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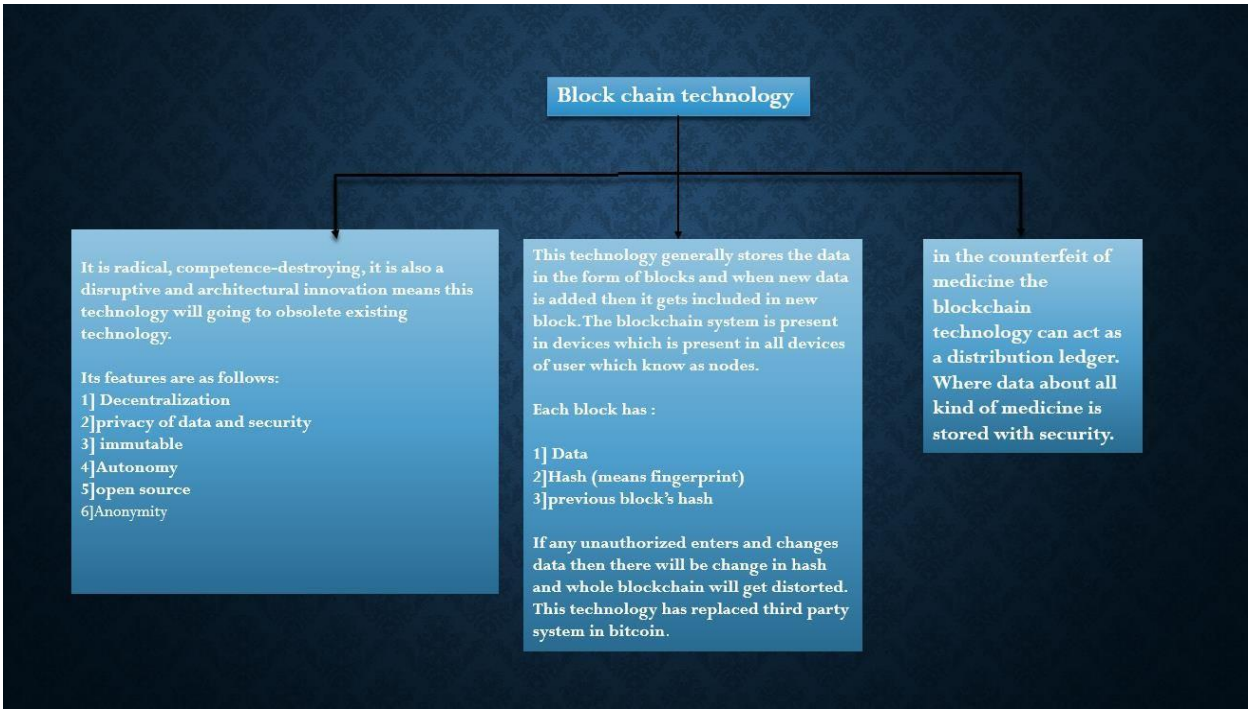
Selected Domain: Blockchain

ASSET TRACKING AND COUNTERFEIT DETECTION USING BLOCKCHAIN

- **The novelty of BCT in pharmaceuticals and in asset tracking**



Pfizer is actively taking part in the Medill-edger blockchain project. The project is all about creating a closed ecosystem that lets the companies track the drug to every last detail. NMC healthcare is very proactive in working with startups to improve the pharma and healthcare industry. United Healthcare is also trying to participate along with Optum. Rochie is one of the biggest giants in pharmaceutical industry. They are currently working with Abbvie and Pfizer to test out the supply chain pilot through its Genentech division.

asset tracking is also one of the areas where blockchain can reduce approval wait times by automating the complicated processes using smart contracts.

The companies like ConsenSys is a global formation of technologists working to strive towards a decentralized world. They have built customizable blockchain asset tracking solutions in healthcare, oil, gas, and real estate industries. Their blockchain platform is known as Treum (formerly known as Viant). It helps in modeling business processes, tracking assets, and building the supply chains. (Compelling insights as to how assets are managed and propagated).

How blockchain technology comes as a solution in asset management?

An initial block is created for the assets as they leave the manufacturer, thereby initiating the blockchain. An unambiguous tag is attached to each asset, which gets scanned whenever the asset transfers from one party to another.

This block would contain the details of time, type, and quantity of goods. Within such a system, all the participants of the supply chain will be able to track the products in real-time.

At any given time, a complete history of the asset's path can be traced by the authorized parties, thus enabling provenance for assets.

- # Utility

Who will use it?

1. Possible user profile and demographics:

UN report published in 2019, the report estimated that of the 271 million people that used any drug.

Age demographics: An age wise study done by Malhotra, Apoorva & Malhotra, Pavan. Show distribution of average no of drugs consumed.

Age Group (Years)	N (%)	Average No of drugs consumption/day
65-70	21(32.8)	5.4
71-75	12(20.3)	4.6
76-80	11(17.2)	5.7
81-85	8(12.5)	4.9
>85	11(17.2)	4.9

A reliable, good-quality medicine supply is essential for health, but it is often missing in countries with weak regulatory systems. The fallout of falsified and substandard medicines includes poisoning, untreated disease, early death, and treatment failure. Over 1 million people die each year from fake drugs. COVID-19 has made it even worse.

2. How will these people benefit from the Idea?

Patient and medical professionals can use the technology to Track and Detect counterfeit of drugs

Possibly saving patients' lives and preventing negative effects such as poisoning etc.

Medical dealers and pharmacists can verify the products while buying and selling them thus preventing their losses by buying counterfeit products

Authorities can use the product to track Medicine and other goods to detect possible tax evasion cases and also prevent counterfeiting.

3. Multiple use cases:

1. This technology can be used to track other assets like real estate The real estate market is worth Rs. 12,000 crore (US$ 1.72 billion) in 2019.

2. This technology can be used to prevent counterfeit other goods like art work and Food products.

- # Feasibility

Parallel cases where blockchain is used to track assets:

1. Everledger is a blockchain assets tracking and source detection company. It has developed a blockchain to track the movement of goods from raw materials source to sales, with its first application tracking diamonds to make sure they don't come from conflict zones.
2. ConsenSys is a global formation of technologists working to strive towards a decentralized world.
3. LeewayHertz Focusing on Blockchain, they build an end-to-end solution for businesses. They are a custom software development company for start-ups and enterprises, currently working in many industries such as Agriculture, Healthcare, Logistics, Legal, Manufacturing, and Startup's.
4. Context labs They provide enterprise-grade blockchain-enabled platform solutions that deliver trust and transparency for the digital and physical worlds.
5. Provenance is now a growing social enterprise with a background in software design, product manufacturing, and blockchain. Their prominent goal is to deliver innovation to commerce through open and accessible information about products and supply chains.

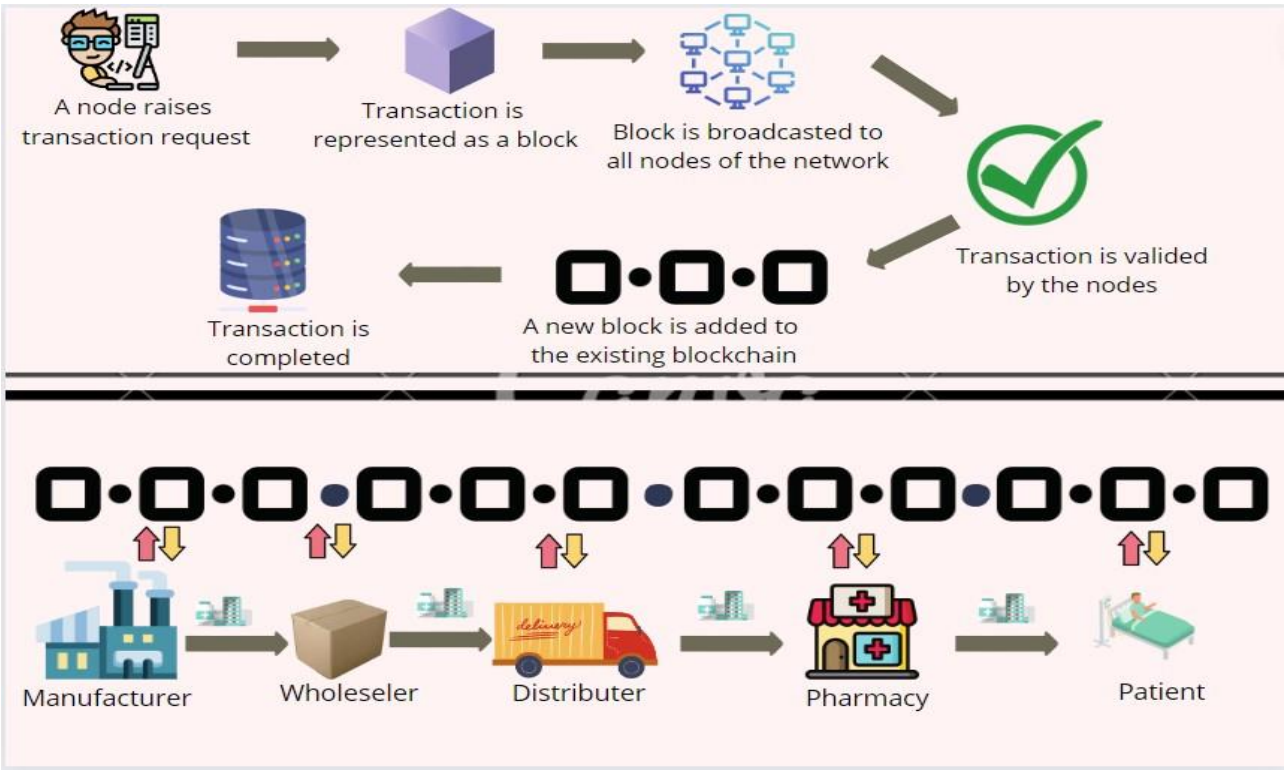
Current system of tracking medicine:

Worldwide all domestic manufacturers will need to incorporate bar coding and Unique Identification Number on every pack of medicine, so as to enable effective tracking of the products right from its inception stage to the delivery point.

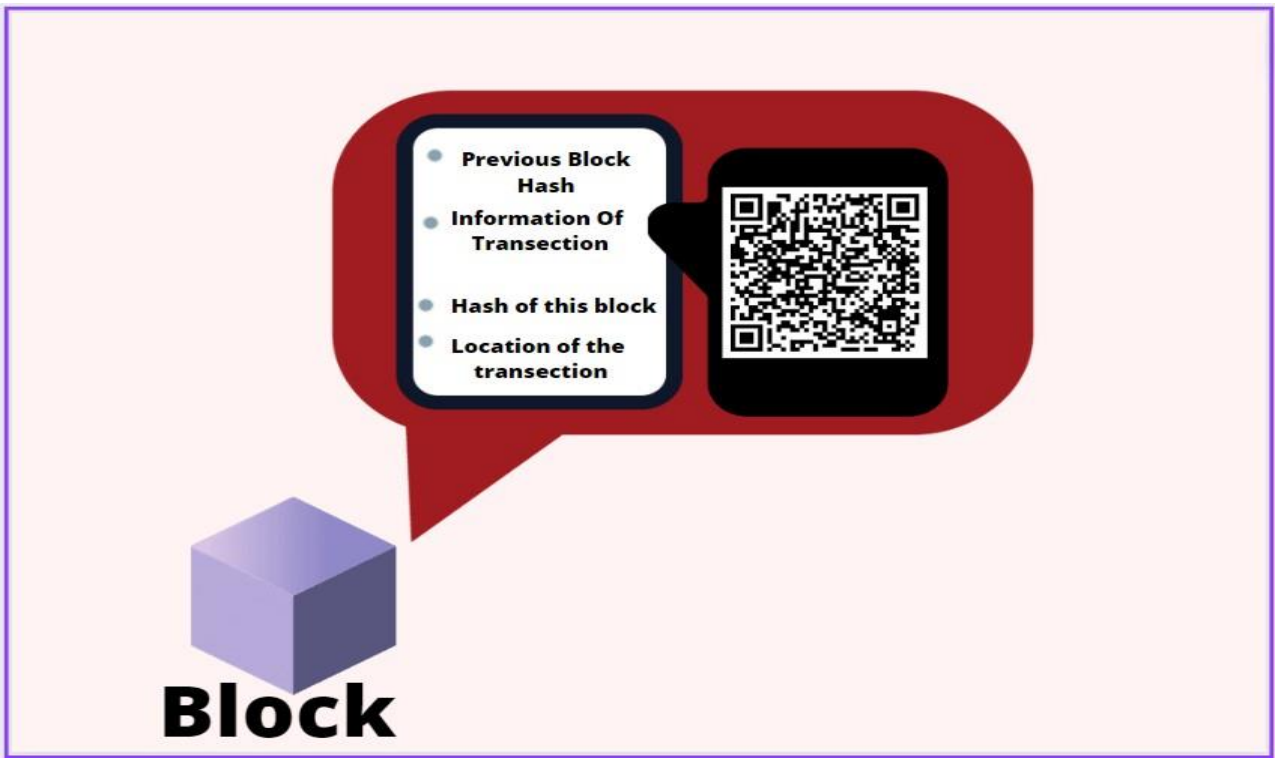
In India similar guidelines are there for all manufacturers but quite often such guidelines are not followed

Blockchain tracking can be easily integrated into the current system make the process of tracking and prevention of counterfeit goods more open and transparent.

- **Design & Development**



Block Design:



- # Cost Effectiveness

1. Raw material requirement:

Developers: hourly cost for hiring blockchain developer's $30–$59/hr

The blockchain app development cost starts at $5,000 and can go as high as $200,000.

To finish a complete enterprise grade solution with GUI app, wallet management, appropriate networking setup, etc. at least up to an initial beta release product quality you're looking at a cost scale of around an additional $100K–200K for a project that will be researched.

2. What is the counter cost of not implementing blockchain technology?

The World Health Organization estimates that there are over 1 million deaths annually from counterfeit and substandard drugs, causing $21 billion global financial impacts

- # Possible Patentability

If we can see the current market scenario, many people and communities are working in this domain. But we can make this project/ idea patentable by doing more advancement in Dapp, privacy and accessibility.

We can add more concepts of blockchain to make this more secure by applying concepts of Proof of Origin, Proof of Work and many more. Also, we need to take reviews from clients and make required changes.

Considering Medicine and its information as an asset we can manage it in a well originated way. Here QR Code plays an important role in authentication and we can easily track the record of the asset. Advancement in QR code will also make this project/ idea patentable.

- # Social and Environmental Impact

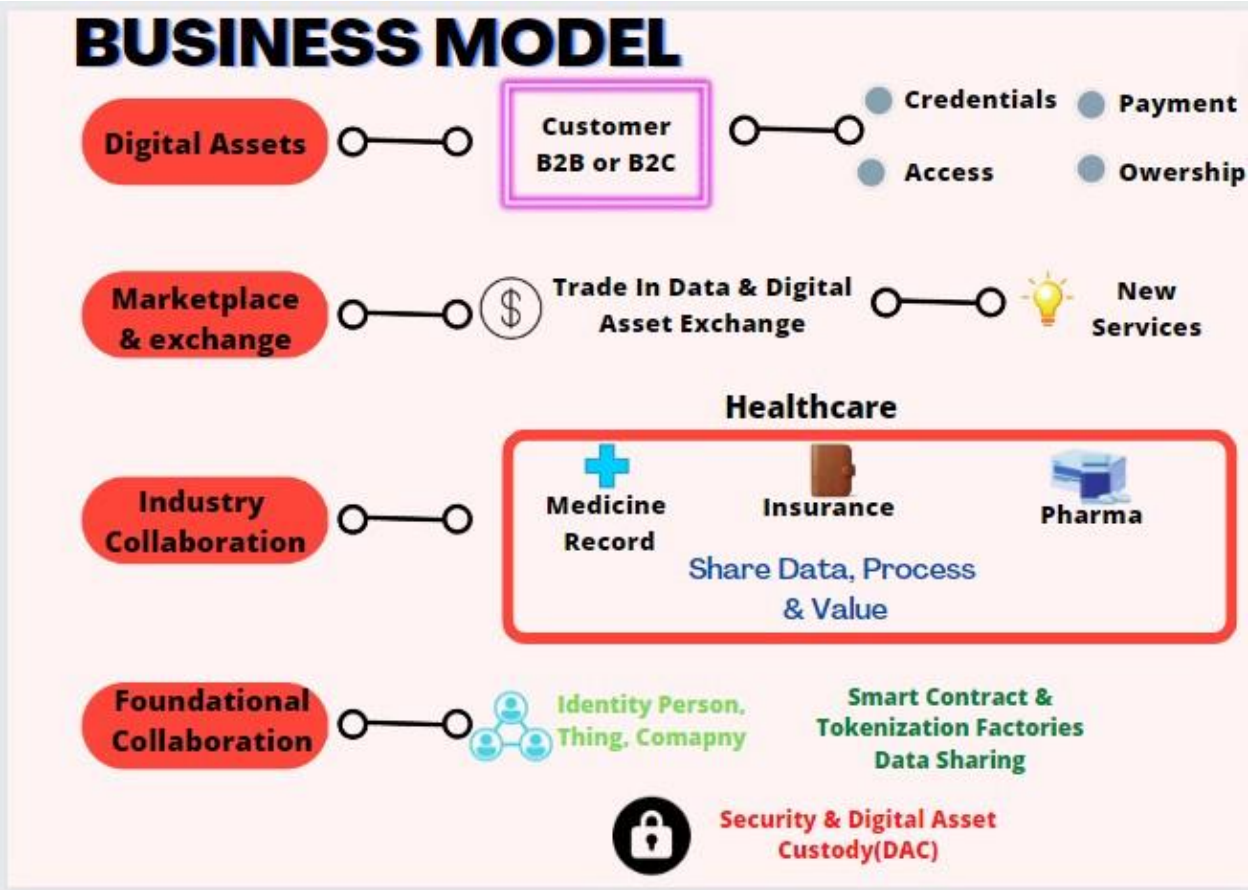
1. Environmental Impact:

- Manufacturers are required to optimize their operations and processes and reduce their negative impacts on the environment. Manufacturers implement sustainable practices to improve energy consumption, increase resource efficiency, reduce wastes, and produce recyclable products
- Environmental management is related to the management and control of the production process and product life cycle, starting from development to delivery and disposal of the product. Environmental management practices contribute significantly to environmental protection and impact positively on businesses and society.
- Manufacturers should implement proper environmental management practices and audits such as applying environmental management and controlling systems, assigning budgets to reduce the impact of manufacturing on the environment, measuring environmental impacts of activities, and educating and communicating the causes of environmental accidents with employees.
- Blockchain technology can play a significant role in developing environmental management practices. Traceability, accuracy, and reliability of data and access to real-time information facilitate the process of reproducing and recalling products.
- Transparency and traceability created by blockchain technology empower customers to identify whether the products produced by manufacturers are environmentally friendly or not, which in turn enforce manufacturers to practice environmentally friendly manners and reduce emissions.
- The customers can track the manufacturing planning, sourcing, making, delivery, and returning processes and identify and identify the potential environmental unfriendly practices.

2. Social Impacts:

- Social impact is another pillar of sustainability that plays a critical role in creating and maintaining relationships with stakeholders and creating a favorable image and reputation.
- Social issues can impact the financial performance and reputation of manufacturers. Manufacturers face various social challenges and should develop a sustainable business model and adopt proper activities and technologies to overcome these challenges.
- Blockchain technology can contribute significantly to sustainable manufacturing and help manufacturers face social challenges related to manufacturing supply chain processes

- **Business Model & Beneficiaries**



- # Futuristic Perspective

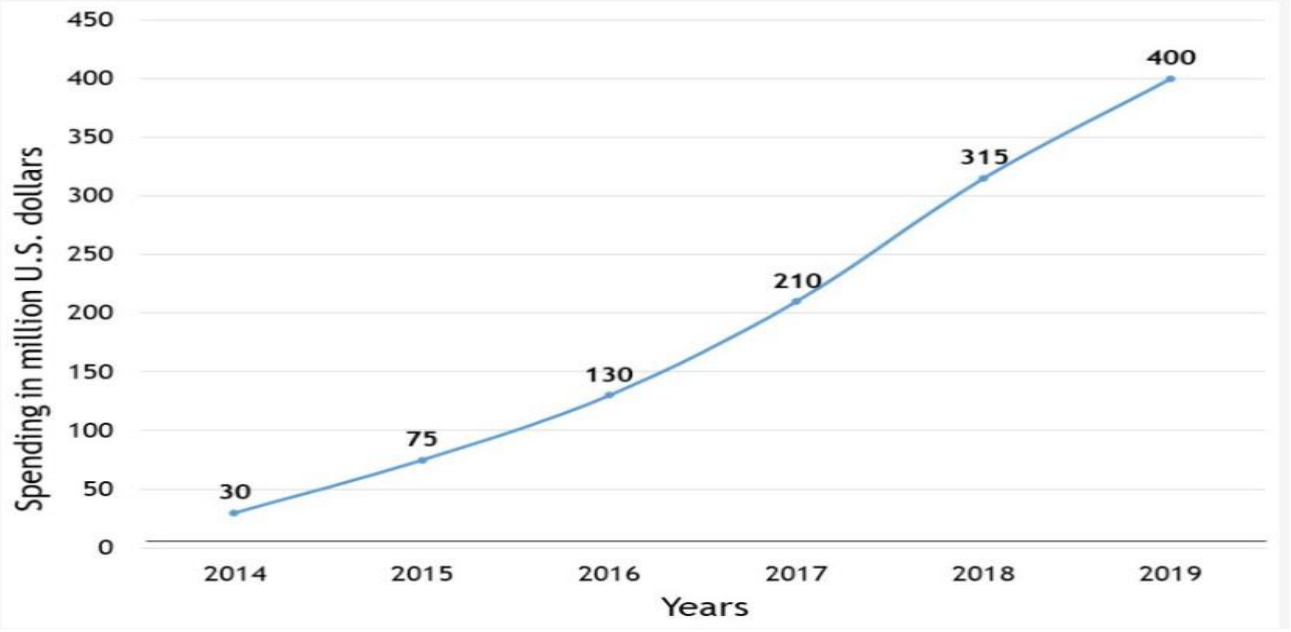
The future perspective of blockchain technology in pharmaceuticals and in asset tracking:

The pharmaceutical and medicine sector is the largest growing and leading sector in the healthcare industry. The pharmaceutical sector introduces new and potential medicines and drugs with contemporary researches on various health conditions of patients to provide the appropriate medication in time. It also assists to ensure the safety and validity of medicines and drugs sold out to the end-users.

The pharmaceutical sector also helps in the evaluation and processing of safe drugs and medicines for quick recovery of patients. In some usual cases, drugs and medicine companies cannot track their medical product timely, as sometimes the drugs have compromised with counterfeiters or fake drugs are invaded in the system. The production and distribution of fake medicines and drugs by counterfeit markets is a global risk to the health of people. Blockchain has the potential to evaluate, monitor, and ensure the safety and security in the production of potential drugs and medicines.

In a counterfeit medicine project based on Hyperledger blockchain was introduced for the inspection of the production of counterfeit drugs and medicines. For the effective delivery of reliable and authentic medical products to the patients, it is imperative to monitor, pharmaceutical industry. Evaluate, and ensure the complete process of development and supply of pharmaceutical drugs and medicines. For the authenticity of delivered medicines and preventing counterfeit drugs, a digital-drug-Control-system (DDCS) provides a durable solution in the market. Some pharmaceutical companies such as Sanofi, Pfizer, and Amgen launched a combine pilot project with blockchain-based DDCS to inspect and evaluate new drugs. Blockchain has the potential to track the production and location of the drugs and Medicines at any time and it also used for improved traceability of fake and falsified drugs. This Technology also ensures the security of drug supply and guarantees the quality and standard of supplied Drugs to the end-users.

Figu: 2. Capital market investments into blockchain technology worldwide, from 2014 to 2019 (in million US dollars). Survey period: 2014–15. Publication date: September 2015. Source: **statista.com**.



The popularity of blockchain has been improving largely because of the successful adoption of its applications across different sectors. The foundation of distributed digital ledger technology brings many benefits by documenting records of all transactions involving data or money. Here blockchain technology comes as a solution in asset tracking. By reducing fraud cases in the case of asset like gold and in case of real estate. It will help customer to verify real owner of real estate for customer. By keeping track of each estate, the crimes related to estate will reduced significantly.

- # Special Government Schemes

Drug counterfeiting has become a problem of immense magnitude worldwide which has aroused a significant level of attention among researchers, managers and policy makers. The counterfeit drug industry is estimated to be worth $200 billion a year and has been defined as the “The crime of the 21st century”, present in almost every industry with Asia appearing to be the single largest producing region for counterfeit drugs.

1. The government plans to make barcoding mandatory on all medicines sold locally in a bid to offset India’s growing reputation as a source of counterfeit medicines.
2. The Centre is planning to set up a task force to deal with counterfeit drugs. All stakeholders of the industry, including pharma companies, NGOs and the government would have representation on the committee.
3. The Ministry of Health has decided that all medicines procured by the Medical Store Organization will be bar coded for proper distribution.
4. In an attempt to tackle the menace of fake life-saving medicines, the health ministry has proposed a "whistle blower" policy that would handsomely reward both the public and officers who inform and help seize spurious, adulterated and misbranded drugs, cosmetics and medical devices.
5. In the case of detection of manufacture and/or sale etc. of spurious or imitation drug products by the unlicensed manufacturers or sellers, the case shall be investigated on top priority and provisions of section 36 AC of the Act invoked under which these offences are considered cognizable and non-bailable.
6. In the case of drugs manufactured by a licensed manufacturer under a valid manufacturing licence and found grossly substandard and where criminal intent or gross negligence is not established, weapon of prosecution should be used judiciously, where it is felt that administrative measures like suspension or cancellation of licenses or compounding of offences would not meet the ends of justice.
7. The State Drug Control Organizations shall create a rapid alert system so that any vital information in the cases of spurious/adulterated drugs is passed on to the appropriate authorities quickly for taking further action in the matter.