The 'impact' of *Current Science*

Among the 49 Indian scientific journals covered by the 2005 *Journal Citation Reports* (*JCR*) Science Edition[1], only *Journal of Biosciences* has an impact factor (IF) of more than 1.000. *Current Science* with an IF 0.728 ranks seventh among Indian scientific journals, behind *Proceedings of the Indian Academy of Sciences – Chemical Sciences* (0.921), *Indian Journal of Medical Research* (0.869), *Journal of Genetics* (0.833), *Journal of Chemical Sciences* (0.818), and *Bulletin of Materials Science* (0.777). Despite being ranked seventh in 2005 when compared to third in 2004 (ref. 2), the IF of *Current Science* has increased from 0.688 in 2004 to 0.728 in 2005. However, it is the most cited Indian scientific journal with 3451 citations in 2005, the next closest being *Indian Journal of Chemistry (section B)* with 2284 citations[1]. Moreover, it is also the Indian scientific journal with the largest number of articles, i.e. 537, published in 2005, followed by *Asian Journal of Chemistry* with 467 published articles[1]. We hope that the *Current Science* IF will cross the magical figure of 1.000 in 2006, and that *Current Science* will retain its position atop the list of total citations and total number of published articles among the Indian scientific journals covered by *JCR* in 2006.

1. *Journal Citation Reports 2005*, Science Edition (CD ROM), Thomson Scientific, Philadelphia, 2006.
2. *Journal Citation Reports 2004*, Science Edition (CD ROM), Thomson Scientific, Philadelphia, 2005.

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CO_2 storage in coal mines

Coal Bed Methane (CBM) is naturally occurring methane (CH_4) with small amounts of other hydrocarbon and non-hydrocarbon gases contained in coal seams as a result of chemical and physical processes. CBM is an environment-friendly clean fuel with properties similar to natural gas. It is often produced at shallow depths and in most cases with large volumes of water of variable quality. It is sourced and reservoired in a coal seam and is often produced through a borehole to the surface. CBM resources represent valuable volumes of natural gas within and outside the areas of conventional oil and gas production.

The commercial production of CBM is a proven technology and CBM is now considered a major source of gas supplementing the production of hydrocarbon gas from petroleum sources. The considerations that weigh for development of CBM resources are: (i) The produced gas is a clean source of energy and if not extracted prior to or during mining, would vent out resulting in increased greenhouse gas emission detrimental to atmosphere and at the same time loss of valuable resources. (ii) Extraction of CBM makes coal mining safe, economic and profitable. (iii) There is also a pressing need for harnessing this alternate source of natural gas, as there is quantum jump in demand for natural gas in the country.

In May 2001, based on the initiative taken by the Directorate General of Hydrocarbons, for the first time in the country, CBM blocks were offered through international bidding for exploration and production of CBM in the country. As on date, under two rounds of CBM bidding, the government has awarded 16 CBM blocks to national, private and joint venture companies for exploration and production of CBM in the country. The total CBM resources in the 16 awarded blocks covering an area of around 7800 km^2 are estimated to be 820 BCM and expected total production from these blocks is estimated at 23 million metric standard cubic metre per day (MMSCMD) at their peak production level. During the last 3 years more than 75 exploratory/test wells have been drilled in the awarded blocks. The results in some of the blocks are very encouraging and there have been significant finds in eastern and central part of India. Preliminary estimates indicate that CBM production from blocks offered could be in the range of 20–22 million cubic metres per day for about 20 years.

The rate of CBM production is a product of several factors like fracture permeability development, gas migration, coal maturation, coal distribution, geological structure and produced water management. These factors vary from basin to basin. In most of the basin areas, naturally developed fracture networks are the most sought-after areas for CBM development. Areas where geologic structures and localized faulting have occurred tend to induce natural fracturing which increases the production pathways within the coal seam. Current commercial CBM production is almost exclusively through reservoir pressure depletion. This is simple but inefficient because total recovery by this technique is generally less than 50% of the gas-in-place. Geologic sequestration of CO_2 generated from fossil fuel combustion may be an environmentally attractive method to reduce the amount of greenhouse gas emissions and enhance CBM recovery.

Subsurface formations retaining hydrocarbon resources do have substantial capacity to store CO_2 and might act as sizable CO_2 sinks. Depleted or abandoned oil and natural gas reservoirs might be utilized for CO_2 storage. Injection of CO_2 in depleted oil and gas reservoirs leads to improving the recovery of hydrocarbons from the drained wells. Another related issue of importance is injection of CO_2 in unmineable coal deposits to store the carbon and simultaneously enhance the recovery of CBM. Thus, CO_2 storage in petroleum and coalfields provides opportunity for combining both economic and environmental goals in the form of enhanced oil and gas recovery and huge sink of CO_2.

Many power plants and other large emitters of CO_2 are located near geologic formations that are amenable to CO_2 storage. Further, in many cases, injection of CO_2 into a geologic formation can enhance the recovery of hydrocarbons, providing value-added byproducts that can offset the cost of CO_2 capture and sequestration. Approximately one third of all CO_2 emissions due to human activity come from fossil fuels used for generating electricity, with each power plant capable of emitting several million tonnes of CO_2 annually. A variety of other industrial processes, for example oil refineries, cement works and iron and steel production also emit large amounts of CO_2 from each plant. These emissions could be reduced substantially, without major changes to the basic structures, by capturing and storing the CO_2.

Injecting CO_2 into methane-rich coal seams hundreds or thousands of feet underground could have a double benefit of boosting energy production and at the same time reducing greenhouse gas emissions. Many unmineable coal seams have associated methane that is adsorbed on the coal. Field tests carried out in North America have shown that CO_2 pumped down an injection well into a deep, unmineable coal seam may be adsorbed on the coal bed, displacing the methane and forcing it to rise up through a production well. Carbon sequestration in selected Gondwana coalfields of India may provide valuable leads regarding application of CO_2 for enhanced CBM recovery and at the same time provide a viable avenue for long-term sequestration of CO_2.

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Combination drugs: Are they rational?

Combination products also known as fixed-dose combinations (FDCs) are combination of two or more active drugs present in a dosage form. The Food and Drug Administration, USA defines a combination product as a product composed of any combination of a drug and a device or a biological product and a device or a drug and a biological product or a drug, device, and a biological product[1].

Several branded formulations are available in India which are either single or fixed dose combination drugs. No doubt all the formulations are meant for prevention or treatment of ailments and diseases, out of which only a few drugs are lifesaving and essential; rest of the drugs are substitutes for each other. The safety of the combination drugs has to be thoroughly evaluated and there are considerations for the drugs that are already in the market as individual or single drug entity. However, the safety profile of the established drugs will alter when they are combined together. There was alarming increase in irrational FDCs in recent years and pharmaceutical companies manufacturing these FDCs are luring physicians to prescribe by unethical means. This may be due to the implementation of product patent regime where the mediocre companies find various alternatives to sustain themselves in the market place and combination products for newer indications play a major role. The total number of essential drugs mentioned in the 14th list of essential medicines by WHO is 312, out of which only 18 are fixed dose combinations[2]. But many of the irrational combinations are popular and widely prescribed by physicians in our country. The combinations such as tetracycline and vitamin C, quinolones and nitroimidazoles and penicillins with sulfonamides are some of the examples of irrational FDCs. Such dubious FDCs entail financial burden, resistant strains of bacteria and increase in unwanted effects. The regulatory requirements for approval of combination products vary from country to country and there are no specific regulations in our country.

In our country, after amendment of the Drugs Act in 1982, the Government has acquired the power to prohibit manufacture and sale of certain drugs and irrational FDCs. The government, subsequently, issued a first gazette notification in July 1983 banning several drugs and their FDCs after due consideration. Since then the government has been notifying the list of banned drugs on a regular basis[3]. The Drugs Controller General of India (DCGI) had issued an order in May 2002 to State drug-controlling authorities not to grant any manufacturing or marketing approvals for new drugs. Since then DCGI has become the centralized authority for granting new drug approvals. This has affected many companies who have already established manufacturing units for their approved FDCs by the State drug-regulatory authorities.

The principal regulatory body, USFDA is not convinced of the rationality behind combination products other than anti-tubercular and anti-AIDS drugs. Due to continuous demands from pharmaceutical companies, they had established the office of combination products in 2002 and they had approved a few combinations in anti-diabetic and cardiovascular segments. Regrettably there are no guidelines for the combination products with specific demarcation of chemical, herbal, biological products and devices. As of now, there is only a guidance draft available at office of combination products, USFDA website. Hence, there exists confusion in manufacturing and rationality of the FDCs.

As the wellbeing of a patient's health lies in the hands of healthcare professionals and pharmacists, it is essential for them to get acquainted with the list of drugs which are irrational and banned by DCGI. In addition, they should keep themselves updated with the notifications issued by the DCGI to curb irrational fixed dose combinations. Moreover, regulatory authorities, healthcare professionals, researchers and pharmaceutical companies should join hands together to formulate guidelines for the FDC's to drive away fear from the minds of patients.

1. Office of Combination Products, Food and Drug Administration, USA: www.fda.gov/oc/combination/21 CFR Part 3.2(e).
2. http://whqlibdoc.who.int/hq/2005/a87017_eng.pdf
3. http://www.cdsco.nic.in/html/Drugsbanned.html

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