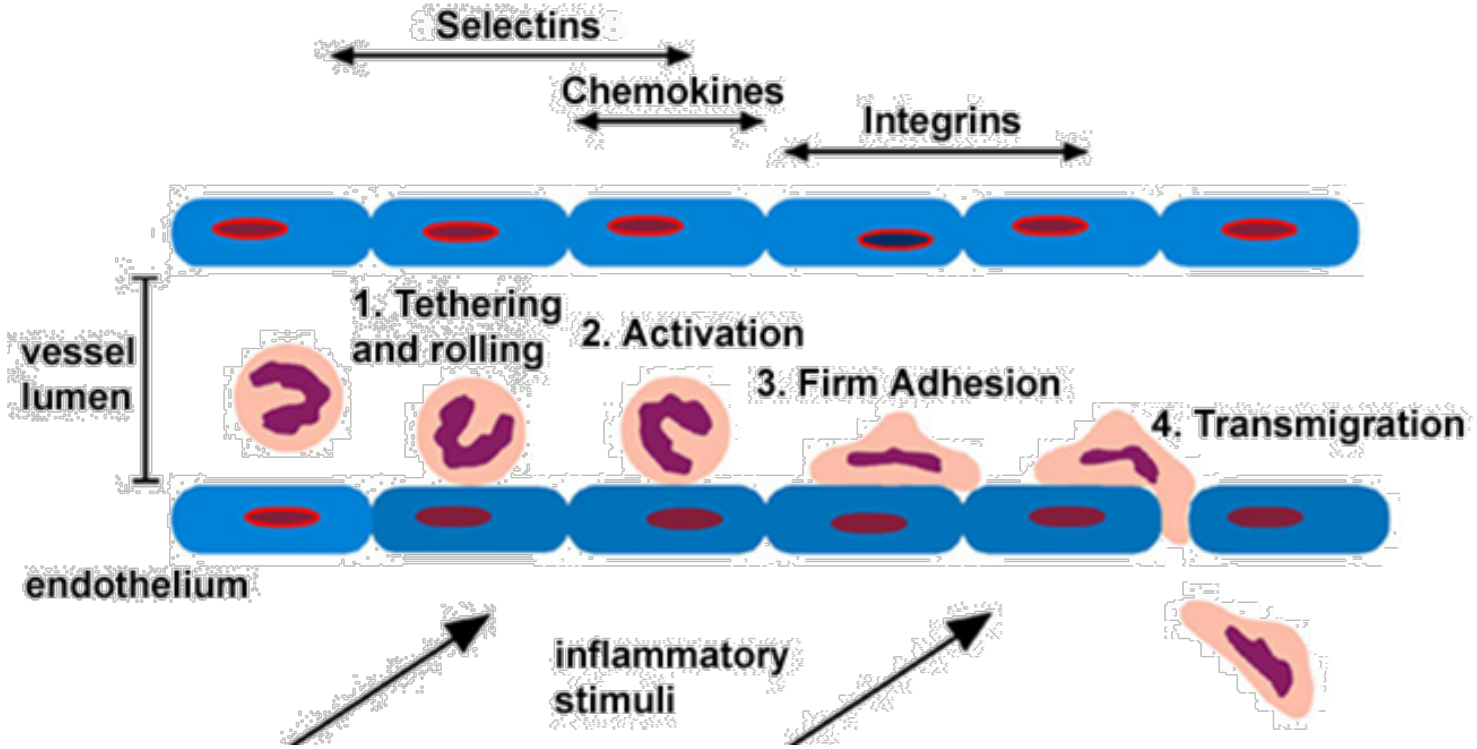
Margination
Adhesion
Transmigration

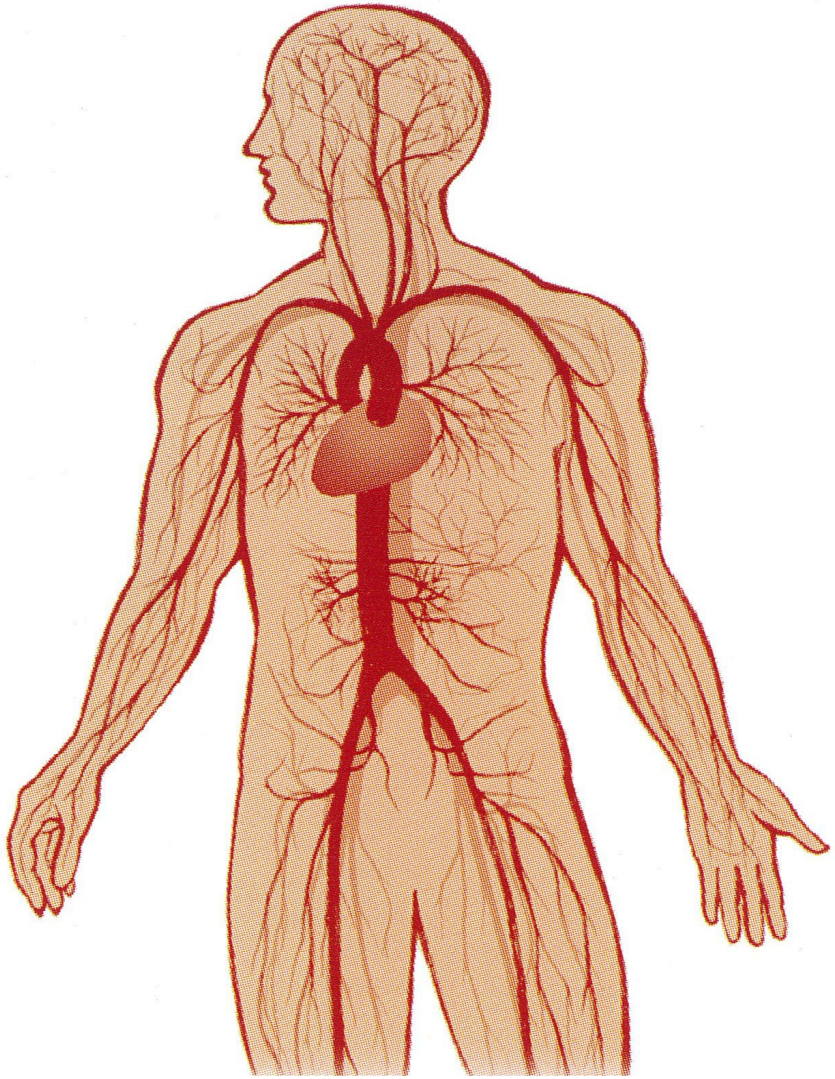




Mpi-muenster.mpg.de; Kanoch et al 2011

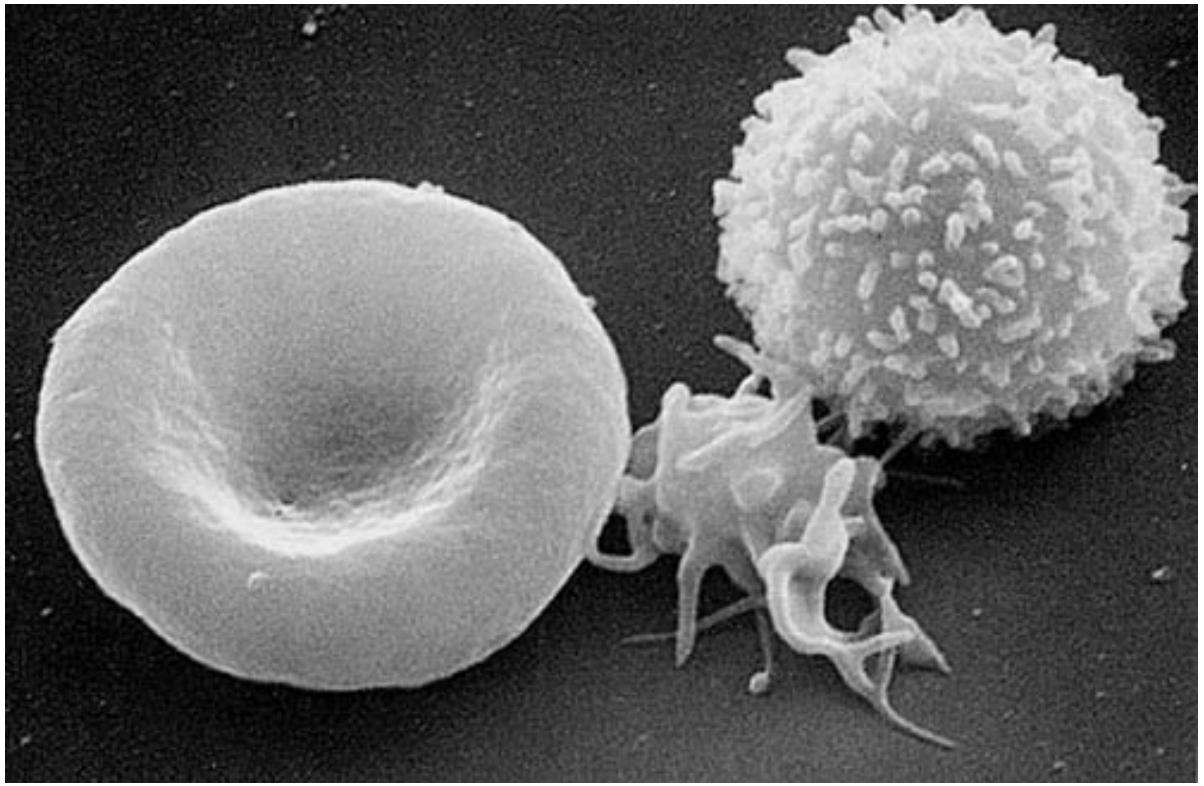
Using the Circulation for Cell Delivery (1)





wikipedia

Using the Circulation for Cell Delivery (2)

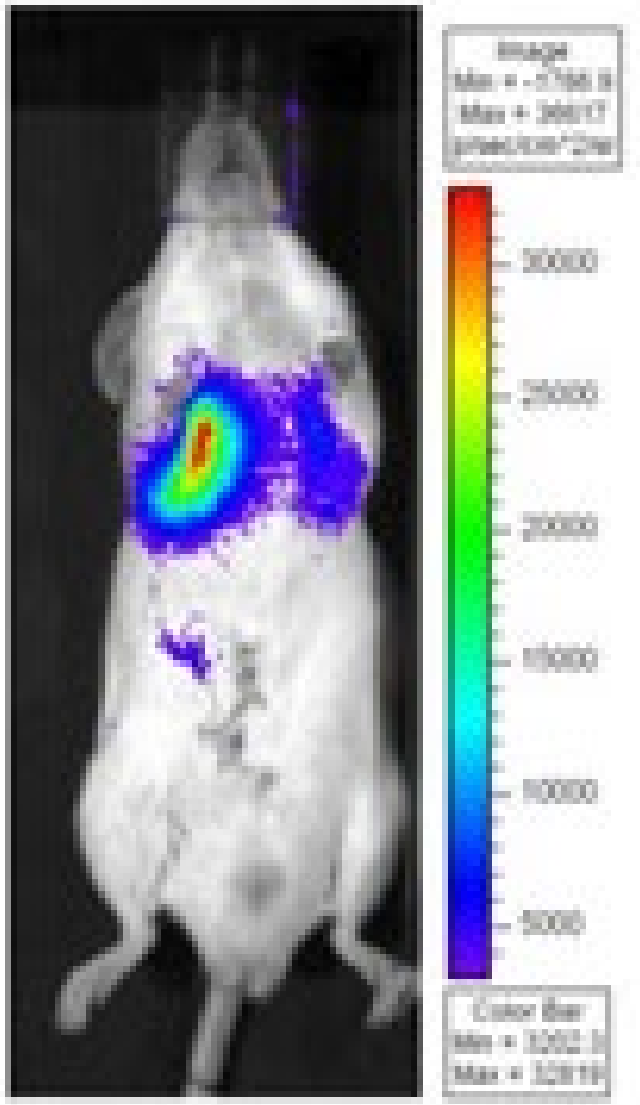


wikipedia.org

Using the Circulation for Cell Delivery (3)

Circulating cells trapped in the blood

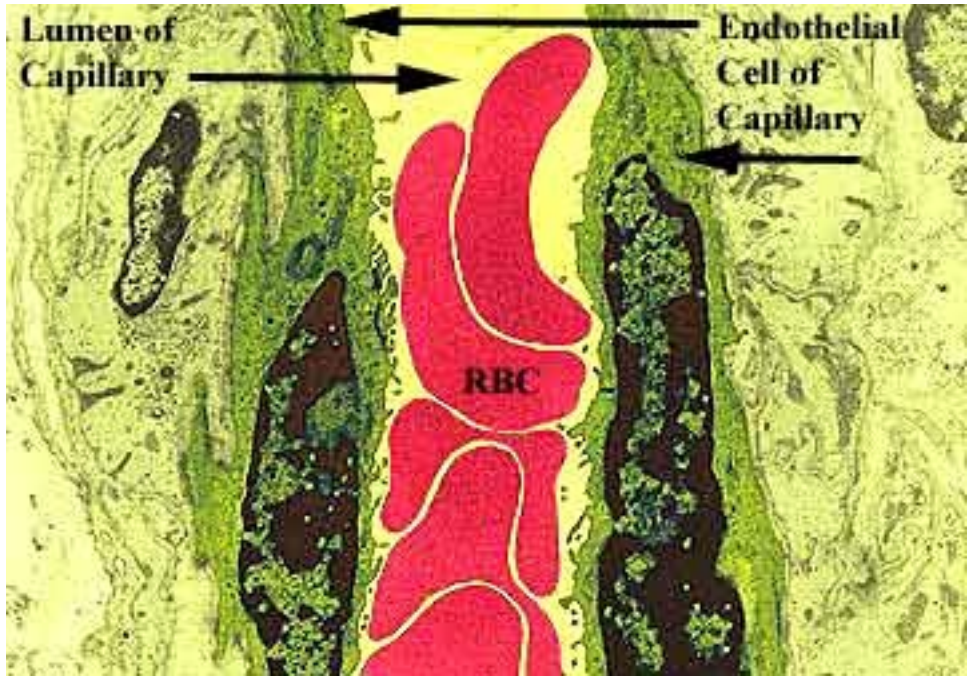
Cell type	Lifespan in circulation
RBCs	110-120 days
Platelets	8 days
Neutrophils	0.3 days
Lymphocytes	30 days

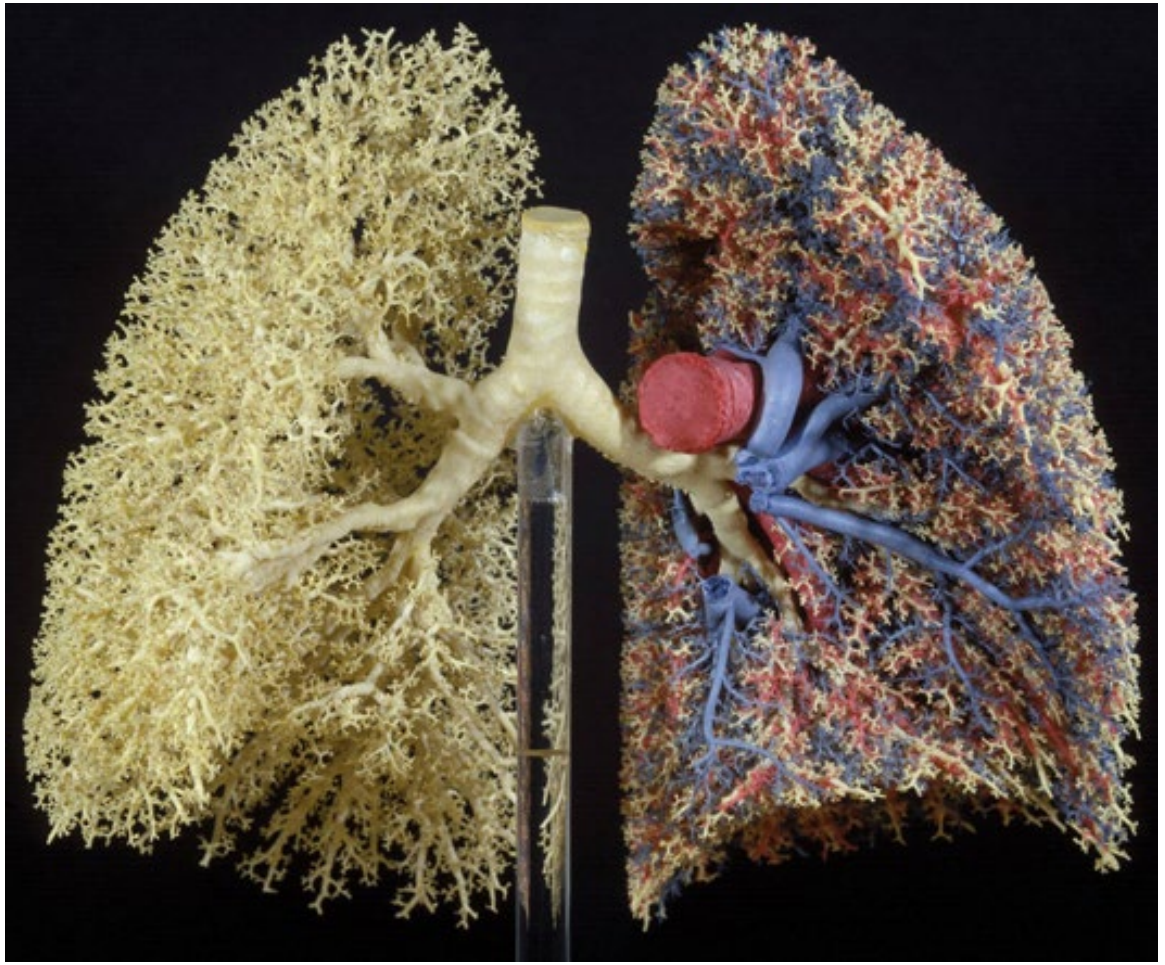


Adapted from Tissue Engineering, Saltzman; Uke.de; Imperial.ac.uk

Using the Circulation for Cell Delivery (4)

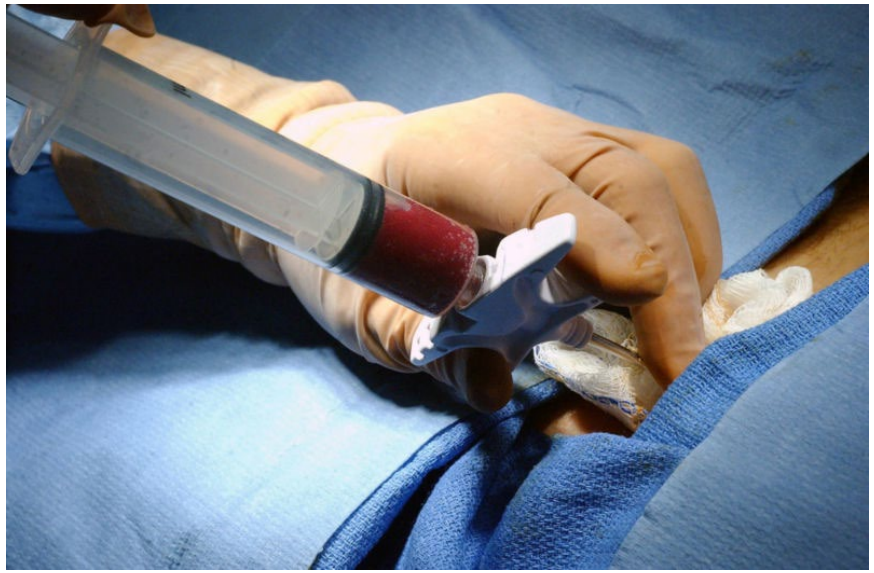
Deforming RBCs in a capillary

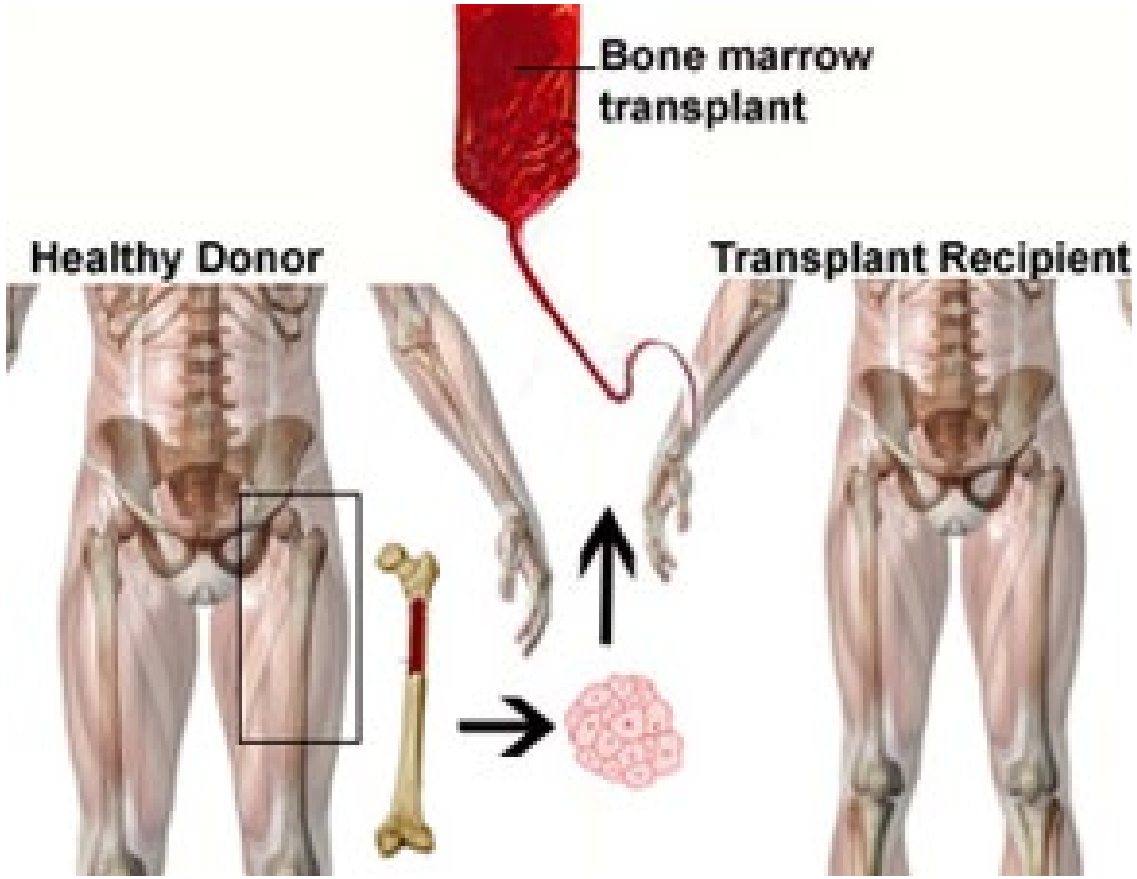




Using the Circulation for Cell Delivery (5)

Hematopoietic stem cells
know where to go
in transplants

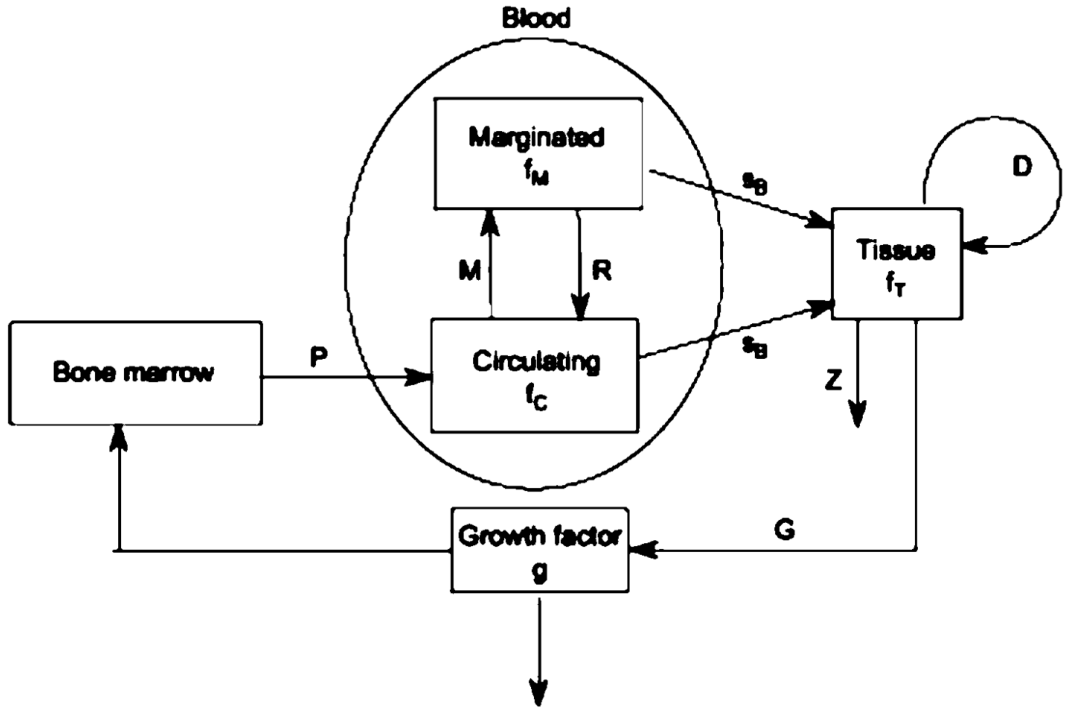




Using the Circulation for Cell Delivery (6)

Compartment model of cell trafficking in the circulation

M	margination
C	circulation
P	production in the bone marrow
Z	destruction
G	growth factor stimulation of production
D	proliferation in the tissue
R	Return



Using the Circulation for Cell Delivery (7)

lymphocyte recirculation

Cell type	Lifespan in circulation
RBCs	110-120 days
Platelets	8 days
Neutrophils	0.3 days
Lymphocytes	**30 days**