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Starch-based Materials to Stop Blood Loss

- Recently, scientists from the Institute of Nano Science and Technology (INST) (under department of S&T) have developed a starch-based 'hemostat' material that concentrates the natural clotting factors in blood by physically absorbing excess fluid.
- Hemostat materials absorb excess fluid by concentrating the natural clotting factors in the blood that are critical for stopping the blood flow.
- The product is made by micro particles known as 'calcium-modified carboxymethyl-starch'.
- Starch is a carbohydrate extracted from agricultural raw materials, starch molecule consists of a large number of glucose units joined by glycosidic bonds.
- When the microparticles combine, they create an adherent gel that can remain on the wound until slowly dissipating as healing proceeds.
- These microparticles are prepared by modifying some of the chemical hydroxyl groups on starch to carboxymethyl groups while also incorporating the beneficial calcium ions, which encourages the aggregation of red blood cells and platelets and their activation to generate the fibrin protein network that forms a stable blood clot.
- This modification increases the ability of the molecules to interact with water.
- This is the basis of its impressive ability to absorb fluid from the blood and hence concentrate the clotting factors.
- The product has increased absorption capacity and adhesion, it is inexpensive, non-toxic, biocompatible as well as biodegradable.
- Presently, no single hemostatic agent exists that can work in all situations and current hemostat materials are very expensive and available mostly in developed countries.

Blood Clotting

- Clotting is a necessary process that can prevent too much loss of blood when there is cut or injury.
- A blood clot is a clump of blood that has changed from a liquid to a gel-

like or semisolid state.

- Blood clots are healthy and lifesaving when they stop bleeding, however unnecessary clotting causes serious medical problems which include a heart attack, stroke, etc.
- E.g If a clot formed inside one of veins breaks free and travels through veins to heart and lungs, it can get stuck and prevent blood flow.
- An injury or a trauma stimulates the platelets (also called thrombocytes) in the blood to release certain factors which activate the mechanism of clotting.
- Calcium ions, Fibrinogens, a protein and Vitamin K are also needed for clotting.

Anti-HIV Drugs for COVID-19

- The Ministry of Health and Family Welfare has issued revised guidelines on the 'Clinical Management of COVID-19'.
- The Ministry has recommended use of drug combinations Lopinavir and Ritonavir (sold under the brand name Kaletra) depending upon the severity of the condition of a person having coronavirus infection.
- The use of this drug combination is suggested by an expert committee comprising doctors from the All India Institutes of Medical Sciences (AIIMS), experts from National Centre for Disease Control (NCDC) and World Health Organization (WHO).
- Lopinavir-Ritonavir is recommended for high-risk groups of patients aged above 60 who are suffering from diabetes mellitus, renal failure, chronic lung disease and are immuno-compromised.
- Lopinavir-Ritonavir is used widely for controlling Human Immunodeficiency Virus (HIV) infection.
- However, the use of Lopinavir-Ritonavir is also associated with significant adverse events which many times have led to discontinuation of therapy.
- There is no current evidence from randomized controlled trials to recommend any specific treatment for suspected or confirmed COVID-19 patients.
- No specific antivirals are recommended for treatment of those suffering from respiratory ailment due to lack of adequate evidence from medical literature.

APEDA

- Agricultural and Processed Food Products Export Development Authority (APEDA), is an authority established under an act of parliament and under

the administrative control of Ministry of Commerce and Industry, Government of India.
- It has been mandated with the responsibility of export promotion and development of the scheduled products viz.

1. Fruits, Vegetables and their Products,
2. Meat and Meat Products, Poultry and Poultry Products,
3. Dairy Products,
4. Confectionery,
5. Biscuits and Bakery Products,
6. Honey, Jaggery and Sugar Products,
7. Cocoa and its products, chocolates of all kinds,
8. Alcoholic and Non-Alcoholic Beverages,
9. Cereal and Cereal Products,
10. Groundnuts, Peanuts and Walnuts,
11. Pickles, Papads and Chutneys,
12. Guar Gum,
13. Floriculture and Floriculture Products,
14. Herbal and Medicinal Plants.

- In addition to this, APEDA has been entrusted with the responsibility to monitor import of sugar.

Small Farmers Agribusiness Consortium (SFAC)

- It is pioneer in organizing small and marginal farmers as Farmers Interest Groups, Farmers Producers Organization and Farmers Producers Company for endowing them with bargaining power and economies of scale.
- It provides a platform for increased accessibility and cheaper availability of agricultural inputs to small and marginal farmers and in establishing forward and backward linkages in supply chain management.
- This initiative has triggered mobilization of farmers for aggregation across the country with ultimate aim of sustainable business model and augmented incomes.
- The Society has been entrusted with the task of implementation of the critically important Delhi Kisan Mandi and National Agriculture Market Scheme on e-platform to progressively free agricultural trade and offer price discovery to farmers.
- Currently there around 1000 FPOs/FPCs registered with SFAC.

Schemes of SFAC

- Schemes of SFAC for FPOs support is to the equity base of FPCs by providing matching equity grants and Credit Guarantee support for facilitating collateral free lending to FPCs.
- The main objectives of Equity Grant Fund are enhancing viability and sustainability of FPCs, increasing credit worthiness, enhancing the shareholding of members to increase their ownership and participation in their FPC.
- The equity grant support to eligible FPCs is provided by the SFAC on matching basis

Nanocomposite Coatings

- International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI), an autonomous R&D center of the Department of Science & Technology (DST) has developed a process for size-selective deposition of nanocomposite coatings.
- Nanocomposite coatings are formed by mixing two or more dissimilar materials at nanoscale to improve the physical, chemical and physicochemical properties of the new materials.
- The scientists have found that nickel tungsten-based coatings with infusion of particular sized Silicon Carbide (SiC) submicron particles using a pulsed electroplating can provide an excellent combination of wear and corrosion resistance.
- Several aerospace, defence, automobile, space devices need to reduce friction, wear, and tear to enhance the life of components.
- Lubricating these dynamic systems add to the cost, complexity, and weight of these systems.
- The nanocomposite demonstrated excellent tribological behavior (science and engineering of interacting surfaces in relative motion, which includes principles of friction, lubrication, and wear) compared to other wear-resistant coatings.

Electroplating

- Electroplating or electrodeposition is a process that employs an electrical signal provided by an external power source to reduce cations of a desired metal in solution and produce a metallic coating.
- It involves the metal parts to be immersed in an electrolyte bath solution.
- In this case, it is typically prepared by dissolving crystals of Nickel (Ni) and Tungsten (W) salts in a mix of distilled water and other additives.
- A Direct Current (DC) is passed through the solution, and the resulting

reaction leaves a deposit of Ni-W alloy on the piece being plated.

Size-Selective Electrodeposition

- For size-selective electrodeposition, Pulse Current (PC) electrodeposition – intermittent application of current is used in place of conventional Direct Current (DC) deposition.
- In this process, only particles having a size equal to or less than diffusion layer thickness can be incorporated into the nano-crystalline coating.
- The size of the diffusion layer thickness is controlled by changing the duration of the electric current pulse.

Scheme for beggars

- The Ministry of Social Justice & Empowerment is exploring the possibilities of a scheme for persons engaged in the act of begging.
- The Scheme would cover identification, rehabilitation, provision of medical facilities, counselling, education, skill development with the support of State Governments/UTs and Voluntary Organizations, etc.
- The Ministry also provides funds to the National Backward Classes Finance & Development Corporation (NBCFDC) and the National Institute of Social Defence (NISD) for the development of members of beggars' community.

National Backward Classes Finance & Development Corporation

- NBCFDC is a Government of India Undertaking under the aegis of Ministry of Social Justice and Empowerment.
- It was incorporated under Section 25 of the Companies Act 1956 in 1992 as a Company not for profit.
- Its objective is to promote economic and developmental activities for the benefit of Backward Classes and to assist the poorer section of these classes in skill development and self-employment ventures.

National Institute of Social Defence

- The National Institute of Social Defence (NISD) is an Autonomous Body and is registered under Societies Act XXI of 1860 with the Government of National Capital Territory (NCT), Delhi.
- It is a central advisory body for the Ministry of Social Justice and Empowerment.
- It is the nodal training and research institute in the field of social defence.
- The institute currently focuses on human resource development in the

areas of drug abuse prevention, welfare of senior citizens, beggary prevention, transgender and other social defence issues.
- The mandate of the institute is to provide inputs for the social defence programmes of the Government of India through training, research & documentation.

Source: PIB, the Hindu