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APPENDIX 1
NOMENCLATURE GUIDELINES

With effect from June 2006

For receptor nomenclature, the Journal generally follows the guidelines laid down in three sources, the BJP Guide to Receptors and Channels, the IUPHAR Receptor Compendia and the reports of NC-IUPHAR Sub Committees published in *Pharmacological Reviews* (e.g. Foord *et al*., (2005) *Pharmacol. Rev*., **57**, 279–288)

1 *Definition of receptors and subtypes*

Receptors and their subtypes are defined in terms of structural information where available, affinity and selectivity of antagonists and thereafter by agonist selectivity.

2 *Receptor nomenclature*

(a) New or modified nomenclature only be introduced if there are compelling reasons to do so. The criteria upon which the new receptor type or subtype are defined must be given, together with adequate explanations of the relationship between the previous nomenclature (fully referenced) and the proposed one.

The new nomenclature should not appear in the Title, Short Title or Keywords.

(b) Only well-established and universally accepted subtype names will be acceptable without any reference to the originator of these terms. In cases of controversy concerning further subdivision of the subtype, full referencing must be given.

(c) When receptors are expressed from DNA or RNA that has been introduced into cells and these receptors display a dissimilar pharmacological profile to the native receptors, or have not been characterised pharmacologically, they should be denoted by use of lower case, e.g. 5-ht_5 for expressed receptors and 5-HT_7 for native receptors. The stoichiometry of the expressed receptor should be indicated, where appropriate, e.g. for an adult muscle nicotinic acetylcholine receptor, it might be $(\alpha_1)2\beta_1\gamma\delta$.

(d) Receptor subtypes should normally be designated by means of a subscript numeral or capital letter. Some double subscripts (i.e. numeral plus letter) are acceptable.

(e) Greek letters and Roman numerals should be avoided in any new nomenclature. The name should not include the letter 'R' or 'r' as an abbreviation for receptor.

(f) Mammalian systems are the basis of receptor classifications with primacy given to humans. Therefore non-mammalian species should be clearly indicated, e.g. *Torpedo* nicotinic acetylcholine receptor, turkey β adrenoceptor, locust GABA receptor.

(g) The "-ergic" should not be used in relation to receptors, i.e. phrases such as cholinergic receptor and adrenergic receptor etc. should not be used. Acetylcholine receptor and adrenoceptor are acceptable.

3 *Naming of ion channels*

Ion channels are typically described by an abbreviation of the ion permeating the channel (e.g. K^+ channel, Na^+ channel, Cl^- channel, Ca^{2+} channel etc.)

Ionic currents are referred to by either the full description of the current (e.g. Ca^{2+}-activated K^+ current) or as an abbreviation using the prefix *I* followed by the atomic species carrying the current as a subscript (e.g. I_{Na}, I_{Ca},) Where it is important to specify the activator of the current, this may be added to the atomic species subscript in parenthesis (e.g. $I_{K(Ca)}$) for a calcium-activated potassium current or $I_{K(V)}$ for a voltage-activated potassium current).

When a pharmacological agent is used to describe a current, it must be fully defined in the text.

When, for example, a system has two currents carried by the same ionic species and activated by similar means but with (for example) different kinetics, the distinguishing factor may be added to the subscript or as a hyphen after the abbreviation (e.g. '$I_{K(Ca,slow)}$' or '$I_{K(Ca)}$-slow', which would refer to a kinetically slow calcium-activated potassium current).

Examples of some commonly used abbreviations are shown below:

Sodium current: $I_{Na(V)}$
Potassium currents: $I_{K(V)}$, $I_{K(Ca)}$, $I_{K(A)}$, $I_{K(IR)}$
Chloride currents: $I_{Cl(Ca)}$, $I_{Cl(cAMP)}$, $I_{Cl(swell)}$
Calcium currents: $I_{Ca(L)}$, $I_{Ca(T)}$, $I_{Ca(N)}$

4 *Nerve fibres*

Nerve fibres that release noradrenaline are to be described as noradrenergic. The term adrenergic should be reserved for nerve fibres known to release adrenaline. Where the identity of the catecholamine is uncertain, catecholaminergic should be used.

NANC is an acceptable abbreviation of non-adrenergic, non-cholinergic for peripheral efferent nerve fibres when the identity of the transmitter(s) is unknown.

Glutamatergic, not glutaminergic, should be used to describe nerve fibres releasing glutamate. In referring to peptide-releasing nerve fibres (e.g. those that may release substance P or vasoactive intestinal peptide) the nomenclature to be used is peptidergic (X), e.g. peptidergic (SP).

The terms 5-hydroxytryptamine (5-HT) and 5-hydroxytryptaminergic are preferred to those of serotonin and serotoninergic.

The term purinergic defines transmission mediated by ATP.

Abbreviations such as 5-HTergic, DAergic, SPergic, etc. should be avoided.

5 *Terms used to describe agonist and antagonist action*

The following terms can be used without full definition where appropriate, other terms may be used but must be accompanied by a full definition.

Terms used to describe affinity and potency

(a) EC_{50} The concentration of an agonist that produces 50% of the maximal response for that agonist *in vitro*. The agonist may be stimulatory or inhibitory. When EC_{50} values are determined in the presence of other agonists or antagonists the concentration of the latter should be stated. Related terms, e.g. EC_{25}, are acceptable if accompanied by a full definition.

(b) IC_{50} This term may be used in the following ways.

(i) The concentration of antagonist that reduces the response to a sub-maximal concentration of agonist by 50%; the concentration of agonist should be stated.
(ii) The concentration of competing agonist or antagonist that inhibits the binding of a radioligand by 50%; the concentration of radioligand should be stated.

(c) ED_{50} This term may be used in the following ways.

(i) The dose of an agonist or antagonist that produces 50% of the maximal possible effect of that agonist or antagonist *in vivo*.
(ii) The dose of drug that produces the effect under investigation in 50% of the population.

(d) K The equilibrium dissociation constant (mol 1^{-1}), for ligand receptor interactions. The reciprocal is called the affinity constant or association equilibrium constant. When necessary for clarity, subscripts (letters or numerals, or a combination of both) may be added but these must be clearly explained when first used.

(e) n_H The Hill coefficient.

(f) pA_2 The negative logarithm to base 10 of the concentration of an antagonist that makes it necessary to double the molar concentration of agonist needed to elicit a given submaximal response. Note that the definition is empirical and does not pre-suppose the mechanism of antagonism.

(g) pD_2 The negative logarithm to base 10 of the EC_{50}.

(h) pIC_{50} The negative logarithm to base 10 of the IC_{50}.

(i) pK The negative logarithm to base 10 of K (with or without subscripts as appropriate: see under K above).

6 *Other nomenclature requirements*

(a) *Racemates* Authors must state unambiguously in the Methods section of papers which isomers were used, e.g. (+)- or (−)-propranolol, and must bring to the attention of the reader the composite character of drugs that are mixtures of stereoisomers. Furthermore, the implications of the composite nature of such drugs studied for the interpretation of the data measured and the conclusions drawn must be made explicit. Capital R and S refer to the absolute configurations of chiral centres and should be used where necessary.

(b) *Purines* This term should not be used as a synonym for purine nucleotides or nucleosides.

(c) *Eicosanoids* The system of nomenclature to be used for eicosanoids is that published in *Methods in Enzymology* (1990) **187**, 1–9. In manuscripts, the first use of the full chemical name of any eicosanoid should indicate double bond geometry when this is known.

(d) *Cell lines* Cell type, range of passage number, species and source should be defined.

(e) *Molecular biology* Abbreviations pertaining to molecular biological techniques need to be defined or presented in such a way that they can be recognised by the non-specialist.

(f) *Ions* When referring to ions, the charge should be indicated, *e.g.* Na^+, Ca^{2+}, $3Na^+/Ca^{2+}$ exchange, etc.