and deodorants. In the study by Surolia and Surolia, triclosan was administered to animals subcutaneously[2], though its use as a systemic anti-microbial has not been established. The pharmacokinetics of triclosan have received little attention because the compound's use has been confined to topical formulations. After intravenous administration of the radiolabeled drug to rats[8], the plasma elimination half-time was about nine hours. Although the oral bioavailability of the compound is unknown, there is some absorption from this route[7].

Despite its extensive use, reports of resistance to triclosan are relatively uncommon. In *E. coli*, resistance is conveyed by upregulation of *fabI* expression or missense mutations in the *fabI* gene[5]. These observations prompt the concern that triclosan or related compounds would need to be used judiciously, or in combination with other antimalarials, to avoid the potential problem of widespread resistance currently seen with drugs such as chloroquine.

The development and marketing of new antimalarials, or of existing compounds such as triclosan for new indications such as malaria, is a slow and costly process. Industrial partners are typically required early in drug development, both for the budget (at least US $20 million) and for essential expertise, such as pharmaceutical development, toxicology and clinical studies, regulatory submission and marketing. Unfortunately, the costs of developing new antimalarials are often perceived as outweighing potential profits. Industry involvement is also influenced by patent rights, the need for animal pharmacokinetics and toxicology and the likelihood of beneficial publicity. Development typically takes at least four years, with no guarantee of a marketable product. Policy-makers, such as Ministers of Health, are understandably conservative about new drugs, and even if all key parties were involved from an early stage, it would probably take at least three years after the drug became available for it to be included in public health strategy. Finally, but perhaps most importantly, the relatively high cost of new drugs is a major obstacle to their use in resource-poor settings where the burden of malaria is greatest[9].

The identification of inhibitors of fatty acid synthesis in *Plasmodium* creates some exciting opportunities for developing novel antimalarials. The challenge ahead lies in exploiting these insights and ensuring that populations most affected by malaria are reached. This will require sustained multi-disciplinary effort from molecular biology through to public health, and public-private partnerships over many years

1. World Health Organisation. World malaria situation in 1994. *Weekly Epidemiol. Record* **72**, 269–274 (1997).
2. Surolia, N. & Surolia, A. Triclosan offers protection against blood stages of malaria by inhibiting enoyl-ACP reductase of *Plasmodium falciparum*. *Nature Med.* **7**, 167–173 (2001).
3. McFadden, G.I. & Roos, D.S. Apicomplexan plastids as drug targets. *Trends Microbiol.* **7**, 328–333 (1999).
4. Waller, R.F. *et al.* Nuclear-encoded proteins target to the plastid in *Toxoplasma gondii* and *Plasmodium falciparum*. *Proc. Natl. Acad. Sci. USA* **95**, 12352–12357 (1998).
5. Heath, R.J., Yu, Y.-T., Shapiro, M.A., Olson, E. & Rock, C.O. Broad spectrum antimicrobial biocides target the FabI component of fatty acid synthesis. *J. Biol. Chem.* **273**, 30316–30320 (1998).
6. Heath, R.J. *et al.* Mechanism of triclosan inhibition of bacterial fatty acid synthesis. *J. Biol. Chem.* **274**, 11110–11114 (1999).
7. Bhargava, H.N. & Leonard, P.A. Triclosan: applications and safety. *Am. J. Infect. Control* **6**, 209–218 (1996).
8. Siddiqui, W.H. & Buttar, H.S. Pharmacokinetics of triclosan in rat after intravenous and intravaginal administration. *J. Environ. Pathol. Toxicol.* **2**, 861–871 (1979).
9. Goodman, C., Coleman, P., & Mills, A. Economic analysis of malaria control in sub-Saharan Africa. Strategic Research Series, vol. 1 *Global Forum for Health Research* (World Health Organization, Geneva, 2000)

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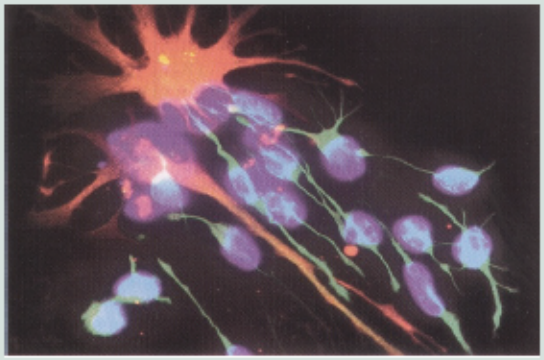
Stem-cell surface appearance

Experiments with human neurogenic precursor cells have revealed the ability of these cells to be carried in culture and differentiate into neurons, astrocytes and oligodendrocytes. Neural stem cells have also been shown to engraft, migrate and differentiate in rodents *in vivo*. However, little is known about the surface antigens present on human central nervous system stem-cells (CNS-SC), affecting the ability of researchers to easily isolate and follow the development of these cells. In the 19 December issue of *Proceedings of the National Academy of Sciences*, Uchida *et al.* (*Proc. Natl. Acad. Sci. USA* **97**, 14720–14725) report the creation of novel antibodies against CNS-SC surface molecules that can be used in fluorescent-activated cell-sorting analysis to isolate these cells from human fetal brain tissue. They demonstrated that this approach could be used to isolate a specific population of self-renewing CNS-SC. These cells were shown to initiate neurosphere cultures and differentiate into neurons and glia cells *in vitro*. When expanded cells were transplanted into the lateral ventricles of newborn mice, they underwent self-renewal, migration and neural differentiation in different areas of the brain. The picture shows the differentiation capacity of clonally derived neurosphere cells. Progeny of single cell-derived neurospheres differentiated into neurons (green) and astrocytes (red), while cell nuclei are stained blue. Uchida *et al.* showed that at 7–12 months post-transplant, the human CNS-SC could still be detected, were still able to respond to host microenvironment cues and were not neoplastic. The ability to directly isolate human CNS-SC will advance the testing of these cells in animal models of neurological disease as well as in preclinical studies for transplantability and tumorigenicity.



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