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Letter to the Editors

Anticholinergics, antimuscarinics or atropinics? About the words in pharmacology

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We read with great interest the two excellent articles from Gnjidic *et al.* [1] and Gerden *et al.* [2] in recent issues of the British Journal of Clinical Pharmacology.

The first work evaluated the Drug Burden Index (a measure of exposure to 'anticholinergic' and sedative drugs) in older Australian men [1]. The second paper discussed association of 'anticholinergic' drugs with antipsychotic drugs in Norway after orphenadrine (an 'anticholinergic' drug which also has H_1 antihistaminic properties) [2].

Our goal is not to question the conclusions of these two interesting and well documented papers but to discuss about the use of the word 'anticholinergic'.

In fact, following the first observation of Sir Henry Dale that the various esters of choline elicited responses similar to either nicotine or muscarine depending on the pharmacological preparation [3], two different cholinergic receptors were described. Nicotinic receptors are ligand-gated ion channels, mainly located on autonomic ganglia and skeletal muscles, whose activation causes a rapid increase in cellular permeability to sodium and calcium, depolarization and excitation. Muscarinic receptors, coupled to a G-protein, are mainly located in the central nervous system (hippocampus, cortex, thalamus) but also, at the peripheral level, on autonomic effector cells innervated by postganglionic parasympathetic nerves (i.e. smooth and cardiac muscles) [4].

Thus, two kinds of cholinergic antagonists ('anticholinergics') were described: nicotinic receptor antagonists, acting either on the skeletal muscle (atracurium or tubocurarine, α-conotoxin . . .), autonomic ganglia and adrenal medulla (trimethaphan, mecamylamine) or central nervous system (mecamylamine, erysodine, α-conotoxin . . .) [4]. In contrast, muscarinic receptor antagonists include not only the naturally occurring alkaloids (atropine or scopolamine) but also semisynthetic and synthetic derivatives of these alkaloids (i.e. ipatropium, tiotropium, tolterodine . . .) [5].

Clinical use of nicotinic receptor antagonists is mainly restricted to anaesthesiology, as neuromuscular blocking agents. In contrast, muscarinic receptor antagonists are widely prescribed in medicine as bronchodilator, urinary or gastrointestinal antispasmodic, mydriatic, antiparkinsonian . . . drugs.

Thus, the drugs investigated by Gnjidic *et al.* [1] and Gerden *et al.* [2], and especially orphenadrine and other antiparkinsonian agents, belong, from a pharmacodynamic point of view, to the groups of muscarinic receptor antagonists. They are not 'anticholinergics' since they are unable to antagonize the effects of acetylcholine on nicotinic receptors. They only block the muscarinic effects of acetylcholine.

Finally, we think that the word 'anticholinergic' suffers from pharmacodynamic approximation and should be replaced by 'antimuscarinic' (if we consider the involved receptor) or 'atropinic' (in relation to the pharmacodynamic effects of this drug class). We hope that this recommendation will be followed, at least in pharmacological journals.

Competing interests

None declared.

REFERENCES

1 Gnjidic D, Cumming RG, Le Couteur DJ, Handelsman DJ, Naganathan V, Abernethy DR, Hilmer SN. Drug Burden Index and physical function in older Australian men. Br J Clin Pharmacol 2009; 68: 97–105.

2 Gjerden P, Slordal L, Brammes JG. The use of antipsychotic and anticholinergic antiparkinson drugs in Norway after the withdrawal of orphenadrine. Br J Clin Pharmacol 2009; 68: 238–42.

3 Dale HH. The action of certain esters and ethers of choline and their relation to muscarine. J Pharmacol Exp Ther 1914; 6: 147–90.

4 Westfall TC, Westfall DP. Neurotransmission: the autonomic and somatic motor nervous systems. In: Goodman & Gilman's the Pharmacological Basis of Therapeutics, 11th edn, eds Brunton LL, Lazo JS, Parker KL. New York: Mc Graw Hill, 2006; 137–81.

5 Brown JH, Taylor P. Muscarinic receptor agonists and antagonists. In: Goodman & Gilman's the Pharmacological Basis of Therapeutics, 11th edn, eds Brunton LL, Lazo JS, Parker KL. New York: Mc Graw Hill, 2006; 183–216.

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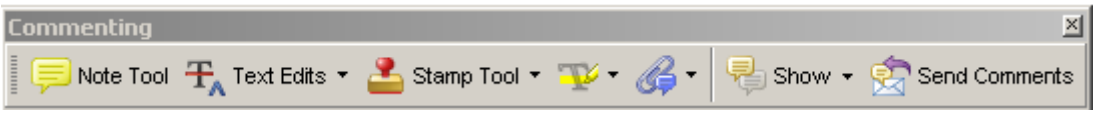

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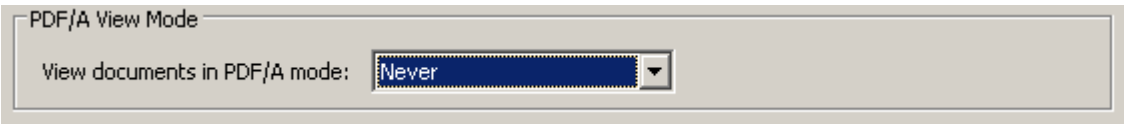

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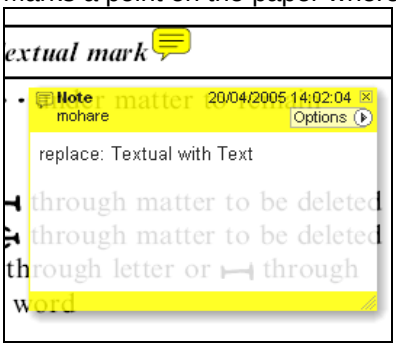

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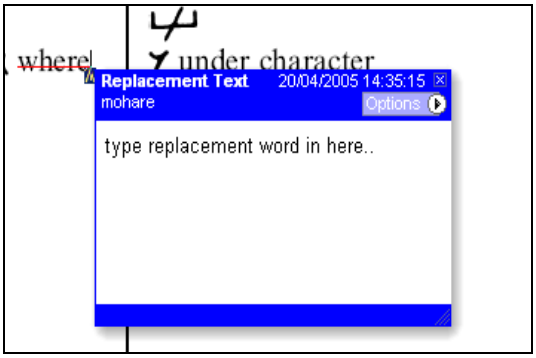

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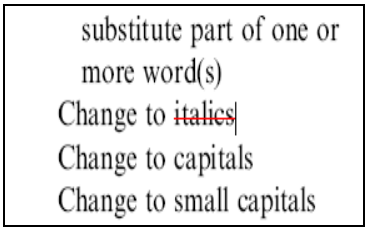

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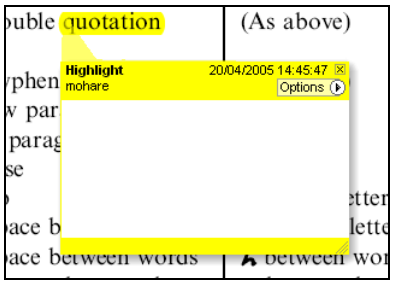

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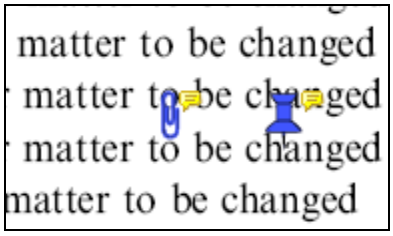

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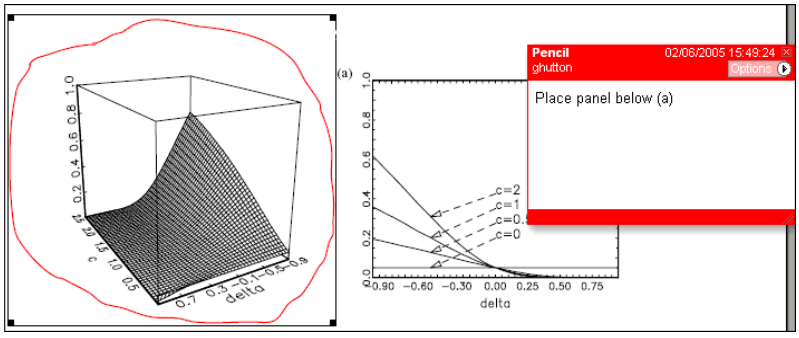

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