The Eradicability of Lymphatic Filariasis and Onchocerciasis

- In Theory
- In Practice

Public Health Goals and Implications

	Intervention	Surveillance
Control	✓	✓
Elimination	-	✓
Eradication	-	-

Eradication: concepts

- Elimination *vs.* eradication
  - "regional eradication"
- Essentials for elimination / eradication
  - Effective intervention tools
  - Effective diagnostic tools

    (effective strategy for using them)
- Tools *vs.* 'force of infection'

Eradicating LF and Oncho

The problem of Lymphatic Filariasis

Lymphatic Filariasis (LF): clinical profile

Lymphoedema/ elephantiasis

Genital damage/ hydrocoele

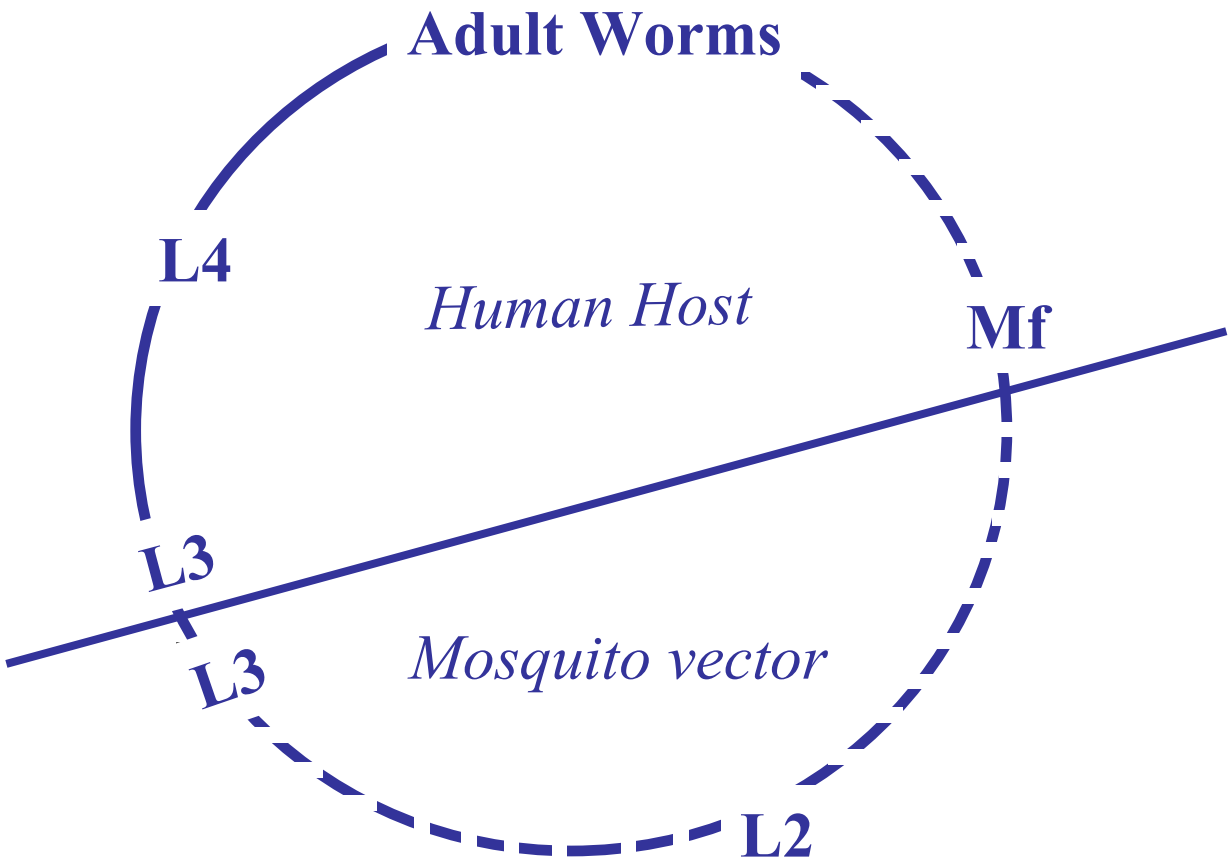
Lymphatic Filariasis (LF): epidemiological profile

- 120 million people *infected* worldwide
- 40 million with *overt* disease; 80 million with *hidden* lymphatic and renal damage
- 1.1 billion people *at risk* of infection
- 80 countries endemic in tropics and subtropics
- Two species: *W. bancrofti* (90%); *B. malayi*
- Vector: mosquitos – numerous species, both urban and rural

Lymphatic filariasis

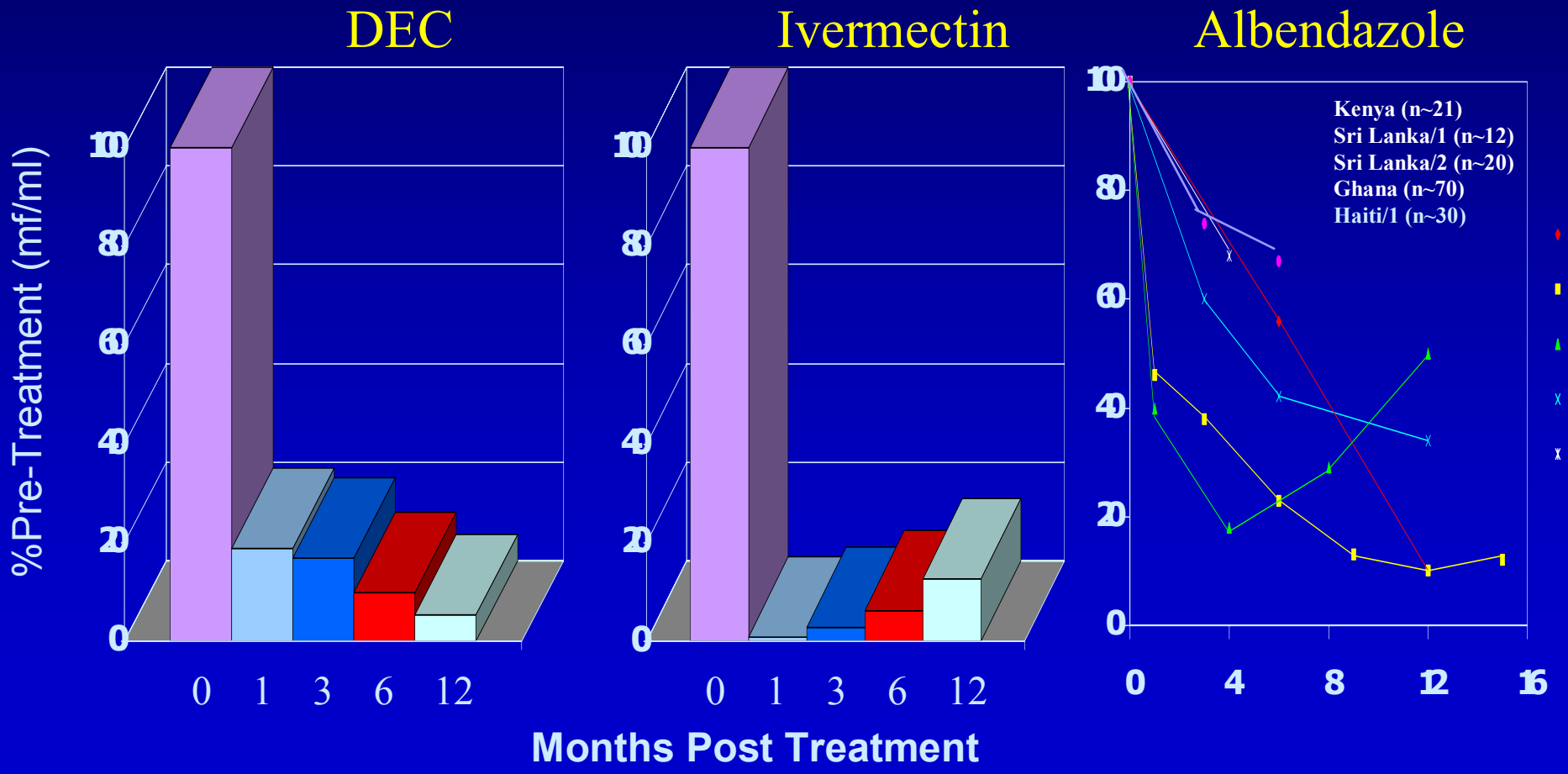
Essential tools for elimination

Lymphatic Filariasis: Life Cycle

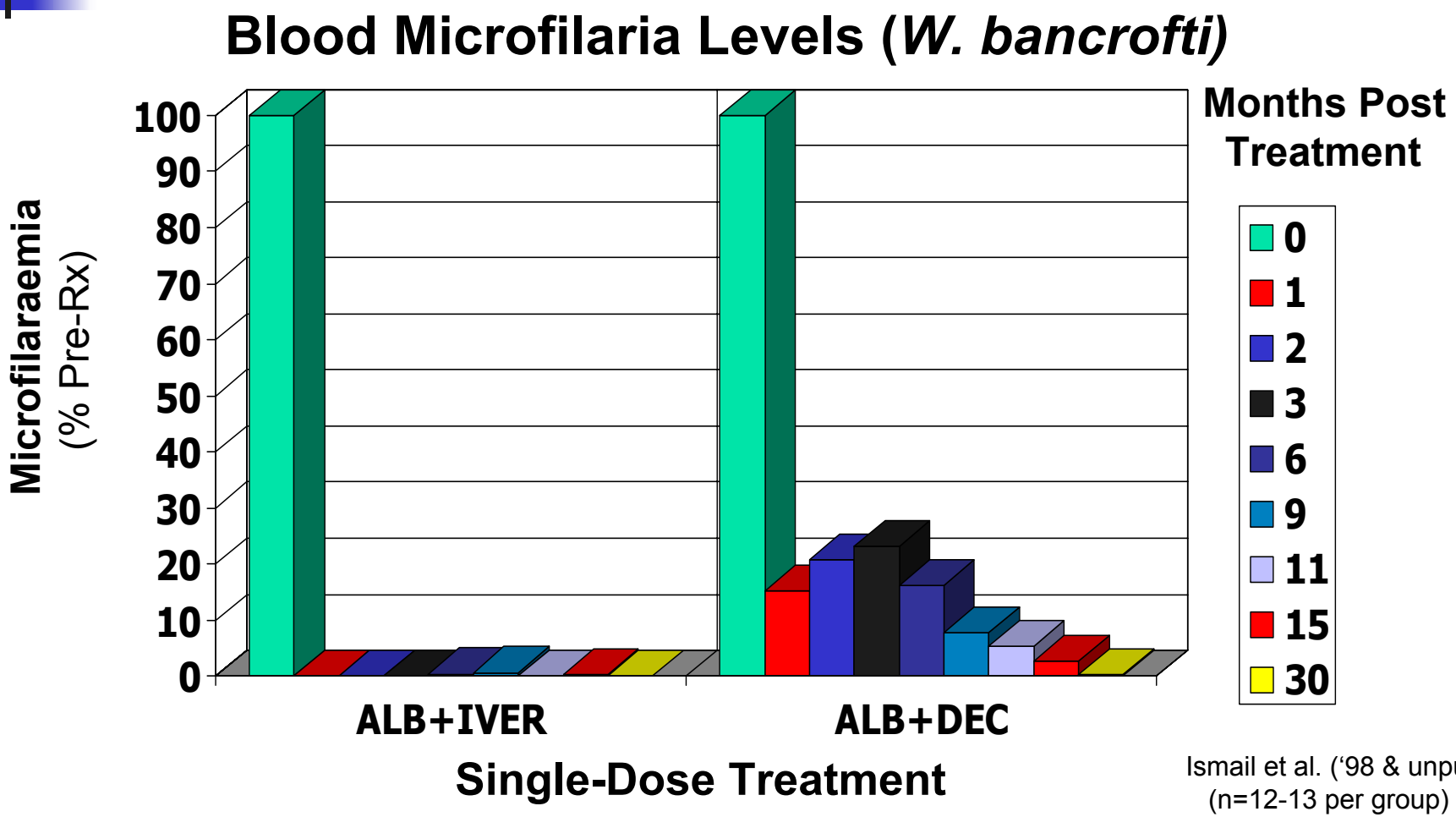


Drug interventions: *single-dose* effectiveness

Blood microfilaria levels *(W. bancrofti)*



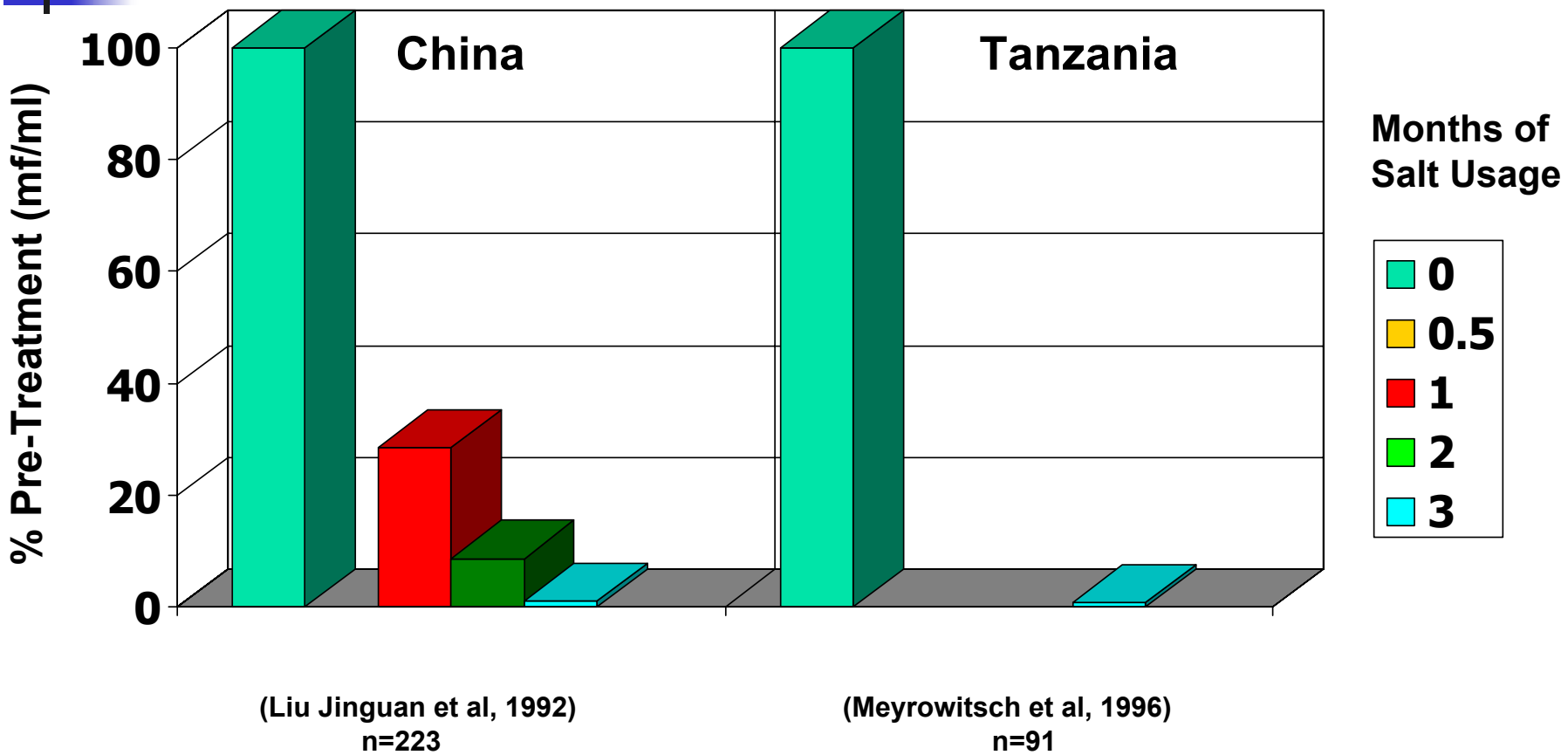
Albendazole + Ivermectin *or* DEC:
2-Drug Regimens



Ismail et al. ('98 & unpub)
(n=12-13 per group)

DEC-Fortified Salt

Early Effects on Blood Microfilaria Levels



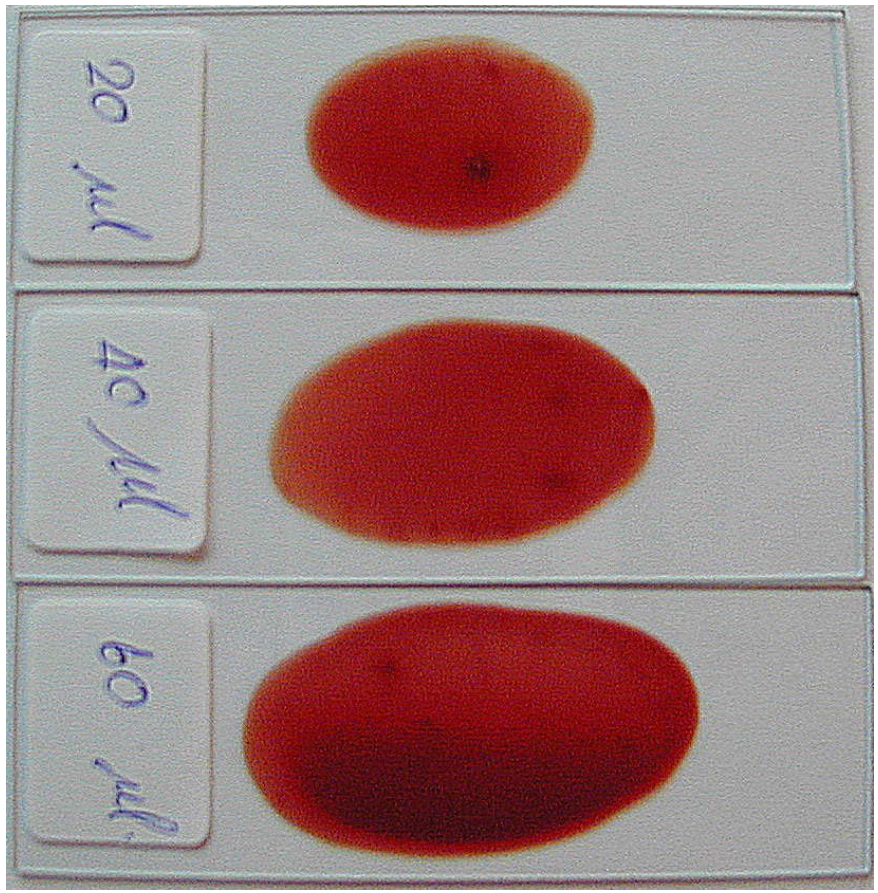
Wuchereria bancrofti

LF elimination: *strategy*

- *Interrupt transmission*
  - 'mass-drug-administration' (MDA) to entire 'at risk' population - *options:*
    - ✓ single-dose, once-yearly 2-drug regimen for 4-6 years
    - ✓ DEC-fortified table/cooking salt for 1 year

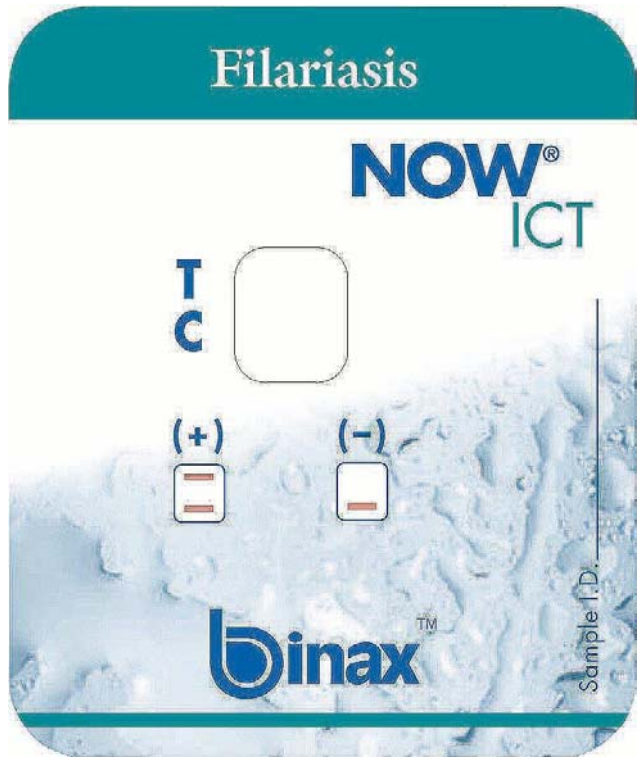
Traditional LF diagnostic: the blood film

- Microscopic examination for microfilariae (mf)
- Parasites occur in blood only at night



'New' diagnostic: antigen-detection test (*W.bancrofti*)

- **High sensitivity (>95%)**
- **High specificity (99%)**
- **Positive night and day**
- Uses finger-prick blood
- Rapid (1-10 minutes)
- Field-useable
- Commercially available (cost: $1.50/test for public health programmes)

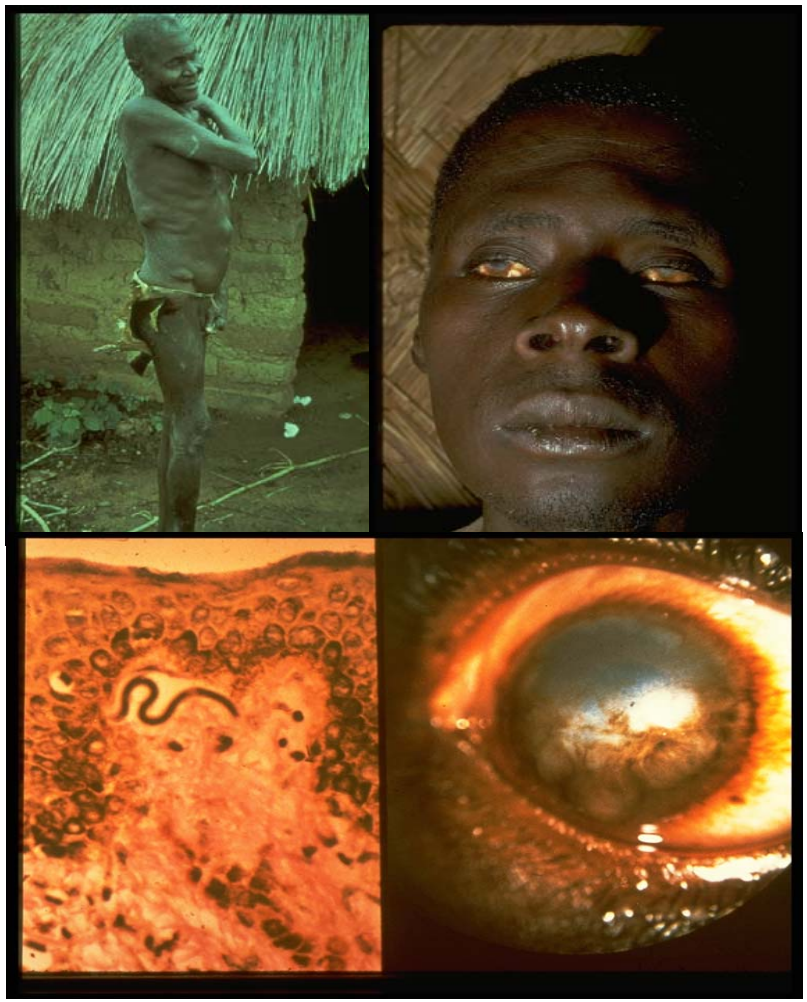


Eradicating LF and Oncho

The problem of Onchocerciasis

Onchocerciasis: clinical profile

Skin Disease



Eye Disease

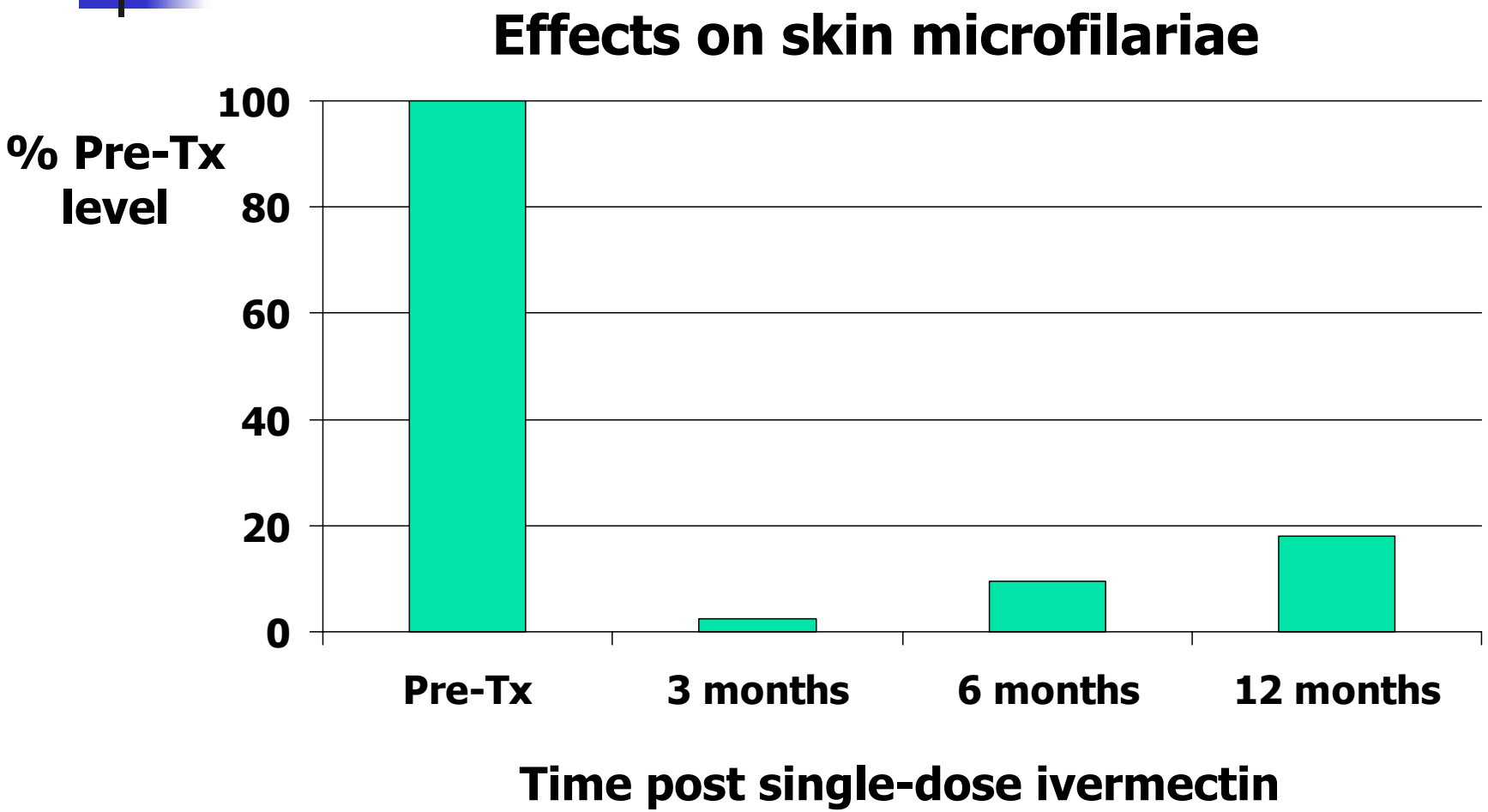
Onchocerciasis: epidemiological profile

- 18 million persons infected; *99% are in Africa*
- 6.5 million with *skin disease*; 1/4 million *blind*
- 120 million persons at risk; *96% are in Africa*
- 36 countries endemic: 29 in Africa, 6 in the Americas & Yemen
- Vector: Blackflies (*Simulium spp.*) breeding in fast-running rivers or streams

Onchocerciasis

Essential tools for elimination

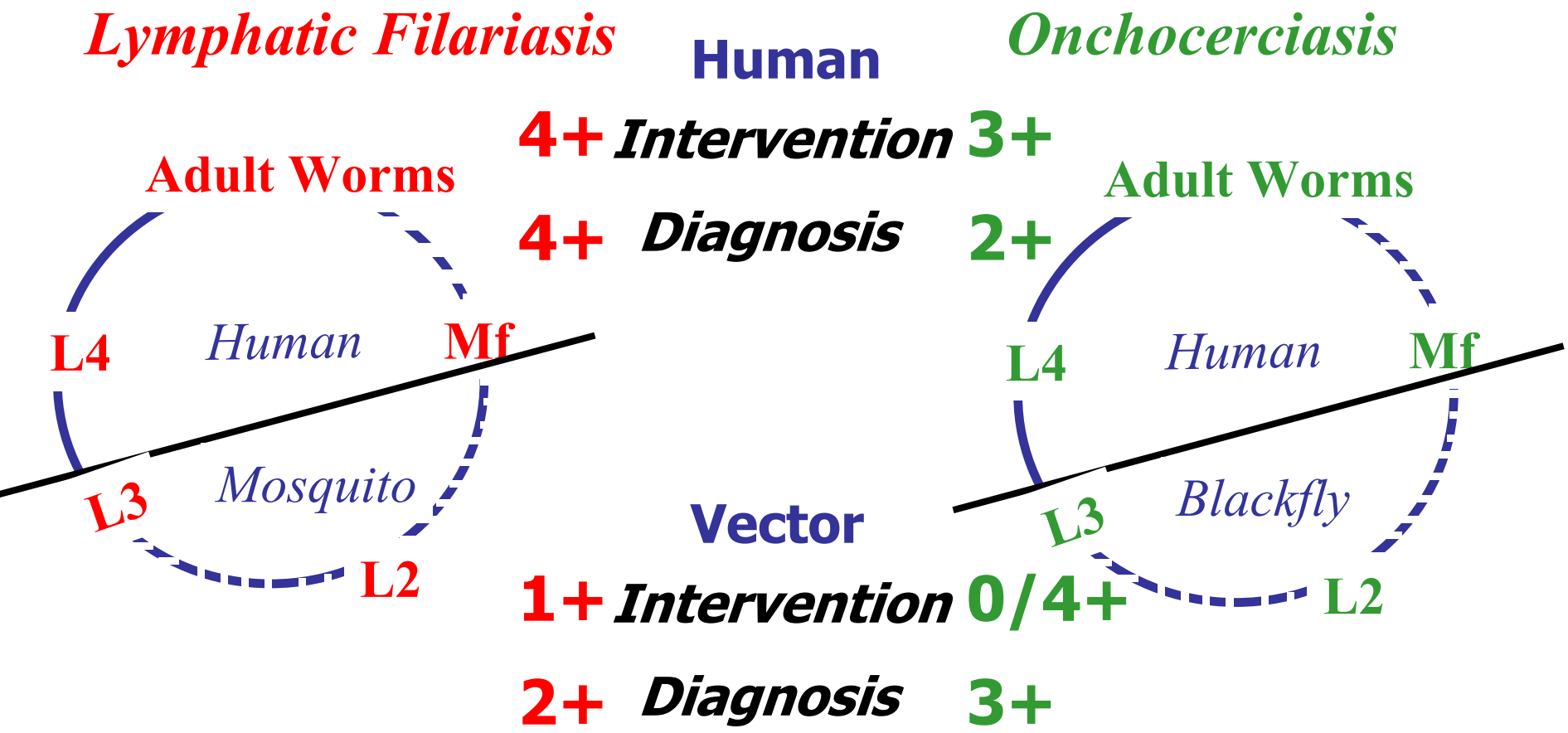
Drug intervention:
Ivermectin in onchocerciasis



Traditional oncho diagnostic: the skin snip

- Skin snip
- Microscopic exam for microfilariae (mf)

Comparison: tools for interrupting transmission



Essential steps to ‘elimination’

Biological potential → Feasibility assessment → Programme creation → Programme execution

- International commitment
- Political/social will
- Programme development
- Financial commitment

In practice

Lymphatic filariasis

LF Elimination: -international political commitment-

- 1997: World Health Assembly Resolution

  - "Urges Member States.....to strengthen activities toward eliminating lymphatic filariasis as a public health problem....."

  - "Requests the Director-General.....to mobilize support for global and national elimination activities."

LF Elimination:
-financial commitment-

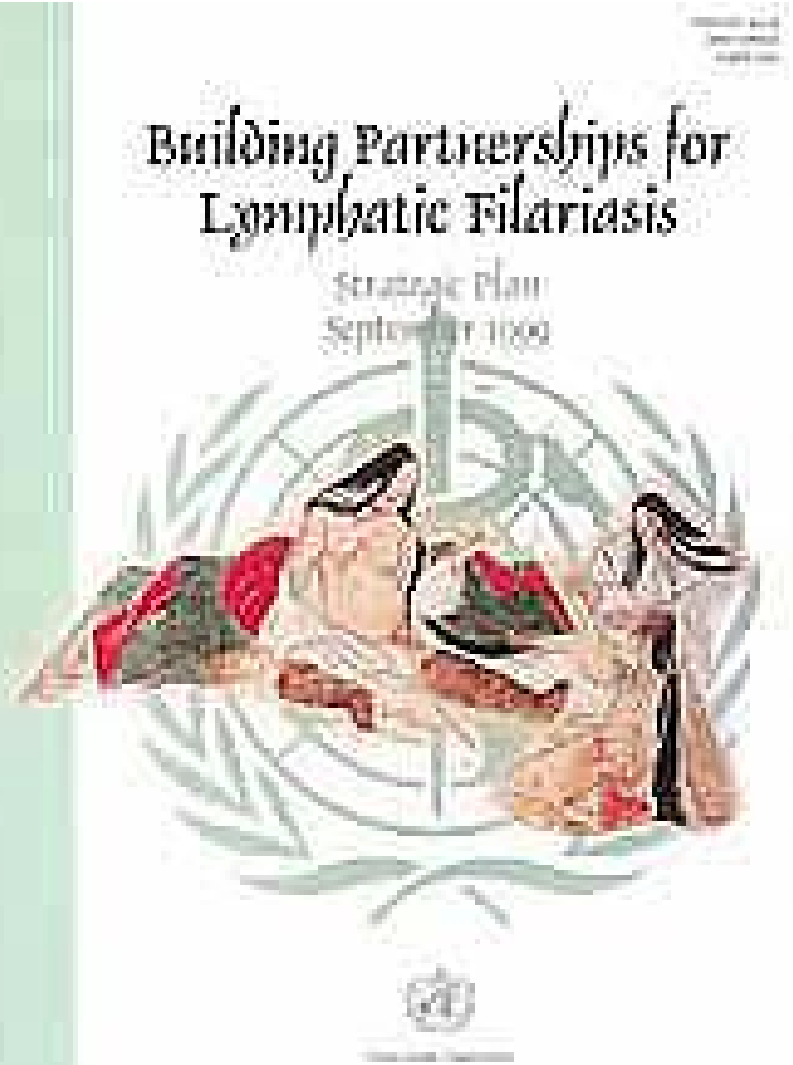
To donate all albendazole required for LF elimination; to support selected research and program activities

To expand Mectizan Donation Program to provide ivermectin for LF treatment where onchocerciasis co-exists

Long-term support of programme development and intervention in the countries and globally, through WHO and the LF support centres

Arab Fund for Economic and Social Development

To support activities toward elimination of LF from all Arab Fund member countries



Global Alliance

Strategic Plan

- Targets
- Milestones
- Roles of partners

Programs to Eliminate LF

	Active in 2001	*Projected* in 2002
Country programs	**27**	**40**
Population treated	**26 million**	**92 million**

In practice

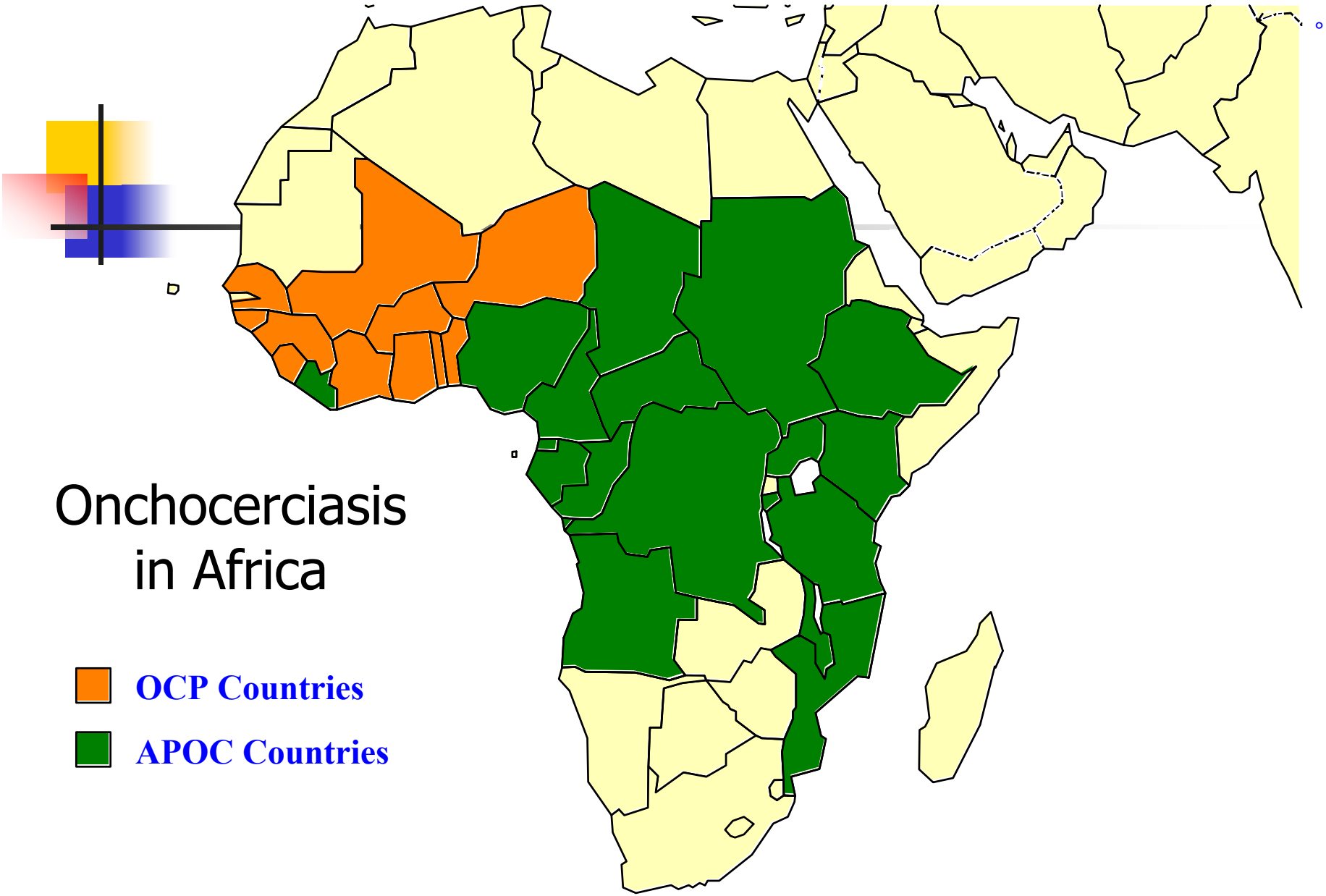
Onchocerciasis

Onchocerciasis

- *Political will & international support*
  - 1974: World Bank, WHO, FAO, 20+ national development agencies > **OCP**

Onchocerciasis: goals and strategy

Program	Activity	Goal	Tool
OCP Onchocerciasis Control Programme	1970's-2002	Elimination	Pesticides


Onchocerciasis
in Africa
OCP Countries
APOC Countries

The blackfly vector is controlled by applying biodegradable larvicides to the rivers each week using helicopters... or fixed-wing aircraft (below)

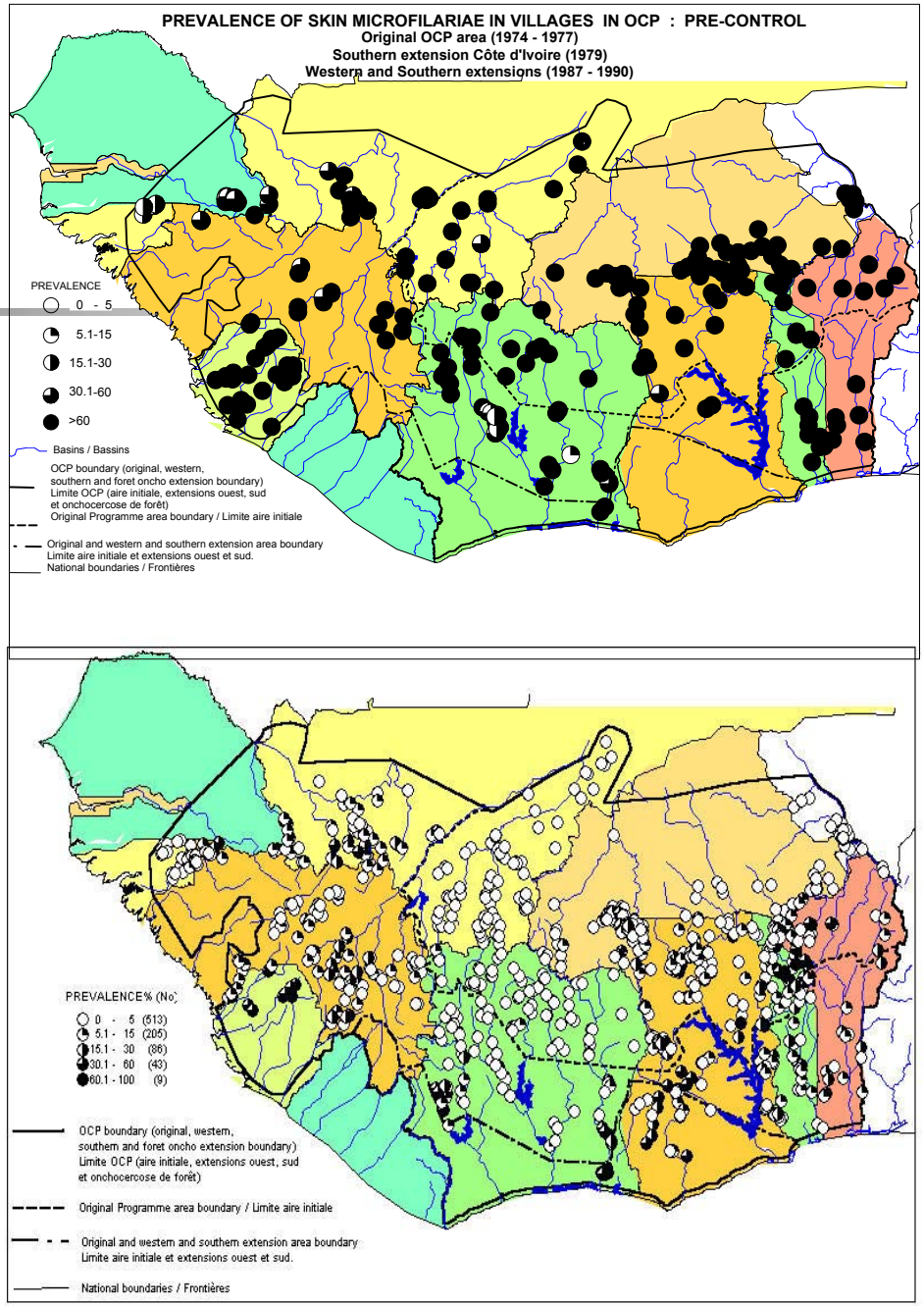
Stocks of larvicide are maintained in caches strategically positioned throughout the Programme area...

...along with fuel, so that the helicopters and fixed-wing aircraft can regularly replenish their tanks

Effectiveness of OCP

Pre-intervention (1975)

Post-intervention (1995)



Onchocerciasis

- *Political will & international support*
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  - 1987: Merck & Co., Inc. (Mectizan Donation Program)

Onchocerciasis: goals and strategy

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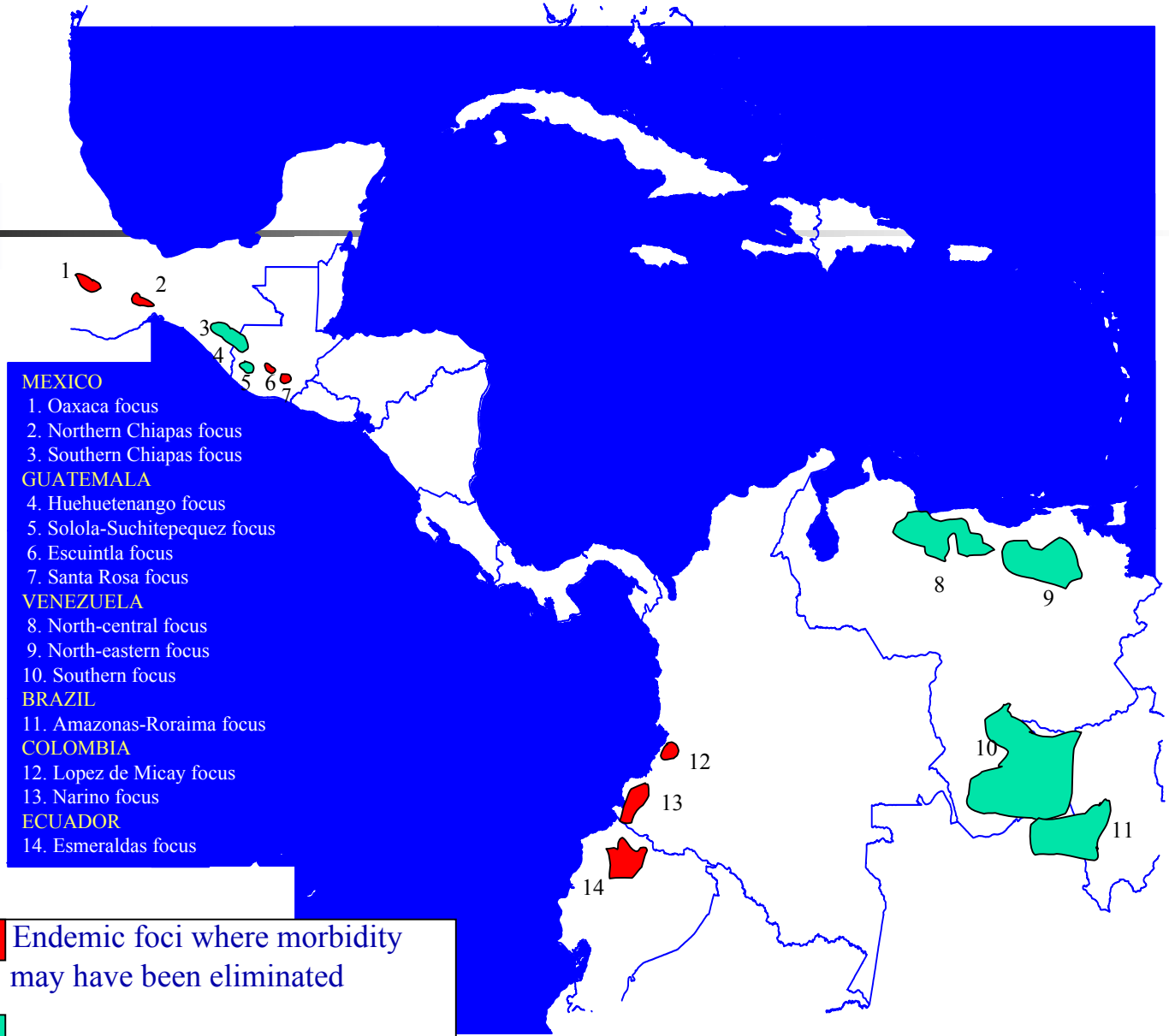
OEPA Onchocerciasis Elimination Program in the Americas	1992-00's	Elimination	Ivermectin (Mectizan)

OEPA: Distribution of onchocerciasis in the Americas



Based on:
Weekly Epidemiological Record 1996;71:278
WHO Technical Report 852, 1995

Onchocerciasis

- *Political will & international support*
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  - 1987: Merck & Co., Inc. (Mectizan Donation Program)
  - 1995: World Bank, WHO, national development agencies, NGOs > **APOC**

Onchocerciasis: goals and strategy

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APOC African Programme for Onchocerciasis Control	1995-00's	Control (sustainable drug delivery)	Ivermectin (Mectizan)

Eradicability of LF & Oncho: Conclusions

	LF	Oncho
Control	4+	4+
Elimination (Regional)	4+	1+
Eradication	possibly	No