

BIBLIOGRAPHIE

Protéines Allostériques

- Changeux J.-P. (1961). The feedback control mechanism of biosynthetic L-threonine deaminase by L-isoleucine. *Cold Spring Harbor Symp. Quant. Biol.* 26: 313-318.
- Changeux J.-P. (1963). Allosteric Interactions on biosynthetic L-theonine deaminase from *E. coli* K12. *Cold Spring Harb Symp Quant Biol*, 28: 497-504
- Monod J., Changeux J.-P., and Jacob. F. (1963). Allosteric proteins and cellular control systems. *J. Mol. Biol.* 6: 306-329
- Monod J., Wyman J., and Changeux J.-P. (1965). On the nature of allosteric transitions: a plausible model. *J. Mol. Biol.* 12: 88-118.
- Rubin M.M., Changeux J.-P. (1966). On the nature of allosteric transitions ; implications of non exclusive ligand binding. *J. Mol. Biol.* 21: 265-274.
- Changeux J.-P., Thiéry J.-P., Tung Y., and Kittel C. (1967). On the cooperativity of biological membranes. *Proc. Natl. Acad. Sci. USA* 57, 335-341.
- Changeux J.-P., Podleski T.R. (1968). On the excitability and cooperativity of electroplax membrane. *Proc. Natl. Acad. Sci. USA* 59:944-950

Récepteur de l'acétylcholine

isolation, purification, structure

- Kasai M. & Changeux J.P. (1971) *In vitro* excitation of purified membrane fragments by cholinergic agonists. *J. Memb. Biol.* 6:1-23 ; 4-57 ; 58-80 ; 81-88.
- Changeux J.-P., Kasai M., Huchet M., Meunier J.-C. (1970). Extraction à partir du tissu électrique de gymnote d'une protéine présentant plusieurs propriétés caractéristiques du récepteur physiologique de l'acétylcholine. *C. R. Acad. Sci.* 270D: 2864-2867.
- Changeux J.-P., Kasai M., and Lee C.Y. (1970). The use of a snake venom toxin to characterize the cholinergic receptor protein. *Proc. Natl. Acad. Sci. USA* 67: 1241-1247.
- Olsen R., Meunier J.C., Changeux J.-P. (1972). Progress in purification of the cholinergic receptor protein from *Electrophorus electricus* by affinity chromatography. *FEBS Lett.* 28., 96-100.
- Meunier J.C., Sealock R., Olsen R. & Changeux J.P. (1974) Purification and properties of the cholinergic receptor protein from *Electrophorus electricus* electroplax. *Europ. J. Biochem.* 45 :371-394
- Hucho F., Changeux J.-P. (1973). Molecular weight and quaternary structure of the cholinergic receptor protein extracted by detergents from *Electrophorus electricus* electric tissue. *FEBS Lett.* 38: 11-15
- Cartaud J., Benedetti E.L., Cohen J.B., Meunier J.C., Changeux J.-P. (1973) Presence of a lattice structure in membrane fragments rich in nicotinic receptor protein from the electric organ of *Torpedo marmorata*. *FEBS Lett.* 33: 109-113.
- Bon F., Lebrun E., Gomel J., Van Rapenbusch R., Cartaud J., Popot J.L. & Changeux J.P. (1984) Image analysis of the acetylcholine receptor heavy form. *J. Mol. Biol.* 176 :205-237.
- Devillers-Thiéry A., Changeux J.-P., Paroutaud P., and Strosberg A.D. (1979). The amino-terminal sequence of the 40.000 molecular weight subunit of the acetylcholine receptor protein from *Torpedo marmorata*. *FEBS Lett.* 104: 99-105.
- Devillers-Thiéry A., Giraudat J., Bentaboulet M., Changeux J.-P. (1983). Complete mRNA coding sequence of the acetylcholine binding alpha subunit of *Torpedo marmorata* acetylcholine receptor: a model for the transmembrane organization of the polypeptide chain. *Proc. Natl. Acad. Sci. USA* 80: 2067-2071.
- Site de liaison de l'acétylcholine**
- Oswald R.E. & Changeux J.P. (1982) Crosslinking of α -bungarotoxin to the acetylcholine receptor from *Torpedo marmorata* by ultraviolet light irradiation. *FEBS Lett.* 139:225-229

Dennis M., Giraudat J., Kotzyba-Hibert F., Goeldner M., Hirth C., Chang J.Y., Lazure C., Chrétien M., Changeux J.-P. (1988). Amino acids of the *Torpedo marmorata* acetylcholine receptor subunit labeled by a photoaffinity ligand for the acetylcholine binding site. *Biochemistry* 27: 2346-2357.

Galzi J.-L., Revah F., Black D., Goeldner M., Hirth C., Changeux J.-P. (1990). Identification of a novel amino acid a-Tyr 93 within the active site of the acetylcholine receptor by photoaffinity labeling: additional evidence for a three-loop model of the acetylcholine binding site. *J. Biol. Chem.* 265: 10430-10437.

Canal ionique

Giraudat J., Dennis M., Heidmann T., Chang J.Y., Changeux J.-P. (1986). Structure of the high affinity site for noncompetitive blockers of the acetylcholine receptor: serine-262 of the delta subunit is labeled by [³H]-chlorpromazine. *Proc. Natl. Acad. Sci. USA* 83: 2719-2723.

Giraudat J., Dennis M., Heidmann T., Haumont P.Y., Lederer F. & Changeux J.P. (1987) Structure of the high-affinity binding site for noncompetitive blockers of the acetylcholine receptor: [³H] chlorpromazine labels homologous residues in the β and δ chains. *Biochemistry*, 26:2410-2418.

Galzi J.-L., Devillers-Thiery A., Hussy N., Bertrand S., Changeux J.-P., Bertrand D. (1992). Mutations in the ion channel domain of a neuronal nicotinic receptor convert ion selectivity from cationic to anionic. *Nature* 359: 500-505.

Eiselé J.L., Bertrand S., Galzi J.L., Devillers-Thiéry A., Changeux J.P. & Bertrand D. (1993) Chimaeric nicotinic-serotonergic receptor combines distinct ligand binding and channel specificities. *Nature*, 366 :479-483.

Corringer P.-J., Bertrand S., Galzi J.-L., Devillers-Thiéry A., Changeux J.-P., Bertrand D. (1999). Mutational Analysis of the Charge Selectivity Filter of the $\alpha 7$ Nicotinic Acetylcholine Receptor. *Neuron* 22: 831-843.

Mulle C., Choquet D., Korn H., Changeux J.-P. (1992). Calcium influx through nicotinic receptor in rat central neurons : Its relevance to cellular regulation. *Neuron* 8: 135-143.

Bertrand D., Galzi J.-L., Devillers-Thiéry A., Bertrand S., Changeux J.-P. (1993). Mutations at two distinct sites within the channel domain M2 alter calcium permeability of neuronal $\alpha 7$ nicotinic receptor. *Proc. Nat. Acad. Sci. USA* 90: 6971-6975.

Léna C, Changeux, JP (1997). Role of Ca²⁺ ions in nicotinic facilitation of GABA release in mouse thalamus. *J Neurosci* 17: 576-585.

Sites modulateurs allostériques

Mulle C., Léna C., Changeux J.-P. (1992). Potentiation of nicotinic receptor response by external calcium in rat central neurons. *Neuron* 8: 937-945.

Galzi JL, Bertrand S, Corringer PJ, Changeux JP, Bertrand D. (1996) Identification of calcium binding sites that regulate potentiation of a neuronal nicotinic acetylcholine receptor. *EMBO J.* 15:5824-32.

Le Novère N, Grutter T, Changeux JP. (2002) Models of the extracellular domain of the nicotinic receptors and of agonist- and Ca²⁺-binding sites. *Proc Natl Acad Sci U S A*.99:3210-5.

Krause RM, Buisson B, Bertrand S, Corringer PJ, Galzi JL, Changeux JP, Bertrand D. Ivermectin: a positive allosteric effector of the alpha7 neuronal nicotinic acetylcholine receptor. *Mol Pharmacol.* 1998 53:283-94

Transitions of Allostériques du Récepteur de l'Acétylcholine

Weber M., David-Pfeuty M.T., Changeux J.-P. (1975). Regulation of binding properties of the nicotinic receptor protein by cholinergic ligands in membrane fragments from *Torpedo marmorata*. *Proc. Natl. Acad. Sci. USA* 72: 3443-3447.

Sugiyama H., Changeux J.-P. (1975). Interconversion between different states of affinity for acetylcholine of the cholinergic receptor protein from *Torpedo marmorata*. *Eur. J. Biochem.* 55: 505-515.

Heidmann T., Changeux J.-P. (1979). Fast kinetic studies on the interaction of a fluorescent agonist with the membrane-bound acetylcholine receptor from *T. marmorata*. *Eur. J. Biochem.* 94: 255-279.

Revah F., Bertrand D., Galzi J.L., Devillers-Thiéry A., Mulle C., Hussy N., Bertrand S., Ballivet M. & Changeux J.P. (1991) Mutations in the channel domain alter desensitization of a neuronal nicotinic receptor. *Nature*, 353:846-849.

Bertrand D., Devillers-Thiéry A., Revah F., Galzi J.L., Hussy N., Mulle C., Bertrand S., Ballivet M. & Changeux J.P. (1992) Unconventional pharmacology of a neuronal nicotinic receptor mutated in the channel domain. *Proc. Natl. Acad. Sci. USA*. 89 :1261-1265.

Edelstein S., Schaad O., Henry E., Bertrand D., Changeux J.-P. (1996). A kinetic mechanism for nicotinic acetylcholine receptors based on multiple allosteric transitions. *Biol. Cybern.* 75: 361-379
Taly A., Delarue M., Grutter T., Nilges M., Le Novère N., Corringer P.J. & Changeux J.P. (2005) Normal mode analysis suggest a quaternary twist model for the nicotinic receptor gatin mechanism. *Biophysics J.* 88 :3954-3965

Bocquet N., Prado de Carvalho L., Cartaud J., Neyton J., Le Poupon C., Taly A., Grutter T., Changeux JP, Corringer PJ. (2007) A prokaryotic proton-gated ion channel from the nicotinic acetylcholine receptor family. *Nature*. 445:116-9.

Bocquet N., Nury H., Baaden M., Le Poupon C., Changeux J.-P., Delarue M., Corringer P.-J. (2008) X-ray structure of a pentameric ligand-gated ion channel in an apparently open conformation. *Nature*. Nov 5

Récepteur de l'Acétylcholine et Stabilisation Sélective des synapses

Changeux J.-P., Danchin, A. (1976). Selective stabilization of developing synapses as a mechanism for the specification of neuronal networks. *Nature* 264: 705-712.

Sotelo C., Changeux J.-P. (1974). Transsynaptic degeneration 'en cascade' in the cerebellar cortex of staggerer mutant mice. *Brain Res.* 67: 519-526.

Mariani J., Crepel F., Mikoshiba K., Changeux J.-P. (1977). Anatomical, physiological and biochemical studies of the cerebellum from reeler mutant mouse. *Phyl. Trans. Royal Soc. B* 281: 1-28

Benoit P., Changeux J.P. (1975) Consequences of tenotomy on the evolution of multiinnervation in developing rat soleus muscle. *Brain Res.* 99:354-8

Henderson CE, Huchet M, Changeux JP. (1983) Denervation increases a neurite-promoting activity in extracts of skeletal muscle. *Nature*. Apr 14;302(5909):609-11.

Betz H., Changeux J.-P. (1979). Regulation of muscle acetylcholine receptor synthesis in vitro by cyclic nucleotide derivatives. *Nature* 278: 749-752.

Klarsfeld A., Changeux J.-P. (1985). Activity regulates the level of acetylcholine receptor alpha-subunit mRNA in cultured chick myotubes. *Proc. Natl. Acad. Sci. USA* 82: 4558-4562.

Klarsfeld A., Laufer R., Fontaine B., Devillers-Thiéry A., Dubreuil C., Changeux J.-P. (1989). Regulation of muscle AChR alpha-subunit gene expression by electrical activity : involvement of protein kinase C and Ca++. *Neuron* 2: 1229-1236.

Piette J., Bessereau J.-L., Huchet M., Changeux J.-P. (1990). Two adjacent MyoD1-binding sites regulate the expression of the acetylcholine receptor delta-subunit gene. *Nature* 345: 353-355.

Fontaine B., Klarsfeld A., Hokfelt T., Changeux J.-P. (1986). Calcitonin gene-related peptide, a peptide present in spinal cord motoneurons, increases the number of acetylcholine receptors in primary cultures of chick embryo myotubes. *Neurosci. Lett.* 71: 59-65.

Fontaine B., Klarsfeld A., Changeux J.-P. (1987). Calcitonin-gene related peptide and muscle activity regulate acetylcholine receptor alpha-subunit mRNA levels by distinct intracellular pathways. *J. Cell Biol.* 105: 1337-1342.

Laufer R., and Changeux J.-P. (1987). Calcitonin gene-related peptide elevates cyclic AMP levels in chick skeletal muscle : possible neurotrophic role for a coexisting neuronal messenger. *EMBO J.* 6: 901-906.

Altiok N., Bessereau J.-L., Changeux J.-P. (1995). ErB3 and ErbB2/neu mediate the effect of heregulin on acetylcholine receptor gene expression in muscle : differential expression at the endplate. *EMBO J.* 14: 4258-4266.

Koike S., Schaeffer L. & Changeux J.P. (1995) Identification of a DNA element determining synaptic expression of the mouse acetylcholine receptor δ -subunit gene. *Proc. Natl. Acad. Sci. USA.* 92:10624-10628

Schaeffer L., Duclert N., Huchet-Dymanus M., Changeux J.-P. (1998). Implication of a multisubunit Ets related transcription factor in synaptic expression of the nicotinic acetylcholine receptor. *EMBO J.*, 17: 3078-3090.

Rossi FM, Pizzorusso T, Porciatti V, Marubio LM, Maffei L, Changeux JP. (2001) Requirement of the nicotinic acetylcholine receptor β -2 subunit for the anatomical and functional development of the visual system. *Proc Natl Acad Sci U S A.* 98:6453-8 ;

Récepteurs nicotiniques, récompense et cognition

Picciotto M., Zoli M., Léna C., Bessis A, Lallement Y, Le Novère N, Vincent P, Merlo Pich E, Brûlet P and Changeux JP (1995) Abnormal avoidance learning in mice lacking functional high-affinity nicotine receptor in the brain. *Nature* 374:65-67.

Le Novère N., Zoli M., Changeux J.-P. (1996). Neuronal nicotinic receptor $\alpha 6$ subunit mRNA is selectively concentrated in catecholaminergic nuclei of the rat brain. *Eur J Neurosci* 8: 2428-2439

Picciotto M., Zoli M., Rimondini R., Léna C., Marubio L., Merlo Pich E., Fuxe K. & Changeux J.P. (1998) Acetylcholine receptors containing $\beta 2$ -subunit are involved in the reinforcing properties of nicotine. *Nature*, 391:173-177.

Marubio L.M., Arroyo-Jimenez M.M., Cordero-Erausquin M., Léna C., Le Novère N., De Kerchove d'Exaerde A., Huchet M., Damaj I. & Changeux JP (1999) Reduced antinociception in mice lacking neuronal nicotinic receptor subunits. *Nature*, 398:805-810.

Zoli M, Picciotto MR, Ferrari R, Cocchi D, Changeux JP (1999) Increased neurodegeneration during ageing in mice lacking high-affinity nicotine receptors. *EMBO J.* 18:1235-44.

Klink R., de Kerchove d'Exaerde A., Zoli M., Changeux J.-P. (2001). Molecular and Physiological Diversity of Nicotinic Acetylcholine Receptors in the Midbrain Dopaminergic Nuclei. *J. Neurosci.* 21: 1452-1463.

Champtiaux N, Gotti C, Cordero-Erausquin M, David DJ, Przybylski C, Lena C, Clementi F, Moretti M, Rossi FM, Le Novere N, McIntosh JM, Gardier AM, Changeux JP (2003) Subunit composition of functional nicotinic receptors in dopaminergic neurons investigated with knock-out mice. *J Neurosci.*, 2003 Aug 27;23(21):7820-9.

Maskos U., Molles B.E, Pons S., Besson M., Guiard B.P., Guilloux J.P., Evrard A., Cazala P., Cormier A., Mameli-Engvall M., Dufour N., Cloz-Tayarani I., Bemelmans A.-P., Mallet J., Gardier A.M., David V., Faure P., Granon S. and Changeux J.-P. (2005) Nicotine reinforcement and cognition restored by targeted expression of nicotinic receptors. *Nature* 436: 103-107

Dehaene S., Changeux J.-P., Nadal J.P. (1987). Neural networks that learn temporal sequences by selection. *Proc. Natl. Acad. Sci. USA* 84: 2727-2731.

Dehaene S., Changeux J.-P. (1993). Development of elementary numerical abilities : a neuronal model. *J. Cognitive Neurosci* 5: 390-407.

Dehaene S., Kerszberg M., Changeux J.-P. (1998). A neuronal model of a global workspace in effortful cognitive tasks. *Proc Natl Acad Sci USA* 95: 14529-14534.

Dehaene S., Sergent C., Changeux J.-P. (2003) A neuronal network model linking subjective reports and objective physiological data during conscious perception. *Proc. Natl. Acad. Sci. USA*, 100: 8520-8525.