

“Code Biology Database – A List of Biological Codes”

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Number	Code Name	Descriptive Name(s)	Full Citation(s), Hyperlinked to Source
1	Acoustic code	The Acoustic Codes	Farina, A. and N. Pieretti (2014). "Acoustic Codes in Action in a Soundscape Context." <i>Biosemiotics</i> 7(2): 321-328. Malavasi, R., K. Kull and A. Farina (2014). "The Acoustic Codes: How Animal Sign Processes Create Sound-Topes and Consortia via Conflict Avoidance." <i>Biosemiotics</i> 7(1): 89-95. Curé, C., N. Mathevon and T. Aubin (2016). "Mate vocal recognition in the Scopoli's shearwater <i>Calonectris diomedea</i>: do females and males share the same acoustic code?" <i>Behav Processes</i> 128: 96-102. Farina, A. (2018). "Ecoacoustic codes and ecological complexity." <i>Biosystems</i> 164: 147-154. Farina, A. (2019). "Acoustic codes from a rural sanctuary: How ecoacoustic events operate across a landscape scale." <i>Biosystems</i> 183: 103986.
2	Auditory Code	The Auditory Codes	Middlebrooks, J. C. and E. I. Knudsen (1984). "A neural code for auditory space in the cat's superior colliculus." <i>J Neurosci</i> 4(10): 2621-2634. Schwarz, D. W. and R. W. Tomlinson (1987). "A complex tone code in the auditory cortex." <i>J Otolaryngol</i> 16(5): 316-321. Sterbing, S. J., U. Schmidt and R. Rübsamen (1994). "The postnatal development of frequency-place code and tuning characteristics in the auditory midbrain of the phyllostomid bat, <i>Carollia perspicillata</i>." <i>Hear Res</i> 76(1-2): 133-146. Schwarz, D. W., F. Tennigkeit, T. Adam, P. Finlayson and E. Puil (1998). "Membrane properties that shape the auditory code in three nuclei of the central nervous system." <i>J Otolaryngol</i> 27(6): 311-317. Lalwani, A. K. and C. M. Castelein (1999). "Cracking the auditory genetic code: nonsyndromic hereditary hearing impairment." <i>Am J Otol</i> 20(1): 115-132. March, L., A. Cienfuegos, L. Goldbloom, W. Ritter, N. Cowan and D. C. Javitt (1999). "Normal time course of auditory recognition in schizophrenia, despite impaired precision of the auditory sensory ("echoic") memory code." <i>J Abnorm Psychol</i> 108(1): 69-75.

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			Arnal, L. H., D. Poeppel and A. L. Giraud (2015). "Temporal coding in the auditory cortex." <i>Handb Clin Neurol</i> 129: 85-98. Hochmair, I., E. Hochmair, P. Nopp, M. Waller and C. Jolly (2015). "Deep electrode insertion and sound coding in cochlear implants." <i>Hear Res</i> 322: 14-23. Laback, B., K. Egger and P. Majdak (2015). "Perception and coding of interaural time differences with bilateral cochlear implants." <i>Hear Res</i> 322: 138-150. Malmierca, M. S., L. A. Anderson and F. M. Antunes (2015). "The cortical modulation of stimulus-specific adaptation in the auditory midbrain and thalamus: a potential neuronal correlate for predictive coding." <i>Front Syst Neurosci</i> 9: 19. Rudnicki, M., O. Schoppe, M. Isik, F. Völk and W. Hemmert (2015). "Modeling auditory coding: from sound to spikes." <i>Cell Tissue Res</i> 361(1): 159-175. Behroozmand, R., S. Sangtian, O. Korzyukov and C. R. Larson (2016). "A temporal predictive code for voice motor control: Evidence from ERP and behavioral responses to pitch-shifted auditory feedback." <i>Brain Res</i> 1636: 1-12. Vyssotski, A. L., A. E. Stepien, G. B. Keller and R. H. Hahnloser (2016). "A Neural Code That Is Isometric to Vocal Output and Correlates with Its Sensory Consequences." <i>PLoS Biol</i> 14(10): e2000317. Woolgar, A., J. Jackson and J. Duncan (2016). "Coding of Visual, Auditory, Rule, and Response Information in the Brain: 10 Years of Multivoxel Pattern Analysis." <i>J Cogn Neurosci</i> 28(10): 1433-1454. Beckert, M. V., R. Pavão and J. L. Peña (2017). "Distinct Correlation Structure Supporting a Rate-Code for Sound Localization in the Owl's Auditory Forebrain." <i>eNeuro</i> 4(3). Carbajal, G. V. and M. S. Malmierca (2018). "The Neuronal Basis of Predictive Coding Along the Auditory Pathway: From the Subcortical Roots to Cortical Deviance Detection." <i>Trends Hear</i> 22: 2331216518784822. Heilbron, M. and M. Chait (2018). "Great Expectations: Is there Evidence for Predictive Coding in Auditory Cortex?" <i>Neuroscience</i> 389: 54-73. Kuchibhotla, K. and B. Bathellier (2018). "Neural encoding of sensory and behavioral complexity in the auditory cortex." <i>Curr Opin Neurobiol</i> 52: 65-71.
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3	Actin code	The Actin Code SEE also Cytoskeleton Code	Vedula, P. and A. Kashina (2018). "The makings of the 'actin code': regulation of actin's biological function at the amino acid and nucleotide level." J Cell Sci 131(9).
4	Adenylation code	The Adenylation Code	Stachelhaus, T., H. D. Mootz and M. A. Marahiel (1999). "The specificity-conferring code of adenylation domains in nonribosomal peptide synthetases." Chem Biol 6(8): 493-505. Davis, R. and Y. Shi (2014). "The polyadenylation code: a unified model for the regulation of mRNA alternative polyadenylation." J Zhejiang UnivSci B 15(5): 429-437. Zhang, F., Y. Wang, Q. Jiang, Q. Chen, L. Karthik, Y.-L. Zhao and Z. Li (2018). "Substrate selection of adenylation domains for nonribosomal peptide synthetase (NRPS) in bacillamide C biosynthesis by marine Bacillus atrophaeus C89." Journal of Industrial Microbiology & Biotechnology 45(5): 335-344.
5	Adhesion code	The Adhesion Code SEE also Synaptic code(s) SEE also Cadherin code(s)	Faria, M. (2018). "Aggregating, polarizing, networking – The evolution of cell adhesion codes." Biosystems 164: 60-67. Tsai, T. Y., M. Sikora, P. Xia, T. Colak-Champollion, H. Knaut, C. P. Heisenberg and S. G. Megason (2020). "An adhesion code ensures robust pattern formation during tissue morphogenesis." Science 370(6512): 113-116.
6	Allosteric code	The Allosteric Code	Edelstein, S. J. (1996). "An allosteric theory for hemoglobin incorporating asymmetric states to test the putative molecular code for cooperativity." J Mol Biol 257(4): 737-744. Daugherty, M. A., M. A. Shea, J. A. Johnson, V. J. LiCata, G. J. Turner and G. K. Ackers (1991). "Identification of the intermediate allosteric species in human hemoglobin reveals a molecular code for cooperative switching." Proc Natl Acad Sci U S A 88(4): 1110-1114.

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7	Angiotensin code	The Angiotensin Receptor Code	Sadybekov, A. and V. Katritch (2020). "Breaking the Enigma Code of Angiotensin II Type 2 Receptor Signaling." Structure 28(4): 390-392.
8	Antibiotic resistance code	The Antibiotic Resistance Codes	Lo, S. W., N. Kumar and N. E. Wheeler (2018). "Breaking the code of antibiotic resistance." Nat Rev Microbiol 16(5): 262.
9	Apoptosis code	The Apoptosis Code	Basañez, G. and J. M. Hardwick (2008). "Unravelling the bcl-2 apoptosis code with a simple model system." PLoSBiol 6(6): e154. Füllgrabe, J., N. Hajji and B. Joseph (2010). "Cracking the death code: apoptosis-related histone modifications." Cell Death Differ 17(8): 1238-1243. Biermann, M., C. Maueröder, J. M. Brauner, R. Chaurio, C. Janko, M. Herrmann and L. E. Muñoz (2013). "Surface code--biophysical signals for apoptotic cell clearance." Phys Biol 10(6): 065007. Shih, H. C., M. El-Shazly, Y. S. Juan, C. Y. Chang, J. H. Su, Y. C. Chen, S. P. Shih, H. M. Chen, Y. C. Wu and M. C. Lu (2014). "Cracking the cytotoxicity code: apoptotic induction of 10-acetylcirciformonin B is mediated through ROS generation and mitochondrial dysfunction." Mar Drugs 12(5): 3072-3090. Wook Choi, D. and C. Yong Choi (2014). "HIPK2 modification code for cell death and survival." Mol Cell Oncol 1(2): e955999. Jiang, S., Y. Liu, B. Xu, Y. Zhang and M. Yang (2020). "Noncoding RNAs: New regulatory code in chondrocyte apoptosis and autophagy." Wiley Interdiscip Rev RNA 11(4): e1584. Rothlin, C. V. and S. Ghosh (2020). "Cracking the Cell Death Code." Cold Spring Harb Perspect Biol 12(5).

10	Archetype codes	The Archetype Codes	Major, J. C. (2021). "Archetypes and code biology." Biosystems 208: 104501. Major, J. C. (2025). From code to archetype: Toward a unified theory of biological, neural, and artificial artifacts. Biosystems, 254, 105516.
11	Area code	The Area / Cell Recognition Code	Hood, L., H. V. Huang and W. J. Dreyer (1977). "The area-code hypothesis: The immune system provides clues to understanding the genetic and molecular basis of cell recognition during development." Journal of Supramolecular Structure 7(3-4): 531-559. Springer, T. A. (1993). "Signals on endothelium for lymphocyte recirculation and leukocyte emigration: the area code paradigm." Harvey Lect 89: 53-103. Dreyer, W. J. (1998). "The area code hypothesis revisited: olfactory receptors and other related transmembrane receptors may function as the last digits in a cell surface code for assembling embryos." Proc Natl Acad Sci U S A 95(16): 9072-9077. Liu, C. Y. (2020). "β7 Gives Tregs a Gut Area Code." Cell Mol Gastroenterol Hepatol 9(3): 543-544.
12	Arrestin code	The Arrestin Receptor Code	Draper-Joyce, C. J. and A. Christopoulos (2018). "Strength in numbers-an arrestin interaction code." Nat Struct Mol Biol 25(6): 437-439.
13	Assembly code	The Assembly Code	Shelton, C. L., D. G. Conrady and A. B. Herr (2017). "Functional consequences of B-repeat sequence variation in the staphylococcal biofilm protein Aap: deciphering the assembly code." Biochem J 474(3): 427-443.
14	Auxin code	The Auxin Metabolism Code	Campos, M. L. (2021). "Breaking the code of auxin metabolism: an additional role for DIOXYGENASE FOR AUXIN OXIDATION 1." Plant Physiol 187(1): 7-8.
15	Axon guidance code	The Axon Guidance Codes	Goodhill, G. J. (2003). "A theoretical model of axon guidance by the Robo code." Neural Comput 15(3): 549-564. Kinrade, E. F. and A. Hidalgo (2004). "Lateral neuron--glia interactions steer the response of axons to the Robo code." Neuron Glia Biol 1(2): 101-112. Shirasaki, R., J. W. Lewcock, K. Lettieri and S. L. Pfaff (2006). "FGF as a target-derived chemoattractant for developing motor axons genetically programmed by the LIM code." Neuron 50(6): 841-853.

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16	BAFF code	The BAFF Immune Code	Mackay, F. and P. Schneider (2009). "Cracking the BAFF code." Nat Rev Immunol 9(7): 491-502.
17	Bile code	The Bile Acid Code	Gadaleta, R. M., M. Cariello, L. Crudele and A. Moschetta (2022). "Bile Salt Hydrolase-Competent Probiotics in the Management of IBD: Unlocking the "Bile Acid Code"." Nutrients 14(15).
18	Binaural code	The Binaural Code	Encke, J. and M. Dietz (2022). "A hemispheric two-channel code accounts for binaural unmasking in humans." CommunBiol 5(1): 1122.
19	Bioelectric code	The Bioelectric Code	Tseng, A. and M. Levin (2013). "Cracking the bioelectric code: Probing endogenous ionic controls of pattern formation." Commun Integr Biol 6(1): e22595. Levin, M. and C. J. Martyniuk (2018). "The bioelectric code: An ancient computational medium for dynamic control of growth and form." Biosystems 164: 76-93. Silver, B. B. and C. M. Nelson (2018). "The Bioelectric Code: Reprogramming Cancer and Aging From the Interface of Mechanical and Chemical Microenvironments." Front Cell Dev Biol 6: 21.
20	Biosynthetic code	The Biosynthetic Code	Xu, Z., M. Baunach, L. Ding, H. Peng, J. Franke and C. Hertweck (2014). "Biosynthetic code for divergolide assembly in a bacterial mangrove endophyte." Chembiochem 15(9): 1274-1279.
21	Body plan code	The (Epigenetic) Body Plan Code	Elder D (1979) An epigenetic code. Differentiation, 14, 119-122.
22	Brain code	The Universal Brain Code	Rosenberg, R. N. (2021). "The universal brain code a genetic mechanism for memory." J Neurol Sci 429: 118073.
23	Cadherin code	The Cadherin Neuronal Code	Pearson, Caroline A., Samantha J. Butler and Bennett G. Novitch (2014). "Neuronal Organization: Unsticking the Cadherin Code." Current Biology 24(23): R1127-R1129.

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24	Calcium code	The Calcium Code	Thomine, S. (2001). "Cracking the calcium code." Trends Plant Sci 6(11): 501. Allen, G. J. and J. I. Schroeder (2001). "Combining genetics and cell biology to crack the code of plant cell calcium signaling." Sci STKE 2001(102): re13. Mauro, T. (2003). "'The discovery channel': CRAC'king the code of calcium influx." J Invest Dermatol 121(1): 1x-x. Parekh, A. B. (2006). "Cell biology: cracking the calcium entry code." Nature 441(7090): 163-165. DeFalco, T. A., K. W. Bender and W. A. Snedden (2009). "Breaking the code: Ca²⁺ sensors in plant signalling." Biochem J 425(1): 27-40. Haiech, J. and M. Moreau (2011). "The calcium signal: a universal carrier to code, decode and transduce information." Biochimie 93(12): v. Covelo, A., A. Badoual and A. Denizot (2022). "Reinforcing Interdisciplinary Collaborations to Unravel the Astrocyte "Calcium Code"." J Mol Neurosci 72(7): 1443-1455.
25	Cancer code	The Epigenetic Cancer Code	Altarc, S. (1993). "Numerical quadruplet code of human cervical carcinoma tissue proteins." Acta Med Croatica 47(2): 85-87. Smith, L. T., G. A. Otterson and C. Plass (2007). "Unraveling the epigenetic code of cancer for therapy." Trends Genet 23(9): 449-456. Ozawa, M. G., M. Cardó-Vila, P. J. Mintz, W. Arap and R. Pasqualini (2010). "Cracking the code for compartment-specific dual functionality proteins in cancer: the case for CRKL." Cell Cycle 9(1): 8-9 Brower, V. (2011). "Epigenetics: Unravelling the cancer code." Nature 471(7339): S12-13.

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26	Cell access code	The Cell Access Code	Zengel, J. and J. E. Carette (2020). "Cracking the cell access code for the deadly virus VEEV." Nature 588(7837): 223-224.
27	Cell surface code	The Cell Surface Recognition Code	Mountoufaris, G., D. Canzio, C. L. Nwakeze, W. V. Chen and T. Maniatis (2018). "Writing, Reading, and Translating the Clustered Protocadherin Cell Surface Recognition Code for Neural Circuit Assembly." Annu Rev Cell Dev Biol 34: 471-493.
28	Cell wall code	The Plant Cell Wall Code	Tavares, E. Q. and M. S. Buckeridge (2015). "Do plant cell walls have a code?" Plant Sci 241: 286-294.
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