

L DOPA



Presentation

Primary Information Services

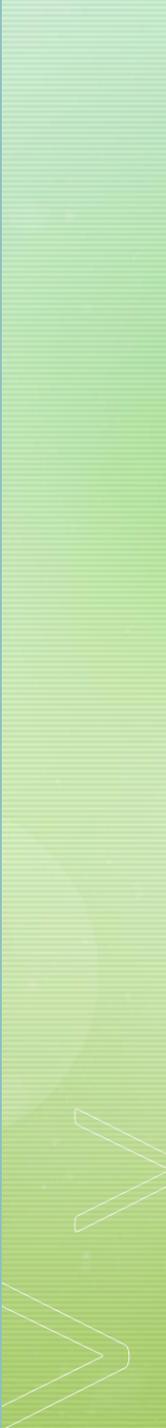
www.primaryinfo.com

<mailto:primaryinfo@gmail.com>



What ?

L-DOPA and is a leading drug used in the treatment of Parkinson's disease
Besides treatment of Parkinson's disease, L-DOPA is reported to be effective in the management of DOPA-responsive dystonia





Parkinson's disease

Parkinson's disease is a clinical condition where the brain loses control over movement of motor muscles often leading to body tremors and uncoordinated movement of body limbs

In the treatment of Parkinson's disease, L-DOPA is administered to the patient intravenously or orally and transferred through the blood circulatory system to the dopamine deficient cells in the brain where it is converted by DOPA decarboxylase to dopamine and used for neurotransmission across synapses with motor neurons



The Disease

parkinson disease - Yahoo India | x +

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PARKINSON'S DISEASE

- Grows usually gradual, after age 50. (Slowly progressive)
- Mask-Like, Blank Expression
- Scooped Posture
- pill Rolling Tremors
- Tremor (Tremor is a rhythmic, involuntary shaking or vibrating of a part of the body, often the hands, which can be caused by stress, caffeine, or certain medications.)
- Shuffling, Propulsive Gait
- Stooped posture
- Reduced arm swinging
- Slightly flexed hips & knees
- Trembling of extremities
- Shuffling, short-stopped gait
- Depression
- Muscle Rigidity (Muscle rigidity is a stiffness of the muscles that can be caused by stress, caffeine, or certain medications.)
- Rarely Occurs in Black Population
- Possible Mental Deterioration

Parkinson's Disease

PARKINSON'S DISEASE FACTS

- Approx. 10 million people worldwide have Parkinson's disease.
- Approx. 1 million people in the US have Parkinson's disease.
- Approx. 500,000 people in the UK have Parkinson's disease.
- Approx. 100,000 people in India have Parkinson's disease.
- Approx. 10,000 people in Australia have Parkinson's disease.
- Approx. 10,000 people in Canada have Parkinson's disease.
- Approx. 10,000 people in South Africa have Parkinson's disease.
- Approx. 10,000 people in Brazil have Parkinson's disease.
- Approx. 10,000 people in Mexico have Parkinson's disease.
- Approx. 10,000 people in Argentina have Parkinson's disease.
- Approx. 10,000 people in Chile have Parkinson's disease.
- Approx. 10,000 people in Colombia have Parkinson's disease.
- Approx. 10,000 people in Venezuela have Parkinson's disease.
- Approx. 10,000 people in Peru have Parkinson's disease.
- Approx. 10,000 people in Ecuador have Parkinson's disease.
- Approx. 10,000 people in Bolivia have Parkinson's disease.
- Approx. 10,000 people in Paraguay have Parkinson's disease.
- Approx. 10,000 people in Uruguay have Parkinson's disease.
- Approx. 10,000 people in Cuba have Parkinson's disease.
- Approx. 10,000 people in Haiti have Parkinson's disease.
- Approx. 10,000 people in Dominican Republic have Parkinson's disease.
- Approx. 10,000 people in Puerto Rico have Parkinson's disease.
- Approx. 10,000 people in the Caribbean have Parkinson's disease.
- Approx. 10,000 people in Central America have Parkinson's disease.
- Approx. 10,000 people in South America have Parkinson's disease.
- Approx. 10,000 people in Africa have Parkinson's disease.
- Approx. 10,000 people in Asia have Parkinson's disease.
- Approx. 10,000 people in Europe have Parkinson's disease.
- Approx. 10,000 people in North America have Parkinson's disease.
- Approx. 10,000 people in Oceania have Parkinson's disease.
- Approx. 10,000 people in Antarctica have Parkinson's disease.

What is Parkinson's Disease?

- Brain Neuron Cell
- Neuron Cell Terminal Branch
- Terminal Branch Dopamine
- Dopamine Weak Signal

Parkinson's Disease Symptoms

- Memory Loss, Dementia
- Anxiety, Depression
- Multitasking
- Slow Blinking
- No Facial Expression
- Clawing
- Difficulty Swallowing
- Shaking, Tremors
- Loss of Smell or Taste
- Free Hand Movement
- Problems with Balance or Walking
- Stooped Posture
- Pain and Pains
- Constipation

Parkinson's Disease

Substantia nigra (dopamine producing cells)

Parkinson's disease

Normal Neuron: Normal dopamine production and release.

Parkinson's affected Neuron: Diminished dopamine production and release.

Typical appearance of Parkinson's disease

- Stooped posture
- Rigidity
- Fixed elbows & wrists
- Forward tilt of trunk
- Reduced arm swinging
- Slightly flexed hips & knees
- Shuffling, short-stopped gait
- Trembling of extremities
- Masked facial expression

Parkinson's Disease

Diminished substantia nigra

Neuron affected by Parkinson's

Parkinson's Disease

Non-Parkinson's: Normal brain anatomy.

Parkinson's: Diminished substantia nigra.

Labels: red nucleus, reticular formation, cerebral aqueduct, Substantia Nigra, Superior colliculus.

Parkinson's disease

Substantia nigra, dopamine-producing cells

Parkinson's Disease

Parkinson's disease: Not just tremors

What is Parkinson's Disease?

Parkinson's disease (PD) is a chronic and progressive movement disorder, meaning that symptoms continue and worsen over time. Nearly one million people in the US are living with Parkinson's disease. The cause is unknown, and although there is currently no cure, there are treatment options such as medication and surgery to manage its symptoms.

Parkinson's involves the malfunction and death of cells in the brain, called neurons. Parkinson's primarily affects neurons in the an area of the brain called the substantia nigra. Some of these cells produce dopamine, a chemical that sends messages to the part of the brain that controls movement and coordination. As PD progresses, the amount of dopamine produced in the

(A) Normal: Limbic system, CMV.

(B) Parkinson's disease: ↑ Pain, ↑ Depression/Anxiety, ↑ Behavioral changes, ↑ GI disturbances, ↑ GI excretion, ↑ Constipation.

Stooped posture, Hunched torso, Arms flexed at elbows and wrists.



Chemical Synthesis

Commercial L-DOPA is largely produced by chemical synthesis

Total elimination of minor impurities from synthetic products is almost unattainable and chemically synthesized L-DOPA is reported not to exceed 98% purity and is contaminated with D-DOPA which could not be removed by downstream processing

L-DOPA Synthesis

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https://www.google.com/search?q="L-+DOPA"+chemical+synthesis&lr=&source=Inms&tbm=isch&sa=X&ved=0ah...

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Catechols
Resorcinols
Toluquinone

Chemical structure of ...
researchgate.net

N[C@@H](Cc1ccc(O)c(O)c1)CO

Carbidopa - Wikipedia
en.wikipedia.org

Tyrosine $\xrightarrow{\text{Tyrosinase}}$ Dihydroxy phenylalanine (L-DOPA)

L-tyrosine to L-DOPA by tyrosinase ...
researchgate.net

L-DOPA - Wikipedia
en.wikipedia.org

N[C@@H](Cc1c(O)c(O)c(D)c1C)C(=O)O

L-DOPA-d3 (CAS 53587-29-4) | Cayman ...
caymanchem.com

| Source | Concentration | Reference |
|---|------------------------------|-----------|
| <i>Aspergillus oryzae</i> (UT7) (double mutant) | 1.25 mg/ml | [28] |
| <i>Aspergillus oryzae</i> | 1.86 mg/ml | [29] |
| <i>Aspergillus oryzae</i> (UT7) | 444 µg/ml | [30] |
| <i>Aspergillus oryzae</i> ME2 (28hr) | 1.68 mg/ml | [31] |
| <i>Aspergillus oryzae</i> ME2 (30hr) | 0.42 mg/ml | [32] |
| <i>Aspergillus oryzae</i> Double mutant | 308 µg | [33] |
| <i>Aspergillus oryzae</i> EB-6 | 1.34 mg/ml | [34] |
| <i>Aspergillus oryzae</i> | 0.89 mg/ml | [35] |
| <i>Aspergillus niger</i> | 0.365 mg/ml | [36] |
| <i>Aspergillus niger</i> | 25.6% | [37] |
| Yeast | | |
| <i>Zeromyces roulei</i> NRRL-110 | 2.50 mg/ml | [38] |
| <i>Aspergillus nidulans</i> black yeast | 66 µg/ml | [39] |
| Bacteria | | |
| <i>Flavobacterium</i> | 4 mg/ml | [40] |
| <i>Pseudomonas melanogena</i> | 8 mg/ml | [41] |
| <i>Z. coel WADCC 111815</i> (polyhydroxybutyrate 3-hydroxybutyrate) | 40 µg/ml in reaction mixture | [42] |
| <i>Aschersonia sp. 89</i> | 0.897 mg/ml | [7] |
| <i>Rhodospirillum rubrum</i> (ATCC 29418) | 15 g/L | [43] |

Biological sources of L-DOPA: An ...
files.cpsc.org

Synthesis of Dopamine

The direct precursor of dopamine, **L-DOPA**, can be synthesized indirectly from the **essential amino acid phenylalanine** or directly from the **non-essential amino acid tyrosine**.

Dopamine & levodopa
slideshare.net

Tyrosine $\xrightarrow{\text{Tyrosinase}}$ L-DOPA $\xrightarrow{\text{Dopa-5-OHase}}$ Dopachrome $\xrightarrow{\text{Dopa-2-OHase}}$ Melanin Synthesis
Phenylalanine $\xrightarrow{\text{Phenylalanine hydroxylase}}$ Tyrosine
L-DOPA $\xrightarrow{\text{Aromatic L-amino acid decarboxylase}}$ Dopamine

Review of literature
shedhagan.inflibnet.ac.in

dopamine.pdf production.pdf 10224-Article Text-....pdf formulation.pdf Show all x

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Natural Sources

Among the natural sources of L-DOPA, *Mucuna pruriens* produce fairly high quantities of L-DOPA (5.4% DW) and 6.8% weight by weight

The common English names of *Mucuna* are cowitch, cowage and velvet bean.

The major chemical components of economic interest produced by *M. pruriens* include proteins-27%, L-DOPA, hallucinogenic tryptamines, phenols and tannins

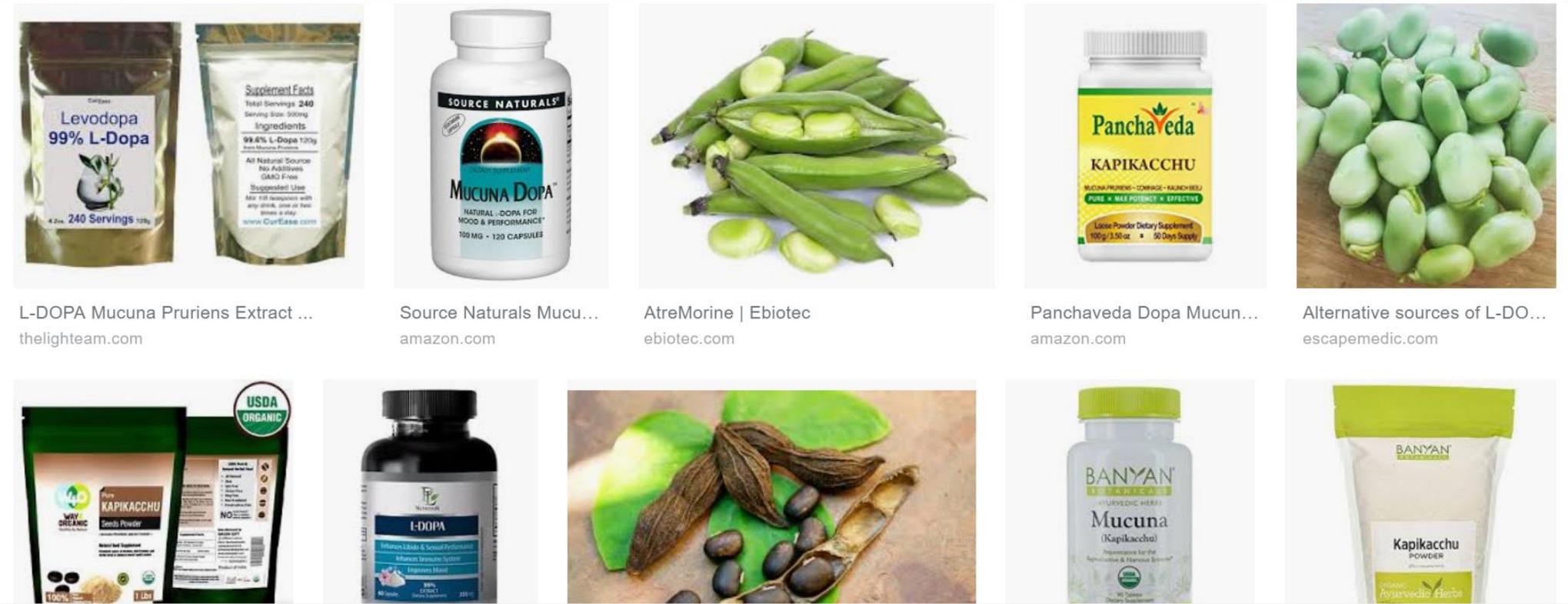
Molecular pharming has consistently shown great potential to emerge as source for commercial production pure natural products such as L-DOPA and therapeutically proteins by using plant and bacterial cells as bio-factories

Mucuna pruriens produce fairly high quantities of L-DOPA

Inbox (16,869) - primaryinfo@gm x | I dopa natural sources - Google S x | +

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Apps | informer | Outlook Mail | Gmail | Primary Info | Google Advanced S... | New Tab | The fastest free You... | Convert HTML to P...



The search results display a grid of images and product information. The first row includes: 1) A bag of Levodopa 99% L-Dopa (240 servings) and its supplement facts. 2) A bottle of Source Naturals Mucuna Dopa capsules. 3) A pile of fresh green Mucuna pruriens pods. 4) A bottle of Panchaveda KapiKacchu loose powder. 5) A pile of shelled green Mucuna pruriens seeds. The second row includes: 1) A bag of USA Organic Pure KapiKacchu Seed Powder. 2) A bottle of I-DOPA capsules. 3) A pile of dried Mucuna pruriens pods and seeds. 4) A bottle of Banyan Pure Medics Mucuna (KapiKacchu) capsules. 5) A bag of Banyan Kapikacchu Powder.

L-DOPA Mucuna Pruriens Extract ... thelightteam.com

Source Naturals Mucu... amazon.com

AtreMorraine | Ebiotec ebiotec.com

Panchaveda Dopa Mucun... amazon.com

Alternative sources of L-DO... escapemedic.com

dopamine.pdf | production.pdf | 10224-Article Text-....pdf | formulation.pdf | Show all x

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L Dopa Synthesis

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Dopamine Biosynthesis

Neurotransmitters Module: The Beery Twins' Story[®]
A Project-Based Learning Activity

Sepiapterin reductase is the final enzyme in the biosynthetic pathway for **tetrahydrobiopterin** – a cofactor used by other enzymes in the synthesis of the neurotransmitters **dopamine** and **serotonin**.

In the case of **dopamine** biosynthesis, the enzyme **tyrosine hydroxylase** uses **tetrahydrobiopterin** to convert tyrosine to L-DOPA. In a second reaction, the enzyme **aromatic L-amino acid decarboxylase** converts L-DOPA into **dopamine**, the active neurotransmitter.

● Enzymes ● Neurotransmitters ● Cofactors



Tetrahydrobiopterin Pathway

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HIMEDIA

Product Information

GRM360 L-DOPA (3,4-Dihydroxy-L-phenylalanine)

| Product Number | Packing |
|----------------|---------|
| GRM360 | : 5G |

Product Information

| | |
|-------------------|---|
| Product Code | : GRM360 |
| Product Name | : L-DOPA |
| Synonym | : L-3-Hydroxytyrosine; 3,4-Dihydroxy-L-phenylalanine ; 3-(3,4-Dihydroxyphenyl)-L-alanine; Levodopa |
| Molecular Formula | : C ₉ H ₁₁ NO ₄ |
| Molecular Weight | : 197.19 |
| CAS No. | : 59-92-7 |
| EC No. | : 200-445-2 |
| HS Code | : 2922 50 00 |
| Shelf Life | : 4 years |

Technical Specification

| | |
|-----------------|--|
| Appearance | : White to cream crystals or powder |
| Solubility | : 33.3 mg soluble in 1 mL of 0.5 M hydrochloric acid |
| FTIR (KBr disc) | : Matches with the standard pattern |

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L-DOPA
CAS No 59-92-7

MATERIAL SAFETY DATA SHEET
SDS/MSDS

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers
Product name : L-Dopa
CAS-No. : 59-92-7

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses : Laboratory chemicals, Industrial & for professional use only.

1.3 Details of the supplier of the safety data sheet
Company : Central Drug House (P) Ltd
7/28 Vardaan House
New Delhi -110002
INDIA
Telephone : +91 11 49404040
Email : care@cdhfinechemical.com

1.4 Emergency telephone number
Emergency Phone # : +91 11 49404040 (9:00am - 6:00 pm) [Office hours]

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08-07-2019

Market Scenario

The screenshot shows a web browser window with the following elements:

- Browser Tabs:** FREEPATENTSONLINE - Yahoo Inc, Mucuna Pruriens Market Set For
- Address Bar:** <https://aindustryreports.com/2019/06/18/mucuna-pruriens-market-set-for-rapid-growth-demand-by-2026/>
- Navigation Bar:** Apps, informer, Outlook Mail, Gmail, Primary Info, Google Advanced S..., New Tab, The fastest free You..., Convert HTML to P...
- Page Header:** Market Industry Reports
- Article Category:** UNCATEGORIZED
- Article Title:** Mucuna Pruriens Market Set For Rapid Growth & Demand, By 2026
- Metadata:** June 18, 2019, 7 Min Read
- Author:** ajinkya@tmrresearch.com
- Text Snippets:**
 - "The report 'Mucuna Pruriens Market - Global Industry Analysis, Size, Share, Growth, Trends and Forecast 2018 - 2026', has been prepared based on an in-depth market analysis with inputs from industry experts."
 - "The global Mucuna Pruriens Market is evolving at an exciting pace driven by changing dynamics and risk ecosystem, an analysis of which forms the crux of the report. The study on the global Mucuna Pruriens"
- Taskbar:** Windows logo, search bar (Type here to search), taskbar icons (File Explorer, PowerPoint, Chrome), system tray (22:50, 08-07-2019, 41 notifications)

QUESTIONS?

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