Antiparasitic drugs: an overview of therapeutics against parasitic infections.

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Introduction

Parasitic infections pose a significant global health challenge, particularly in tropical and subtropical regions. They affect millions of people and animals, causing a spectrum of diseases ranging from mild discomfort to life-threatening conditions. Antiparasitic drugs are the cornerstone of treatment and control strategies against parasitic diseases caused by protozoa, helminths, and ectoparasites. This article explores the classification, mechanisms, clinical applications, challenges, and future prospects of antiparasitic drugs [1, 2, 3, 4].

Classification of Antiparasitic Drugs

Antiparasitic drugs can be broadly classified based on the type of parasites they target:

1. **Antiprotozoal Drugs:** Used against protozoan parasites such as *Plasmodium* (malaria), *Trypanosoma* (sleeping sickness), *Leishmania* (leishmaniasis), and *Giardia*.
2. **Antihelminthic Drugs:** Target parasitic worms including nematodes (roundworms), cestodes (tapeworms), and trematodes (flukes).
3. **Ectoparasiticides:** Used to eliminate ectoparasites such as lice, mites, and ticks.

Mechanisms of Action

Antiparasitic drugs exhibit a variety of mechanisms to eliminate parasites, including [5, 6, 7]:

- **Inhibition of nucleic acid synthesis:** Drugs like metronidazole disrupt DNA synthesis in protozoa.
- **Interference with energy metabolism:** For example, atovaquone inhibits mitochondrial electron transport in *Plasmodium* species.
- **Disruption of microtubules:** Albendazole and mebendazole bind to tubulin, preventing microtubule formation in helminths.
- **Neuromuscular blockade:** Ivermectin causes paralysis in nematodes by enhancing neurotransmission.
- **Alteration of parasite membrane permeability:** Praziquantel increases calcium influx leading to paralysis in cestodes and trematodes [8, 9, 10].

Conclusion

Antiparasitic drugs remain vital tools in controlling parasitic diseases worldwide. Understanding their mechanisms, appropriate use, and limitations is essential for effective management and for guiding future research. Continued investment in antiparasitic drug development, resistance monitoring, and public health initiatives will be critical to reduce the global burden of parasitic infections.

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