

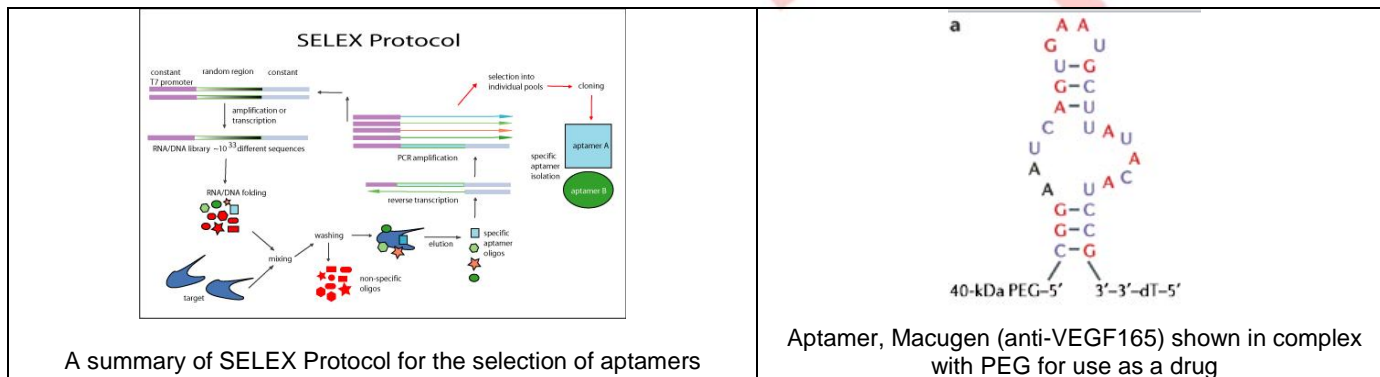
While antibodies can be made to limited antigens, there may be an Aptamer for every substance provided one has the strategy to find it. Aptamers could function as antibodies; play the role of a protein or enzyme, acts as a catalyst or an inhibitor. Aptamers are short synthetic piece of DNA, RNA, or peptide. Most interesting aspect of Aptamers is their potential use as 'Chemical or Synthetic Antibodies'. Aptamers offer powerful alternatives to monoclonal antibodies in therapeutics, diagnostics, drugs and vaccine development. Aptamers are opening new avenues that were not possible with antibodies or chemical drugs. Aptamers are routinely and reliably produced in labs with DNA/Peptide synthesizers in bulk quantities. Therefore, there is no safety concern due to the use of animal or cell lines, animal or human-derived by products. Their low cost, stability, and safety profiles are even more attractive for big Pharma, Biotech and Vaccine companies.

Aptamers are short strand of oligonucleic acid (**DNA or RNA** of 15-60 bases) or **oligo-peptide** (15-60 amino acids) that binds to a specific target molecule. Aptamers are usually selected from a random, synthetic library of DNA/RNA with a complexity of 10^{14} - 10^{16} molecules of approximately 30-60 bases or amino acids. Natural aptamers also exist in riboswitches. Peptide aptamers consist of a short variable peptide domain, attached at both ends to a protein scaffold. Aptamers are selected repeated rounds of in vitro selection or equivalently, **SELEX (Systematic Evolution of Ligands by Exponential Enrichment)** to bind to nucleic acid, proteins, small organic compounds, and even entire organisms. They also function as highly specific affinity ligand by molecular interaction based on the three dimensional folding pattern. The three dimensional complex shape of a single stranded

oligonucleotide is primarily due to the base composition led intra-molecular hybridization that initiates folding to a particular molecular shape. This molecular shape assists in binding through shape specific recognition to it targets leading to considerable three dimensional structure stability and thus the high degree of affinity.

Theoretically it is possible to engineer and select aptamers virtually against any molecular target; aptamers have been selected for small molecules (e.g. ATP), peptides (Hisx6), proteins (Erythropoietin or EPO) as well as whole viruses and bacteria. Aptamers can distinguish between closely related but non-identical members of a protein family, or between different functional or conformational states of the same protein. In a striking example of specificity, an aptamer to the small molecule theophylline (1,3-dimethylxanthine) binds with 10,000-fold lower affinity than to caffeine (1,3,7-trimethylxanthine), a difference of a single methyl group.

Recent developments in aptamer-based therapeutics have been rewarded in the form of the first **aptamer-based drug** (Macugen) in the treatment for age-related macular degeneration (AMD). Pegaptanib (brand name Macugen) is an anti-angiogenic medicine for the treatment of neovascular (wet) age-related macular degeneration (AMD). Macugen or Pegaptanib is a pegylated anti-VEGF aptamer, a single strand of nucleic acid that specifically binds to VEGF 165, a protein that plays a critical role in angiogenesis or the formation of new blood vessels) and increased permeability (leakage from blood vessels), two of the primary pathological processes responsible for the vision loss associated with neovascular AMD. Additional therapeutic aptamers are being studied to replace the use of humanized antibodies.



Aptamers are also attractive for the development of new types of biosensors: upon target binding, the structure of an aptamer changes to some extent. In contrast with antibodies, this structural change can be used to design aptamer sensors that are similar to molecular beacons. Many laboratories and companies are exploring aptamer-mediated detection of toxins or substances used in biological warfare.

A **Spiegelmer** (from German spiegel "mirror") is an RNA-like molecule built from L-ribose units. It is an artificial oligonucleotide named for being a mirror image of natural oligonucleotides. Spiegelmers are a form of aptamers. Due to their L-nucleotides, they are highly resistant to degradation by nucleases. Spiegelmers are considered potential drugs

and are currently being tested in clinical trials. Nucleic acid aptamers, including Spiegelmers, contain adenosine monophosphate, guanosine monophosphate, cytidine monophosphate, uridine monophosphate, a phosphate group, a nucleobase and a ribose sugar. Spiegelmers themselves have low antigenicity. In contrast to other aptamers, Spiegelmers have high stability in blood serum, since they are less susceptible to be cleaved hydrolytically by enzymes. They are excreted by the kidneys in a short time due to their low molar mass Spiegelmers have been obtained for the chemokines CCL2 and CXCL12, the complement components C5a and ghrelin. They are currently in preclinical or clinical development. They can also be used as diagnostic agents.

List of DNA Aptamers (Ordering Information)

http://www.4adi.com/commerce/catalog/spcategory.jsp?category_id=2771

Catalog#	Product Description
AD-101-U	Abrin Toxin, DNA Aptamer
AD-102-U	Acute myeloid leukemia cells (KH1C12), DNA Aptamer
AD-103-U	Adenosine, DNA Aptamer
AD-104-U	Adenosine/ATP (DH25.42), DNA Aptamer
AD-105-U	Anti-His Tag (6H7), DNA Aptamer
AD-106-U	Apple Stem Pitting Virus of MT32 Apple Isolate, DNA Aptamer
AD-107-U	Apple Stem Pitting Virus of PSAH Pearlsolate, DNA Aptamer
AD-108-U	Bisphenol A, DNA Aptamer
AD-109-U	CCRF-CEM (SGC8), DNA Aptamer
AD-110-U	Cellobiose (Cel#16), DNA Aptamer
AD-111-U	Cholic Acid (9), DNA Aptamer
AD-112-U	Crude Extracellular Mixture of E. coli, DNA Aptamer
AD-113-U	Daunomycin (10.10), DNA Aptamer
AD-114-U	Daunomycin (10.10v), DNA Aptamer
AD-115-U	Ethanolamine (14.3), DNA Aptamer
AD-116-U	Fibrinogen (Ap90), DNA Aptamer
AD-117-U	Hematoporphyrin (26), DNA Aptamer
AD-118-U	Hen Egg White Lysozyme (lys11-2), DNA Aptamer
AD-119-U	Hepatitis C Virus RdRp (r10/43), DNA Aptamer
AD-120-U	HGF (H38-15), DNA Aptamer
AD-121-U	Histone H4 (Clone 4.33), DNA Aptamer
AD-122-U	HIV-1 RT (4.3), DNA Aptamer
AD-123-U	HIV-1 TAR RNA Hairpin Loop (B22-19), DNA Aptamer
AD-124-U	IgE (4.4.12), DNA Aptamer
AD-125-U	Lactobacillum acidophilus (hemag1P), DNA Aptamer
AD-126-U	L-Selectin (LD201), DNA Aptamer
AD-127-U	L-Tyrosinamide (pe35), DNA Aptamer
AD-128-U	Lysozyme, DNA Aptamer
AD-129-U	Non-small Cell Lung Cancer (S6), DNA Aptamer
AD-130-U	Organic Dyes (GR-30), DNA Aptamer
AD-131-U	Pb(II), DNA Aptamer
AD-132-U	PC12 Cells (Aptamer17a), DNA Aptamer
AD-133-U	PCB106 (Aptamer 9.3), DNA Aptamer
AD-134-U	PCB72 (Aptamer 9.3), DNA Aptamer
AD-135-U	Phospholamban (Apt-9), DNA Aptamer
AD-136-U	Platelet-Derived Growth Factor B-chain (36t), DNA Aptamer
AD-137-U	Protein Kinase C-d, DNA Aptamer
AD-138-U	Ramos Cells, DNA Aptamer
AD-139-U	Ricin Toxin (C5), DNA Aptamer
AD-140-U	RNase H1 (VI-2), DNA Aptamer
AD-141-U	Sialyllactose (SI-11), DNA Aptamer
AD-142-U	Small-cell lung cancer (HCH07), DNA Aptamer
AD-143-U	Staphylococcus aureus (SA23), DNA Aptamer
AD-144-U	Streptavidin (31), DNA Aptamer
AD-145-U	Sulforhodamin B (Clone 73), DNA Aptamer
AD-146-U	Taq DNA polymerase (TQ21), DNA Aptamer
AD-147-U	Tenascin-C (GBI-10), DNA Aptamer
AD-148-U	Tetracyclines (T24), DNA Aptamer
AD-149-U	TGF-β1 (T18_1_3), DNA Aptamer
AD-150-U	Thrombin(15mer), DNA Aptamer
AD-151-U	TTF1 (A), DNA Aptamer
AD-152-U	Tumour Marker MUC1 (S1.1), DNA Aptamer
AD-153-U	vaccinia virus-infected A549 cells (TV08), DNA Aptamer
AD-154-U	YPEN-1 Endothelial Cells (III.1), DNA Aptamer
AD-155-U	Human Neutrophil Elastase (DNA I), DNA Aptamer
AD-156-U	Multivalent B-cell receptor specific, DNA aptamer
AD-157-U	Advanced Glycation End Products (Clone 9), DNA

List of Peptide Aptamers (Ordering Information)

http://www.4adi.com/commerce/catalog/spcategory.jsp?category_id=2771

Cat #	Product Description
AP-301-U	Alpha V Beta 5 Integrin, Peptide Aptamer
AP-302-U	Aminopeptidase N, Peptide Aptamer
AP-303-U	Bevacizumab-treated Tumors, Peptide Aptamer
AP-304-U	Brain Blood Vessel, Peptide Aptamer
AP-305-U	Breast Cancer Cells (a-peptide 18), Peptide Aptamer
AP-306-U	Colorectal WiDr Cell Line, Peptide Aptamer
AP-307-U	Concanavalin A Lectin, Peptide Aptamer
AP-308-U	Endothelial Cells (P36), Peptide Aptamer
AP-309-U	EphA2 Receptor, Peptide Aptamer
AP-310-U	EphA2 Receptor, Peptide Aptamer
AP-311-U	E-Selectin, Peptide Aptamer
AP-312-U	Gelatinase, Peptide Aptamer
AP-313-U	Human Breast Cancer Xenografts (RGD-4C), Peptide Aptamer
AP-314-U	Human Gastric Adenocarcinoma, Peptide Aptamer
AP-315-U	Human Prostate, Peptide Aptamer
AP-316-U	human umbilical vein endothelial cells, Peptide Aptamer
AP-317-U	Islets of Langerhans, Peptide Aptamer
AP-318-U	Kidney Blood Vessel, Peptide Aptamer
AP-319-U	Laminin 5, Peptide Aptamer
AP-320-U	Liver-Specific Ligands (236), Peptide Aptamer
AP-321-U	Mouse Lung, Peptide Aptamer
AP-322-U	Mouse Pancreas, Peptide Aptamer
AP-323-U	Mouse Placenta, Peptide Aptamer
AP-324-U	Mouse Retina, Peptide Aptamer
AP-325-U	Mouse Skin, Peptide Aptamer
AP-326-U	Mouse White Fat, Peptide Aptamer
AP-327-U	Nestin Protein expressed in Brain Tumors, Peptide Aptamer
AP-328-U	PC-3 (G1), Peptide Aptamer
AP-329-U	Protective Antigen (PA) of Bacillus anthracis (MMS_128), Peptide Aptamer
AP-330-U	Thrombopoietin Receptor, Peptide Aptamer
AP-331-U	Trypsin, Peptide Aptamer
AP-332-U	Type III FN Repeat (RGD), Peptide Aptamer
AP-333-U	VCAM-1, Peptide Aptamer
AP-334-U	VEGF receptor Flt-1 (F56), Peptide Aptamer
AP-335-U	VEGF receptor KDR and Flt-1 (v107), Peptide Aptamer
AP-336-U	VEGF receptor KDR/Flk-1 (K237), Peptide Aptamer
AP-337-U	VEGF-KDR, Peptide Aptamer
AP-338-U	VEGF-stimulated Human Umbilical Vein Endothelial Cell, Peptide Aptamer
AP-339-U	VEGF-stimulated human umbilical vein endothelial cells, Peptide Aptamer

Note: Contact ADI for Biotin or FITC-labeled aptamers. We can also custom design and make new aptamers not listed here in desired the purity and amount.

List of RNA Aptamers (Ordering Information)

http://www.4adi.com/commerce/catalog/spcategory.jsp?category_id=2771

Cat#	Product Description
AR-201-U	Activated Protein C (APC 9G-70) , RNA Aptamer
AR-202-U	Adenine (12E4), RNA Aptamer
AR-203-U	ADP, RNA Aptamer
AR-204-U	Amyloid Peptide BetaA4(1– 40) (B55) , RNA Aptamer
AR-205-U	Aspartame , RNA Aptamer
AR-206-U	ATP (1-1min) , RNA Aptamer
AR-207-U	ATP (ATP-40-1) , RNA Aptamer
AR-208-U	Avian Myeloblastosis Virus (a.1.1) , RNA Aptamer
AR-209-U	Basic Fibroblast Growth Factor (26A-t) , RNA
AR-210-U	Beta 2-Integrin (D20) , RNA Aptamer
AR-211-U	Biotin, RNA Aptamer
AR-212-U	Bovine Thrombin (T7 05 RNA), RNA Aptamer
AR-213-U	Caffeine (S2.caf.D11), RNA Aptamer
AR-214-U	Caffeine (TCT8-4), RNA Aptamer
AR-215-U	cAMP, RNA Aptamer
AR-216-U	cAMP (AR4), RNA Aptamer
AR-217-U	cCMP (AR3), RNA Aptamer
AR-218-U	Cd2+ (AR1), RNA Aptamer
AR-219-U	cGMP (AR2), RNA Aptamer
AR-220-U	Chloramphenicol (Cm1), RNA Aptamer
AR-221-U	Co2+ (AR1), RNA Aptamer
AR-222-U	Colicin E3 (F1-1), RNA Aptamer
AR-223-U	C-Reactive Protein, RNA Aptamer
AR-224-U	Cyanocobalamin (35-mer), RNA Aptamer
AR-225-U	Dopamine (dopa2), RNA Aptamer
AR-226-U	D-Tryptophan (MF-10), RNA Aptamer
AR-227-U	E. coli 5S RNA (Helix 89 RNA), RNA Aptamer
AR-228-U	E. coli Release Factor 1 (Clone II-1), RNA Aptamer
AR-229-U	Extracellular Regulated Kinase 2 (Family II), RNA
AR-230-U	Feline Immunodeficiency Virus (F1a), RNA Aptamer
AR-231-U	FMN (AR5), RNA Aptamer
AR-232-U	H5 Avian Influenza Virus (HAS15-5), RNA Aptamer
AR-233-U	Hepatitis B Virus (HBV) Polymerase (P protein) (A9), RNA Aptamer
AR-234-U	Hepatitis C NS3 Protein (10G-1), RNA Aptamer
AR-235-U	Hepatitis C Virus Dependent RNA Polymerase, RNA
AR-236-U	Hepatitis C Virus Non-Structural Protein 3 (G9-1), RNA Aptamer
AR-237-U	HER3 (A30), RNA Aptamer
AR-238-U	Heteroaryldihydropyrimidine (Aptamer 21), RNA
AR-239-U	Histone H3R8Me2sym (Clone 1), RNA Aptamer
AR-240-U	HIV-1 Integrase (P5), RNA Aptamer
AR-241-U	HIV-1 Nuceocapsid, RNA Aptamer
AR-242-U	Human Influenza A virus H3N2 (P30-10-16), RNA
AR-243-U	Interleukin-32 (AC3-3), RNA Aptamer
AR-244-U	Kanamycin A (sla 16), RNA Aptamer
AR-245-U	Kanamycin B (K8), RNA Aptamer
AR-246-U	L-Arginine, RNA Aptamer
AR-247-U	L-Arginine(44Arg11), RNA Aptamer
AR-248-U	L-Citrulline (44Cit11), RNA Aptamer
AR-249-U	L-Histidine (His 945), RNA Aptamer
AR-250-U	L-Isoleucine (IL 42-32b), RNA Aptamer
AR-251-U	L-tryptophan(Trp 70-727), RNA Aptamer
AR-252-U	L-Valine, RNA Aptamer
AR-253-U	Lysozyme, RNA Aptamer
AR-254-U	Malachite Green (MG-4), RNA Aptamer
AR-255-U	Methylenedianiline (M1), RNA Aptamer
AR-256-U	Mn2+ (AR1), RNA Aptamer
AR-257-U	Moenomycin A (C2), RNA Aptamer
AR-258-U	Moloney Murine Leukemia Virus, RNA Aptamer
AR-259-U	NAD, RNA Aptamer
AR-260-U	NF-kappa B (Aptamer 3), RNA Aptamer
AR-261-U	Ni2+ (AR1), RNA Aptamer
AR-262-U	Nickel (N1), RNA Aptamer

AR-263-U	OSM (ADR58), RNA Aptamer
AR-264-U	Pepocin (9-41U22), RNA Aptamer
AR-265-U	Phenylalanine, RNA Aptamer
AR-266-U	Phosphorylated ERK2, RNA Aptamer
AR-267-U	ppERK2/ERK2, RNA Aptamer
AR-268-U	Protein Tyrosine Phosphatase (N71yc16), RNA
AR-269-U	Rev Peptide, RNA Aptamer
AR-270-U	RNA Tobramycin Molecular Beacon (BA 14-2), RNA
AR-271-U	S. enterica serovar Typhi IVP pili protein (S-PS8.4), RNA Aptamer
AR-272-U	S-adenosyl homocysteine (CTH-5), RNA Aptamer
AR-273-U	SARS coronavirus NTPase/Helicase (ES15-1), RNA
AR-274-U	Sialyl Lewis X (5), RNA Aptamer
AR-275-U	Tetracycline (cb28 minimum), RNA Aptamer
AR-276-U	Theophylline (AR6), RNA Aptamer
AR-277-U	Theophylline (TCT8-4), RNA Aptamer
AR-278-U	Thyroxine (ApT4-A'), RNA Aptamer
AR-279-U	TLR3-ECD (Family-1), RNA Aptamer
AR-280-U	Tobramycin (J6), RNA Aptamer
AR-281-U	Trypanosoma brucei (2-16), RNA Aptamer
AR-282-U	Unphosphorylated ERK2, RNA Aptamer
AR-283-U	Xanthine (XAB), RNA Aptamer
AR-284-U	Yeast phenylalanine tRNA (B2), RNA Aptamer
AR-285-U	Zinc, RNA Aptamer
AR-286-U	Zn2+ (AR1), RNA Aptamer
AR-287-U	Alpha-V Beta-3 (Clone 17.16), RNA Aptamer
AR-288-U	CD4 (Aptamer 7), RNA Aptamer
AR-289-U	ErbB2 (Apt 15-8), RNA Aptamer
AR-290-U	Escherichia coli (E. coli) O157:H7, RNA Aptamer
AR-291-U	HIV-1 R5 SU Glycoprotein gp120 (B4), RNA Aptamer
AR-292-U	Human IgG (Apt 8), RNA Aptamer
AR-293-U	Human Interleukin-17A/F (APTAF42), RNA Aptamer
AR-294-U	Human WiAR-type PAI-1 (WT-15), RNA Aptamer
AR-295-U	Keratinocyte Growth Factor (14F), RNA Aptamer
AR-296-U	MCP-1 (ADR7), RNA Aptamer
AR-297-U	Neurotensin receptor NTS-1 (P19), RNA Aptamer
AR-298-U	P-Selectin (PF377), RNA Aptamer
AR-299-U	PAUF (P12FR2), RNA Aptamer
AR-300-U	PrP Fibrils (SAF-93), RNA Aptamer
AR-301-U	PSMA Aptamer (A10.L), RNA Aptamer
AR-302-U	Receptor Tyrosine Kinase (RET) Mutant (D4), RNA
AR-303-U	RIG-I (CL9), RNA Aptamer
AR-304-U	Rous Sarcoma Virus (A), RNA Aptamer
AR-305-U	Trypanosoma cruzi-Fibronectin Parasite Receptor (F4), RNA Aptamer
AR-306-U	Trypanosoma cruzi-Heparan Parasite Receptor (HS6), RNA Aptamer
AR-307-U	Trypanosoma cruzi-Thrombospondin Parasite Receptor (T6), RNA Aptamer
AR-308-U	von Willebrand factor (VWF R9.18), RNA Aptamer
AR-309-U	GnRH (S42) , RNA Aptamer
AR-310-U	GnRH (A10) , RNA Aptamer
AR-311-U	Actylcholine Receptor Antibody (mAB198) (SE RNA VII) , RNA Aptamer
AR-312-U	Anti-acetylcholine Autoantibodies (SE RNA) , RNA
AR-313-U	Human Nonpancreatic Secretory Phospholipase A2 (Aptamer 15) , RNA Aptamer
AR-314-U	Insulin Receptor Antibody (MA20) (#1) , RNA
AR-315-U	Interferon-γ (2'NH2-17) , RNA Aptamer
AR-316-U	Prion Protein , RNA Aptamer
AR-317-U	synthetic CD4 aptamer, RNA aptamer
AR-318-U	Anthrax protective antigen, RNA aptamer
AR-319-U	Anti-EGFR Aptamer, RNA aptamer

Note: Contact ADI for custom aptamers.

DNA_RNA_Peptide_Flr rev 121119A