بخش ۲

فرآیندهای حیاتی در سطح سلولی مولکولی

Part 2
Cellular and Molecular Processes

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Abbreviations Used in Complement System

C1, 2, 3,5...9
complement factors (mostly written in boxes. Activated forms shown with bar)
factor B, D, H, I
factor C3b and C4b inactivators
factor C4b binding protein
factor CR binding protein = MAP (homologous restriction factor)
complement factor I inhibitor
decay accelerating factor
decay accelerating factor
membrane cofactor protein
binding to bacteria or amino groups at serum or membrane proteins

Abbreviations Used in DNA Metabolism, Transcription, Translation and Signal Transduction

(Most abbreviations are those used by the first authors).

aa
amino acid (unspecified). For specified amino acids, see "Genetic Code" (square GP 7-8).
A,C,G,U
adenine, cytosine, guanine, uracil
ddx-, ddxxx-
dideoxy- or deoxynucleosidetriphosphate
ddx-, ddxxx-
dideoxy- or deoxynucleosidemonophosphate
ADP-ribosylation
enzymatic reaction using nicotinamide + cAMP
base pair kinkbase pair
CAP
catabolite activator protein (=CRP)
CAP binding protein
nuclear proteins involved in transcriptional regulation
cAMP
cyclic adenosine monophosphate
CRE
cAMP responsive element binding protein
A,P,T-DP, -MP, -TP
adenosine, thymidine di-, monophosphate
protein binding to DNA-Origin(eo) of the initiation complex
eukaryotic initiation factors for translation (abbrev. to IF...)
eukaryotic elongation factor
eukaryotic termination factor
eukaryotic initiation factors for translation (abbrev. to IF...)
eRF
eukaryotic release factor
fMet
N-formylmethionine
GAP
GTPase-activating protein
GDP, GTP
guanine nucleoside di-, triphosphate
GEF
guanine nucleotide exchange factor
G-NUCLEOTIDE
guanine nucleoside di-, triphosphate + cGMP
HAT
histone acetyltransferase
HDAC
histone deacetylase
(ISU-)rich/nonspecific/LS, IS, Y-specific/endonuclease
restriction endonuclease, isolated from Escherichia coli
insulin-like growth factor
Midasses (TOO0 bases)
mitogen activated ribosomal protein (brain)
messenger ribonucleic acid
enzymes for repair of replication errors in DNA synthesis
nuclear matrix proteins
protein components of protease complex
NLS binding protein
nuclear localization signal
nuclear pore complex
nuclear transport receptor
nucleotide excision repair
regulatory subunit of NKB protein
PCNA
DNA polymerase processivity factor
DNA polymerase 1
phosphodiesterase
PDE1
calmodulin-dependent
PDE5
cGMP-specific
RF-A,-B,-C
RF-A,RF-B,RF-C
factors
rRNA
ribosomal RNA
SerA,B,Y
serine
SHP
SRP
signal recognition particle
SRP
serine/arginine
TF-II-B, -D, -E, -H
transcription factor
TFIIB, TFIID, TFIIE, TFIIH
transcription factor
TOPO-I, -II
topoisomerase
tRNA
transfer RNA
UBF
upstream binding factor
UTR
untranslated region
VP
virion protein

Abbreviations Used in Coagulation
(Indices x = Activated, Index I = Inhibited)

Proteinases and Precursors

V_x
factor V, prothrombin thrombin
VII_x
factor VII, proconvertin convertin
IX_x
factor IX, Christmas factor
X_x
factor X, Stuart-Prower factor
XI_x
factor XI, plasma thromboplastin antecedent
XII_x
factor XII, Hageman factor
PK
plasma kallikrein (activated PK)

Cofactors and Receptors

$VIII_x$
factor VIII, antihemophilic factor
$VIII_x$:vWF
factor VIII:antihemophilic globulin complex
HMW-kg
high molecular weight-kininogen
TM
thrombomodulin

Proteinase Inhibitors

AT_x
antithrombin
$C1INH_x$
C1 inhibitor
$PAI-1,2,3$
inhibitor 1, 2, 3
PCI
protein C inhibitor
PN-1
protease nexin 1
$TFPI_x$
tissue factor pathway inhibitor (=EPI,LACI)

Platelet Factor Receptors
(Important for Activation of Adhesion)

GP
glycoprotein
GPIb
receptor for vWF
GPIIb/IIIa
receptor for fibrinogen mediated activation
α-granule membrane protein exposed
GPIIb/IIIa
receptor for fibrinogen mediated activation
receptor for von Willebrand factor
GPVI
collagen receptor
GPIIb/IIIa
receptor for fibrinogen
GPIIb
receptor for fibrinogen

Others

$XIII_x$/$XIII_x$-A,-B
factor XIII, fibrin stabilizing factor (subunits in parentheses)
plasminogen activator inhibitor 1 inhibitor
heparin cofactor II = HCII
plasminogen activator inhibitor
protein C inhibitor
tissue factor 2
thrombin/factor pathway inhibitor (=EPI,LACI)

Coagulation control

protein C/Ca
plasma (prealbumin)/Factor factor)
plasminogen
PLG
plasminogen
PLG_x
plasmin
PLG_x
activator
scu PA
single chain tissue-type plasminogen activator
scu_xPA
single chain urokinase-type plasminogen activator

Abbreviations used in Immunology

Ig
immunoglobulin
IgA
IgD
IgE
IgG
IgM
sIg
surface immunoglobulin
TCR
T-cell receptor
MHC
major histocompatibility complex
HLA
human leukocyte antigen
APC
antigen presenting cell
MLR
mixed lymphocyte reaction
CTL
cytotoxic T-lymphocyte
NK
natural killer cell
LAK
lymphokine activated killer cell
ADCC
antibody dependent cell mediated cytotoxicity
Fab
antigen binding fragment
Fc
crystallizable fragment
V
variable
C
constant
H
heavy chain
L
light chain
CDR
complementarity determining region
FR
framework region
Ig-SF
immunoglobulin superfamily
TI
T-cell independent
TD
T-cell dependent
Ig-R
Ig receptor
Ig-BP
Ig binding protein
Ig-BF
Ig binding factor
Ig-BS
Ig binding site
Ig-GF
Ig gene family
Ig-GS
Ig gene segment
Ig-GR
Ig gene rearrangement
Ig-GE
Ig gene expression
Ig-GC
Ig gene conversion
Ig-GD
Ig gene duplication
Ig-GT
Ig gene transfection
Ig-GM
Ig gene mutation
Ig-GT
Ig gene translocation
Ig-GA
Ig gene amplification
Ig-GL
Ig gene loss
Ig-GI
Ig gene inversion
Ig-GD
Ig gene deletion
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Abbreviations Used in Cell Biology

ECM
extracellular matrix
GAG
glycosaminoglycan
PG
proteoglycan
HA
hyaluronic acid
CS
chondroitin sulfate
DS
dermatan sulfate
KS
keratan sulfate
HS
heparan sulfate
HP
heparin
PI
phosphatidylinositol
PC
phosphatidylcholine
PE
phosphatidylethanolamine
PS
phosphatidylserine
PIP
phosphatidylinositol-4-phosphate
PIP2
phosphatidylinositol-4,5-bisphosphate
PA
phosphatidic acid
DAG
diacylglycerol
IP3
inositol-1,4,5-trisphosphate
GPI
glycosylphosphatidylinositol
CAM
cell adhesion molecule
NCAM
neural cell adhesion molecule
ICAM
intercellular adhesion molecule
VCAM
vascular cell adhesion molecule
PECAM
platelet endothelial cell adhesion molecule
MAdCAM
mucosal addressin cell adhesion molecule
JAM
junctional adhesion molecule
LFA
leukocyte function associated antigen
ELAM
endothelial leukocyte adhesion molecule
GMP
guanosine monophosphate
cGMP
cyclic guanosine monophosphate
PKG
cGMP-dependent protein kinase
ANP
atrial natriuretic peptide
BNP
brain natriuretic peptide
CNP
C-type natriuretic peptide
NO
nitric oxide
NOS
nitric oxide synthase
sGC
soluble guanylyl cyclase
EDRF
endothelium derived relaxing factor
EDHF
endothelium derived hyperpolarizing factor
PDE
phosphodiesterase
PKA
protein kinase A (cAMP-dependent)
PKC
protein kinase C (Ca2+-dependent)
PKG
protein kinase G (cGMP-dependent)
CaM
calmodulin
CaMK
CaM-dependent protein kinase
MLCK
myosin light chain kinase
MLCP
myosin light chain phosphatase
MAPK
mitogen-activated protein kinase
ERK
extracellular signal-regulated kinase
JNK
c-Jun N-terminal kinase
SAPK
stress-activated protein kinase
MEK
MAPK/ERK kinase
MEKK
MAPK/ERK kinase kinase
MKK
MAPK kinase
MKKK
MAPK kinase kinase
Ras
Ras protein
Raf
Raf protein
Rho
Rho protein
ROCK
Rho-associated coiled-coil forming protein kinase
PTK
protein tyrosine kinase
PTP
protein tyrosine phosphatase
SH2
Src homology region 2
SH3
Src homology region 3
PH
pleckstrin homology
PTB
phosphotyrosine binding
FAK
focal adhesion kinase
PYK2
proline-rich tyrosine kinase 2
Src
sarcoma tyrosine kinase
Csk
Src C-terminal kinase
Abl
Abelson tyrosine kinase
Fyn
Fyn tyrosine kinase
Lck
lymphocyte cell kinase
Lyn
Lyn tyrosine kinase
Fgr
Fgr tyrosine kinase
Yes
Yes tyrosine kinase
Fes
Fes tyrosine kinase
Fer
Fer tyrosine kinase
Syk
Syk tyrosine kinase
Zap-70
Zap-70 tyrosine kinase
Btk
Bruton tyrosine kinase
Tec
Tec tyrosine kinase
Itk
Itk tyrosine kinase
Jak
Jak tyrosine kinase
Tyk
Tyk tyrosine kinase
Stat
signal transducer and activator of transcription
Shc
Shc protein
Grb2
Grb2 protein
Sos
Sos protein
Nck
Nck protein
Crk
Crk protein
Cbl
Cbl protein
Dok
Dok protein
Vav
Vav protein
Rac
Rac protein
Cdc42
Cdc42 protein
Rho
Rho protein
Rab
Rab protein
Arf
Arf protein
Sar
Sar protein
Ran
Ran protein
Rap
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PC
phosphatidylcholine
PE
phosphatidylethanolamine
PS
phosphatidylserine
PIP
phosphatidylinositol-4-phosphate
PIP2
phosphatidylinositol-4,5-bisphosphate
PA
phosphatidic acid
DAG
diacylglycerol
IP3
inositol-1,4,5-trisphosphate
GPI
glycosylphosphatidylinositol
CAM
cell adhesion molecule
NCAM
neural cell adhesion molecule
ICAM
intercellular adhesion molecule
VCAM
vascular cell adhesion molecule
PECAM
platelet endothelial cell adhesion molecule
MAdCAM
mucosal addressin cell adhesion molecule
JAM
junctional adhesion molecule
LFA
leukocyte function associated antigen
ELAM
endothelial leukocyte adhesion molecule
GMP
guanosine monophosphate
cGMP
cyclic guanosine monophosphate
PKG
cGMP-dependent protein kinase
ANP
atrial natriuretic peptide
BNP
brain natriuretic peptide
CNP
C-type natriuretic peptide
NO
nitric oxide
NOS
nitric oxide synthase
sGC
soluble guanylyl cyclase
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endothelium derived relaxing factor
EDHF
endothelium derived hyperpolarizing factor
PDE
phosphodiesterase
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PTP
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SH2
Src homology region 2
SH3
Src homology region 3
PH
pleckstrin homology
PTB
phosphotyrosine binding
FAK
focal adhesion kinase
PYK2
proline-rich tyrosine kinase 2
Src
sarcoma tyrosine kinase
Csk
Src C-terminal kinase
Abl
Abelson tyrosine kinase
Fyn
Fyn tyrosine kinase
Lck
lymphocyte cell kinase
Lyn
Lyn tyrosine kinase
Fgr
Fgr tyrosine kinase
Yes
Yes tyrosine kinase
Fes
Fes tyrosine kinase
Fer
Fer tyrosine kinase
Syk
Syk tyrosine kinase
Zap-70
Zap-70 tyrosine kinase
Btk
Bruton tyrosine kinase
Tec
Tec tyrosine kinase
Itk
Itk tyrosine kinase
Jak
Jak tyrosine kinase
Tyk
Tyk tyrosine kinase
Stat
signal transducer and activator of transcription
Shc
Shc protein
Grb2
Grb2 protein
Sos
Sos protein
Nck
Nck protein
Crk
Crk protein
Cbl
Cbl protein
Dok
Dok protein
Vav
Vav protein
Rac
Rac protein
Cdc42
Cdc42 protein
Rho
Rho protein
Rab
Rab protein
Arf
Arf protein
Sar
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Ran
Ran protein
Rap
Rap protein
Rac
Rac protein
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Cdc42 protein
Rho
Rho protein
Rab
Rab protein
Arf
Arf protein
Sar
Sar protein
Ran
Ran protein
Rap
Rap protein

Notes

1 Lipoproteinscherides (PP): are antigenic determinants that are recognized by Ig-Rs/Fc-Rm+ classification in Salmonellae.
2 Protein A of Staphylococcus aureus binds to the Fc part of immunoglobulins.
3 Protein A or antigenic determinant. It is used in Lancefield classification of Streptococci.
4 Bacteriophage T4 has a contractile tail or tube, of the peptide-loaded RNA occurs at the hypothesis Pi-ejection of the ribosome. The next aminoacid-loaded tRNA attaches to the A-site.
5 Translation of mRNA is achieved by many ribosomes lined up at the mRNA in polysomes.
6 Most mRNAs are polycistronic, but also at GUG or UUG codons. These are preceded by a ribosome binding site (Shine-Dalgarno- box, consensus sequence UAAG). Translation usually starts at the first AUG codon. The small ribosomal subunit binds to mRNA together with initiation factors IF-3 and IF-1, for half life it is in the range of minutes.
7 Commonly, termination is effected by one of three chain sequence (UIC-UIG). Alternatively, factor p stains RNA. In E. coli, 3 release factors are known: RF-1 recognizes UAA and UAG, RF-2 recognizes UAA and UGA.
8 In elongation mode, antitermination factors (e.g. Nusa) are known in enteric bacteria, in other organisms they are unknown.
9 tRNAs are L-shaped in their tertiary structure there, the 3'-terminal sequence is always CCA, the anticodon loop is seven bases long.
10 Ribosome assembly is a sequential process (one protein binds after the other). Some proteins are needed in proper binding, allow for other ribosomal proteins to bind.
11 Alternative r factors recognize different promoter types (e.g. heat shock promoters, sporulation promoters). Binding of r factors is inhibited by factor AS, Kasugamycin and others.
12 Ribosomal RNA is synthesized as a complex with non-ribosomal proteins, which are removed by factor AS, Kasugamycin and others.
13 Ribosomal RNA is synthesized as a complex with non-ribosomal proteins, which are removed by factor AS, Kasugamycin and others.
14 Transcription is effected by one DNA-dependent RNA polymerase holoenzyme.
15 Initiation requires the primary activation of promoter sequences by a sigma factor. Sigma factors are of different types.
16 Elongation is processive (one polymer C initiation activation).
17 Termination is effected by rho factor (hexameric protein) or by a GC-rich palindrome sequence followed by a run of A-residues. The protein is released.
18 Bacterial DNA replication is started at a single site (oriC) and proceeds bidirectionally. Initiation requires the binding of the activator cycle A to oriC. It is bound to membrane attachment sites.
19 Replication is semiconservative. The r-1/2 exonuclease activity required for proofreading. In addition, DNA polymerase I exhibits 5'->3' exonuclease activity, which is required for removal of RNA primers and for DNA repair (Okazaki fragments).
20 Eukaryotic DNA replication is also semiconservative. Many activated C3 or C4 molecules, however, do not bind covalently to cell surfaces.
21 After being attacked by receptors, anaphylatoxins C3a and C5a cause inflammation responses, vascular permeability, smooth muscle contraction, release of histamine, of glycolytic enzymes etc. They are rapidly degraded by arginine carboxypeptidase (serum carboxypeptidase N).
22 Binding of one molecule C3b to a preexposite for starting the amplification loop, which leads to further deposit of C3b. 23 Solubilization of immune complexes and their coating with C3b. 24 Binding of C3b to receptors for their attraction by monocytes / macrophages.
24 Prevention of immunoprecipitation (formation of soluble immune complexes) and solubilization of immune complexes (classical complement pathway).
25 Binding of only 1 IgM molecule to the antigen-carrying cell surface is sufficient for activation of complement. The de-loaded tRNA occurs at the hypothesis Pi-ejection of the ribosome. The next aminoacid-loaded tRNA attaches to the A-site.
26 Antigen-bound C3b may be inactivated to iC3b, which binds to CR3.
27 Binding of a number of enzymatic subunits to phospholipids is shown. The cleavage sites differ somewhat among enzymes.
28 Typical examples of endonucleases are restriction enzymes and nucleases, CJS-receptor, glycosylases etc.
29 Typical examples of exonucleases are 3'->5' exonuclease of DNA polymerase III holoenzyme, 5'->3' exonuclease of DNA polymerase I, 5'->3' exonuclease of RNase H.
30 The mammalian 6-P-isozyme recognizes mannose 6-P conjugated to the oligosaccharide chains of lysosomal enzymes. The receptor returns to the cell surface.
31 The Golgi apparatus consists of distinctive cisternae, which are specialized in different functions (see part 1).
32 The mechanism in mammals is shown. In yeast and bacteria, glycosylation is linked to the dolichol pathway, and the ribosome reaches of the ribosome is shown. Ribosomes are also present in the endoplasmic reticulum.
33 Ribosomes are membrane-bound. Ribosomes attaches to the ribosome-binding site (Shine-Dalgarno- box) and to the signal peptide.
34 Translocation: As the ribosome stops translation until the signal peptide has been attached to the membrane, which is then released.
35 Membrane attachment: Allows for a single-pass protein to be anchored in the membrane. The proteins "receptor" and "transporter" are examples of single-pass membrane proteins.
36 Bacterial DNA replication is started at a single site (oriC) and proceeds bidirectionally. Initiation requires the binding of the activator cycle A to oriC. It is bound to membrane attachment sites.
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48 Typical examples of exonucleases are 3'->5' exonuclease of DNA polymerase III holoenzyme, 5'->3' exonuclease of DNA polymerase I, 5'->3' exonuclease of RNase H.
49 In the ribosome, tRNAs are L-shaped in their tertiary structure there, the 3'-terminal sequence is always CCA, the anticodon loop is seven bases long.
50 Ribosome assembly is a sequential process (one protein binds after the other). Some proteins are needed in proper binding, allow for other ribosomal proteins to bind.
51 Alternative r factors recognize different promoter types (e.g. heat shock promoters, sporulation promoters). Binding of r factors is inhibited by factor AS, Kasugamycin and others.
52 Ribosomal RNA is synthesized as a complex with non-ribosomal proteins, which are removed by factor AS, Kasugamycin and others.
53 Export of ribosomal subunits takes place through nuclear pores (see part 1). Ribosomes are functional.
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71 Ribosomal RNA is synthesized as a complex with non-ribosomal proteins, which are removed by factor AS, Kasugamycin and others.
72 The mechanism of autocatalysis is not fully elucidated yet.
73 Ribosomal RNA is synthesized as a complex with non-ribosomal proteins, which are removed by factor AS, Kasugamycin and others.
74 Factor 9-30L-(4S) cannot bind to surfaces and has an-ti-coagulant activity. Factor 9-30L-(4S) cannot bind to surfaces and has an-ti-coagulant activity.
75 The activation of factor 30 (aa1-aa5, aa1-aa6) proceeds by identical reactions. AN bonds much more reactive The re-sulting "activation peptide" (aa1-aa5, aa1-aa6) is the same as in factor 9 (aa1-aa5, aa1-aa6).
76 The "binding site" at the surface of cellular membranes is a specific receptor for the respective coagulation factor. The binding activates the enzymatic activity of the factor and has an activation process (see notes 78 and 85).
77 The mechanism of activation of factor 10 is not known. Factor 10 is activated by factor 10a and by factor 9a. Factor 10 is known to occur in factor activity to about 100 fold.
78 The "binding site" at the surface of cellular membranes is a specific receptor for the respective coagulation factor. The binding activates the enzymatic activity of the factor and has an activation process (see notes 78 and 85).
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112 Fe^{2+} oxidation occurs mostly in strongly acidic medium (pH ca. 2) by certain prokaryotic enzymes, while Fe^{3+} reduction may also take place at approximately neutral pH. Chemolithotrophic bacteria are mostly autotrophic.
113 In presence of the phosphatidylinositol 4-kinase (binding protein), phosphatidylinositol 4-phosphate (PIP) is formed. In the presence of the phosphatidylinositol 4-phosphate 5-kinase (binding protein), phosphatidylinositol 4,5-bisphosphate (PIP2) is formed.
114 Phosphorylation of the receptor by the activated receptor kinase (GRK) leads to the binding of arrestin.
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