Leprosy Update 2019:
From the Basics to the Latest

AAFP Global Health Summit October 2019
Albuquerque. New Mexico

Ronald Pust MD
Professor Emeritus, Dept of Family & Community Medicine
Office of Global & Border Health—College of Medicine
University of Arizona--Tucson
National Hansen's Disease Program Arizona Clinic
US Public Health Service
Phoenix, Arizona

AMERICAN ACADEMY OF FAMILY PHYSICIANS
STRONG MEDICINE FOR AMERICA

…Abstract continued…

- Using cases from the author's current clinical U.S. Public Health Service practice in Arizona---
  ---we will discuss the clinician's role in working with National Hansen's Disease Program (NHDP).
- Working abroad, you will need to adapt to national leprosy programs which use the new WHO guidelines
- We will provide the relevant primary resources and latest reviews.

This presentation owes much to colleagues at Arizona Leprosy Clinic—next slide…

Activity Disclaimer

It is the policy of the AAFP that all individuals in a position to control content disclose any relationships with commercial interests upon nomination/invitation of participation. Disclosure documents are reviewed for potential conflicts of interest (COI), and if identified, conflicts are resolved prior to confirmation of participation. Only those participants who had no conflict of interest or who agreed to an identified resolution process prior to their participation were involved in this CME activity.

Ronald Pust has indicated that he has no relevant financial relationships to disclose.

Leprosy in Clinical Practice

Recognition, Regimens, Reactions, Rehabilitation and Resources

…in the USA and Around the World

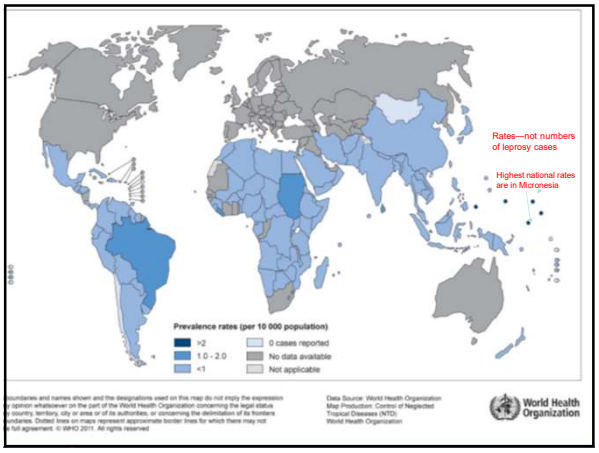
Ronald Pust MD
Tracy Carroll, PT,MPH
Ronald Favors, Cert. Orthotist
NHDP Arizona Clinic at…
Wesley Community Health Center
Phoenix, Arizona

AMERICAN ACADEMY OF FAMILY PHYSICIANS
STRONG MEDICINE FOR AMERICA

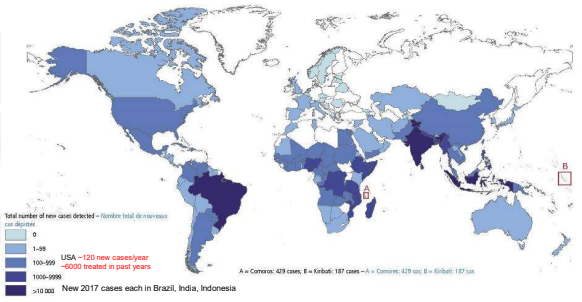
Abstract

- New leprosy treatment and prevention regimens issued by WHO in October 2018 are extensive and controversial.
- In this session, we will delineate the basics of the recognition, diagnosis, and treatment of leprosy in the U.S---
  --and abroad, where World Health Organization (WHO) recommendations are being implemented.

… abstract is continued on next slide



Numbers of new leprosy cases reported to WHO in 2017 *



* In 2017, WHO began displaying leprosy burden by NUMBERS of cases in each nation [NOT rates]

NHDP ALGORITHM FOR BIOPSY DIAGNOSIS, 2012 [current in 2019]

Histological features of leprosy, and Acid-Fast Bacilli, seen in skin biopsy

- AFB in nerve → Diagnosis of Leprosy; No further studies necessary
- No nerves/ No AFB in nerves → Request PCR for *M. leprae*
  - Positive → Diagnosis of Leprosy; No further studies necessary
  - Negative → Request sequencing → Identify *M. lepromatosis* or other mycobacteria

Clinical features follow from 3 unique basic science facts about *Mycobacterium leprae*

1. COOL : *M. leprae* grows best at 82 F (28 C)—not 98.6 (37 C).
2. LIKES NERVES, mainly the "cool nerves," i.e., those closest to the skin surface—whether sensory, motor, or autonomic.
3. SLOW : *M. leprae* divides every 12-21 days (compared to 12-21 hours for many bacteria)

Recognition—the first of five "Rs"

LEPROSY IS A CHRONIC, INFECTIOUS HUMAN DISEASE
WHICH PRIMARILY INVOLVES:

- **SKIN**
- **PERIPHERAL NERVES (at their most superficial points)**
- **EYES (anterior chamber)**
- **NOSE**

Why these body areas? What do they have in common?

The first [and *least* important !] update of this leprosy presentation is the…

Current clinical status of "*M. lepromatosis*"

per David Scollard, MD, Ph.D *, past Director of the USPHS National Hansen's Disease Program in Baton Rouge, LA, August 2019:

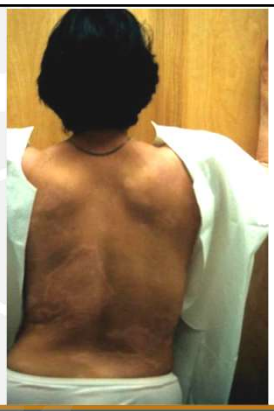
- This organism does have a unique molecular signature
- Taxonomic issues of this mycobacterium are not decided

Clinical experience with "*M.lepromatosis*" by 2019 has included all types of leprosy. With reference to classic *M. leprae*:

- Similar range of clinical presentations and skin lesions
- Identical appearance histologically—Infects nerves
- Good response to standard HD drug regimens
- Similar prognosis: not better or worse than the usual *M. leprae*

Conclusion:
M. lepromatosis is a variant of *M. leprae*, causes leprosy, and should be treated in the same manner.

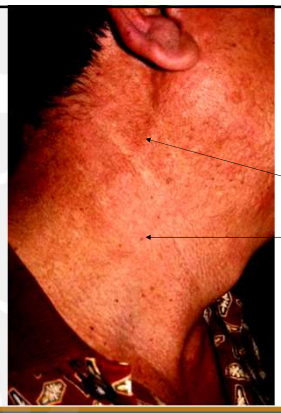
* personal communication, August 2019



SKIN

35 year old woman born in Hermosillo, Sonora, Mexico, with Borderline Tuberculoid [BT] leprosy .
She had sought diagnosis for nearly two years in Tucson, before leprosy was diagnosed.
The lesions are densely anesthetic. She also has facial nerve palsy and plantar ulcer.

Except where otherwise credited, the patient photos are from the authors' Arizona/NHDP clinic.



PERIPHERAL NERVES, especially where superficial

Here: the recurrent auricular nerve, distal to its emergence from behind and under the S-C-Mastoid muscle.

40 yr old man diagnosed in Phoenix Arizona with borderline [BB] leprosy

AMERICAN ACADEMY OF FAMILY PHYSICIANS

DIAGNOSTIC CRITERIA for Leprosy [HD]

- **ANESTHETIC SKIN LESIONS**
  - **"Leprosy until 'ruled out'," especially if patient is from an endemic nation**
- **ENLARGED PERIPHERAL NERVES**
  - **which usually have loss of motor and/or sensory function**
- **ACID FAST BACILLI** [AFB] **in SKIN SMEARS**
  - **Mainly in multibacillary** [= LL,BL,BB] and/or **SKIN BIOPSY may show granulomas in paucibacillary leprosy** [= BT, TT]
  - **AFB if within nerves is diagnostic of HD**

AMERICAN ACADEMY OF FAMILY PHYSICIANS

EYES [anterior chamber]: iritis in LL leprosy "reaction" [here] or damage to nerves V [sensory] or VII [motor] in BL,BB, or BT

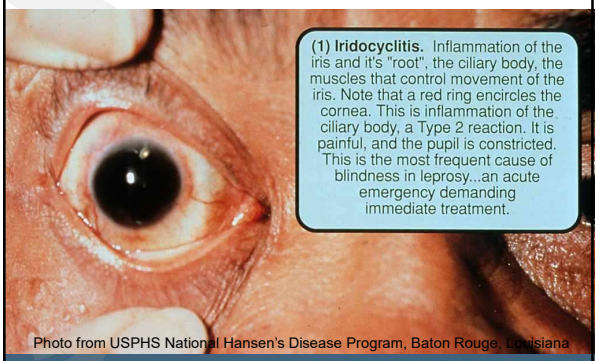
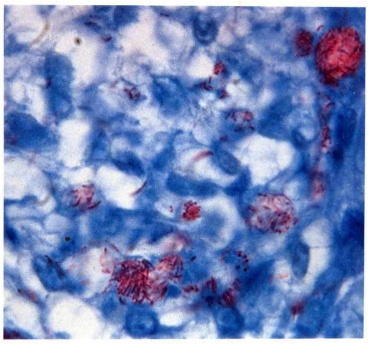


Photo from USPHS National Hansen's Disease Program, Baton Rouge, Louisiana

AMERICAN ACADEMY OF FAMILY PHYSICIANS



Numerous acid fast bacilli within a nerve. (Fite Faraco stain.)

AMERICAN ACADEMY OF FAMILY PHYSICIANS

MUCOUS MEMBRANES: mainly nasal (cooler temperature)

Photo R. Pust, Papua New Guinea,1977

AMERICAN ACADEMY OF FAMILY PHYSICIANS

TRANSMISSION & INCUBATION PERIOD

- **UNTREATED LEPROMATOUS PATIENTS – RESPIRATORY ROUTE? YES DIRECT SKIN CONTACT? Less likely**
- **ARMADILLOS? Yes. What significance?**
- **SOIL OR VEGETATION? Very unlikely**
- **INCUBATION PERIOD: Averages 3 – 8 YEARS, but can be decades**

Epidemiology is hampered because no reliable skin test or serologic markers.

AMERICAN ACADEMY OF FAMILY PHYSICIANS

SUSCEPTIBILITY to *M. Leprae*

- **ONLY ~ 5% OF MOST POPULATIONS ARE SUSCEPTIBLE to becoming cases of clinical leprosy even if exposed**
- **ATTACK RATE OF CASE SPOUSES IS 2-10% [average 5%]**
- **CHILDREN OR CONTACTS OF TREATED PATIENTS RARELY GET THE DISEASE**
- **NUTRITIONAL FACTORS ? No evidence for this**
- **GENETIC FACTORS ? Not proven**
- **IMMUNE FACTORS ?—a unique immunological disease—**

See top line above re: 5% susceptibility

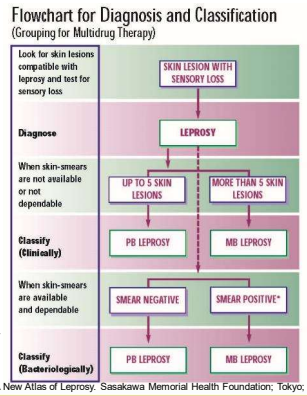
WHO simplifies the clinical diagnosis of leprosy into *paucibacillary* [PB] or *multibacillary* [MB] types.

For low resource nations, this chart uses number of lesions to Dx PB vs. MB, leading to 2 different treatment regimens.

However—major and controversial *UPDATE:*

In 2018 WHO proposes to treat both types with the same 3 drug regimen !

More on treatment options in later slides…



McDougall AC, Yuasa Y. A New Atlas of Leprosy. Sasakawa Memorial Health Foundation; Tokyo; 2001.

"Immuno-Clinical" Spectrum of Leprosy [Ridley-Jopling]

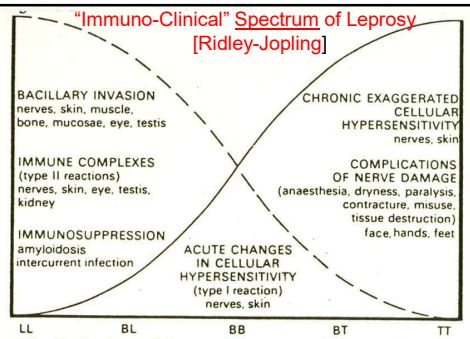


Fig. 2.2 Mechanisms of damage in leprosy, and tissues affected. Mechanisms under the broken line are characteristic of disease near the lepromatous end of the spectrum, those under the solid line of the tuberculoid end. They overlap in the centre where, in addition instability predisposes to type 1 reactions. Bryceson A, Pfaltzgraff RE. Leprosy, 1979.

Spectrum of Cases from TT to LL

The next several clinical photos are from…

- Browne S. *Early Recognition of Leprosy*

[Only the 3 composite photo/slides introducing tuberculoid, borderline, and lepromatous types of leprosy]

- Arizona Hansen's Disease Clinic

[all other clinical photos / brief patient histories]

Classifications within the Immuno-Clinical Spectrum of Leprosy

Table 1. Comparison of clinical aspects of multibacillary and paucibacillary leprosy (Hansen's disease)

Clinical aspect	Multibacillary Lepromatous		Borderline		Paucibacillary Tuberculoid
Ridley-Jopling type:	LL	BL	BB	BT	TT
Immunity (cell-mediated)	Low	Moderate			High
Infectiousness	Moderate	Slight			None
Clinical features					
Skin lesions					
Number	Many, diffuse	Several		Few (2-5)	One
Symmetry	Symmetric	Variable			Asymmetric
Size	Small	Variable			Variable
Raised lesions	Diffuse	Nodules	Polymorphic plaque, often with central healing		
Macular lesions	Innumerable	Multiple			Variable size
Surface	Shiny, poorly marginated				Dry to scaly
Sensation, hair growth, sweat	Intact ("stocking-glove" loss late)	Variable loss		Moderate loss (early)	Marked loss (early)
Nerve enlargement	None and/or late				Marked and/or early
Systemic (EENT, testes, muscle, bone) signs	Common (early)	Variable (later)		Rare	None

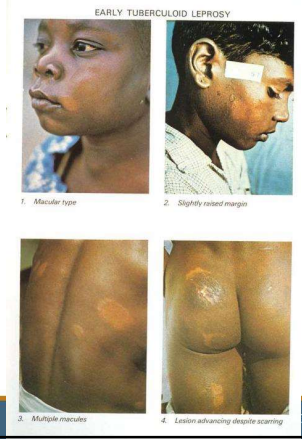
Source: Pust R, Campos-Outcalt D, *Postgraduate Med.*,1985 [based on several primary sources]

Tuberculoid leprosy:
High CMI, few AFB

Circumscribed anesthetic macules or plaques

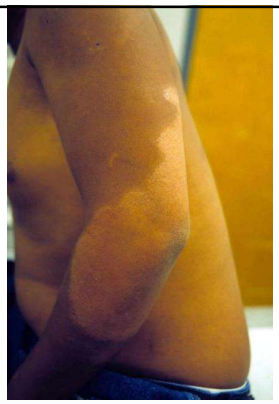
Early loss of sensation (and perhaps of motor function—especially if Type I "reversal" immunologic reaction)

Four photos via the late Dr. Stanley Browne [Uzuakoli Leprosy Hospital, Nigeria]



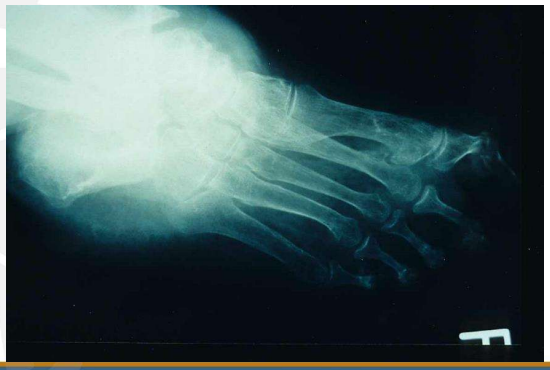
Tuberculoid Leprosy

Filipino boy of 10, from Yuma, Arizona with giant hypopigmented, anesthetic macules; but no motor loss

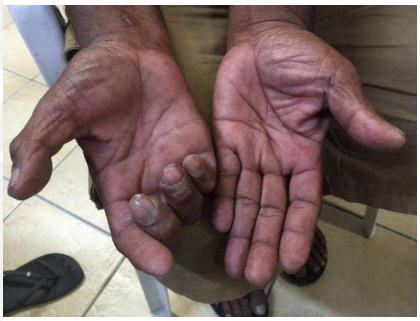


AMERICAN ACADEMY OF FAMILY PHYSICIANS

Radiograph of this 78 yr old woman's Charcot foot, Nogales, AZ



AMERICAN ACADEMY OF FAMILY PHYSICIANS



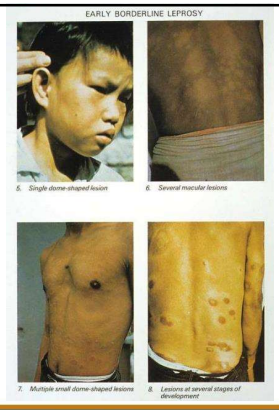
Motor nerve loss in leprosy

Marshallese man, 52, who had tuberculoid [PB] leprosy many years ago. Type 1 leprosy reactions had caused classic "claw hand" and hypothenar atrophy due to ulnar nerve loss. Thumb shows median nerve damage. Left hand normal.

AMERICAN ACADEMY OF FAMILY PHYSICIANS

Borderline Leprosy:

Moderate CMI, more diffuse and varied lesions, and a few AFB in skin smears



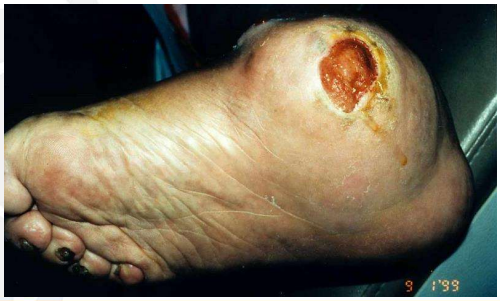
Photos: Dr. Stanley Browne

AMERICAN ACADEMY OF FAMILY PHYSICIANS

Tuberculoid: Woman,78, Nogales, AZ: insensitive Charcot foot

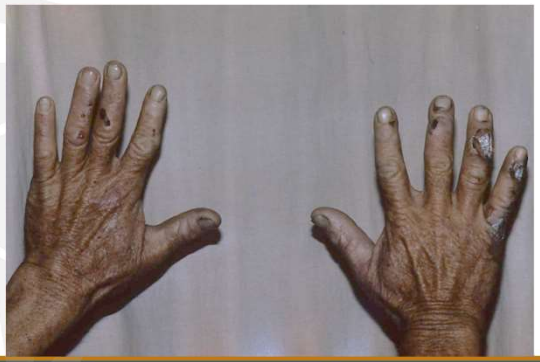
Charcot first described this in France in tertiary syphilis with loss of dorsal spinothalamic tract.

This woman in 1999 was bearing all her Right leg's weight and walking on her distal tibia.



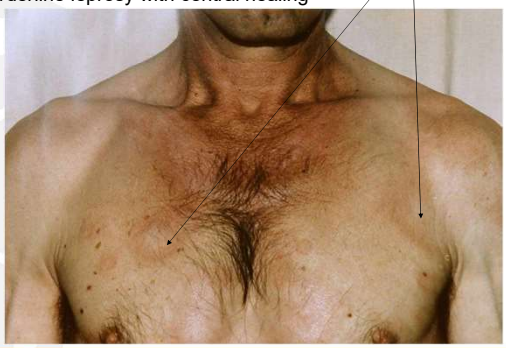
AMERICAN ACADEMY OF FAMILY PHYSICIANS

Borderline [BT]: Arizona M,32: Frying pan burns to insensitive hands; motor nerves OK



AMERICAN ACADEMY OF FAMILY PHYSICIANS

BT: [same man] Classic enlarging, insensitive macules of borderline leprosy with central healing



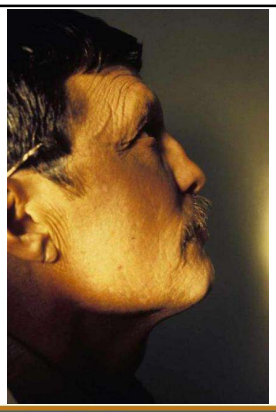
AMERICAN ACADEMY OF FAMILY PHYSICIANS

M, 40s,** Phoenix, Arizona

Classic EENT features of lepromatous [LL] leprosy:

- Saddle nose [due to collapsed nasal septum]
- Madarosis [loss of eye-brows] and eyelashes

**Patient now ~ 66 years old, seen for HD limb problems.



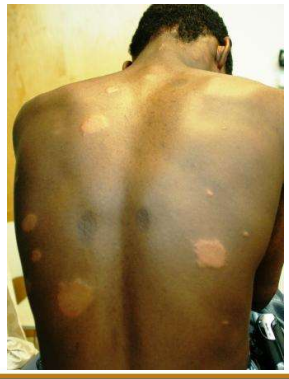
AMERICAN ACADEMY OF FAMILY PHYSICIANS

19 yr old Tucson refugee from Somalia:

Anesthetic, raised plaques of borderline lepromatous [BL] type of multibacillary [MB] leprosy.

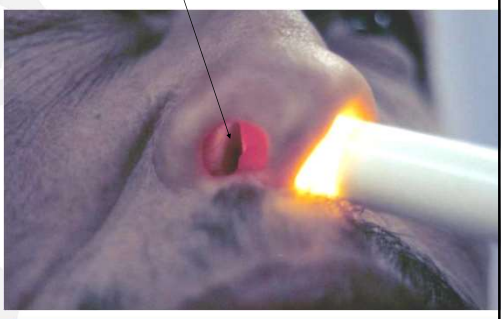
[MB~more than 5 lesions per WHO]

He had no hand or foot damage, and only mild "stocking-glove" anesthesia.



AMERICAN ACADEMY OF FAMILY PHYSICIANS

M,40s [same] Destruction/perforation of nasal septum. Differential of perforated nasal septum includes…..?



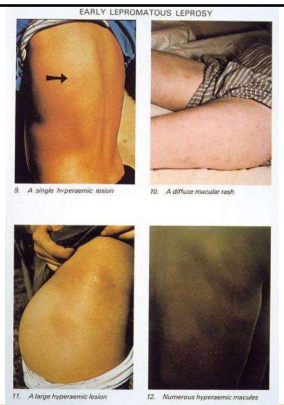
AMERICAN ACADEMY OF FAMILY PHYSICIANS

Lepromatous Leprosy:

Little to no CMI to M. leprae; Many AFB infiltrating lesions--and entire skin. Lesions may have no definitive borders.

Sensation loss later, in "stocking/glove" pattern [like diabetes], may lead to limb damage
Motor nerve loss rare.

Clinical diagnosis may be more difficult than tuberculoid; but skin smears are always positive



AMERICAN ACADEMY OF FAMILY PHYSICIANS

M, 40s, from Arizona and California.
[born in Colima, MX]

Severe, classic lepromatous leprosy facies and saddle nose.

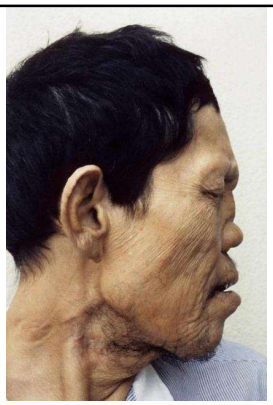
He also had disseminated coccidioidomycosis

AMERICAN ACADEMY OF FAMILY PHYSICIANS

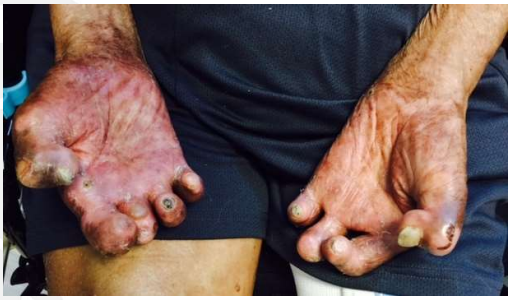
[same M, 40s, from Arizona]

Classic EENT features of advanced lepromatous [LL] leprosy

…and cervical lymph-adenitis due to coccidioidomycosis.

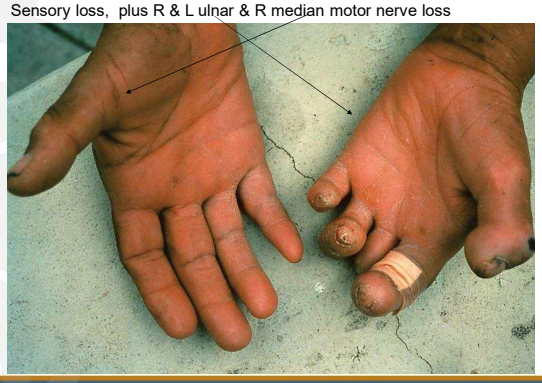


His hands looked vaguely familiar….



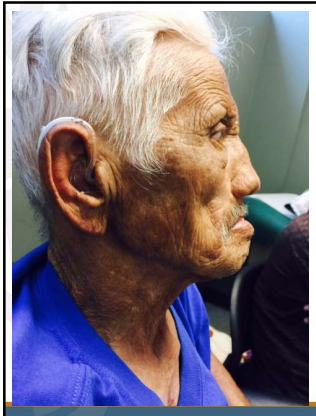
…but much worse than in 1997.

Borderline lepromatous leprosy in a 49 yr old Arizona cowboy in 1997
Sensory loss, plus R & L ulnar & R median motor nerve loss



Review of Leprosy Diagnosis

- Clinical exam for enlarged/tender nerves
- Clinical exam for skin anesthesia, best with graded-diameter [Semmes-Weinstein] filament set, if available
- Slit-skin smears, from six sites, stained for AFB
  [also used to monitor treatment every 6-12 months in multi-bacillary leprosy].
- Skin biopsy: Need a good AFB histopathologist
- *No useful blood or skin test [in contrast to TB]*
- Physical exam more useful than history or lab

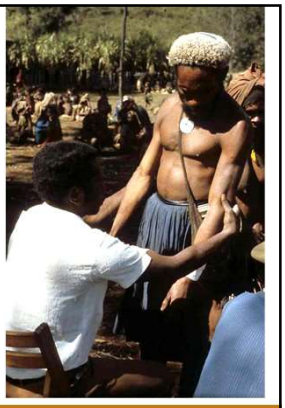


This same Kingman, AZ cowboy at age 77, who had been on dapsone alone since diagnosis in 1964 at his Army discharge; he had served in Greenland and Vietnam.
He had been a cowboy in SE Texas, home to armadillos, before Army service.

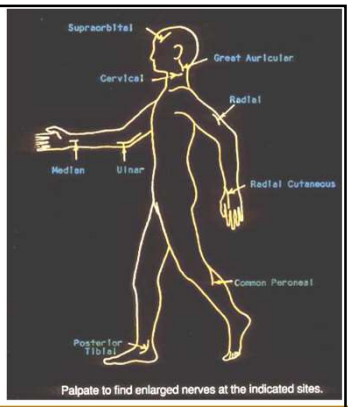
He attended our leprosy clinic in Phoenix once in 1995, but then was "lost to followup".
He was admitted to Tucson VA Hospital for treatment of vertebral osteomyelitis in July 2015 and is now back under our Arizona leprosy clinic care, where we gave him 3 drug, 2 year Rx.

Population survey for Leprosy in [then] high-prevalence population: Papua New Guinea, 1974

Leprosy is now decreasing world-wide, likely due to case-finding and improved, multi-drug treatment—and also due to BCG vaccine directed at tuberculosis—but *BCG is more effective vs. leprosy than it is against TB…*



Clinical exam protocol:
to find enlarged (and/or tender) superficial nerves, during surveys or in evaluating persons suspected of having leprosy—
--or Type 1 leprosy reaction [when they may be very tender].

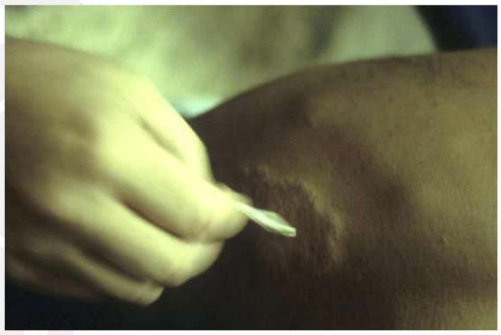


AMERICAN ACADEMY OF FAMILY PHYSICIANS

Skilled user of Semmes-Weinstein filament set in sensory testing [Tracy Carroll PT, MPH at Arizona leprosy clinic]

AMERICAN ACADEMY OF FAMILY PHYSICIANS

Checking for anesthesia in a skin plaque [no instrument needed—though graded Semmes-Weinstein filament preferred] [PNG, 1988]



AMERICAN ACADEMY OF FAMILY PHYSICIANS

Slit-skin smear technique

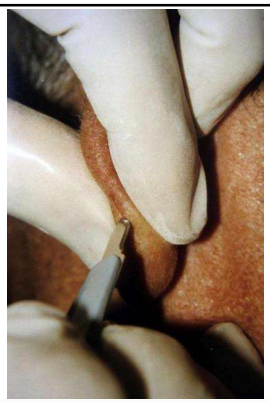
• Pressure [very firm] = hemostasis and "anesthesia"

• With a No. 15 scalpel, make incisions 8 mm long x 4 mm deep at 6 standard sites:
ear lobes, elbows, and knees bilaterally.

• Apply the "interstitial fluid" to glass slide, then air dry.

• AFB stain [similar to sputum for *M. tbc*]

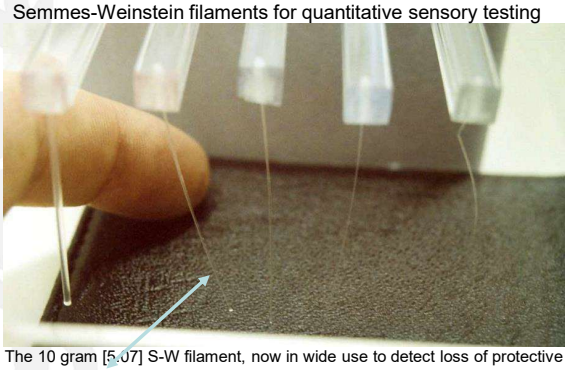
• Count AFB on log scale, from 1+ to 6 +



Photo, Arizona Hansen's Clinic, R. Pust

AMERICAN ACADEMY OF FAMILY PHYSICIANS

Semmes-Weinstein filaments for quantitative sensory testing



The 10 gram [5.07] S-W filament, now in wide use to detect loss of protective sensation in diabetics' feet, came from leprosy research using~20 filament sizes

AMERICAN ACADEMY OF FAMILY PHYSICIANS

Slit Skin Smears: Log Scale

0	**=**	**NONE FOUND IN 100**		**OIF**
1+	**=**	**1-10**	**PER 100**	**OIF**
2+	**=**	**1-10**	**PER 10**	**OIF**
3+	**=**	**1-10**	**PER**	**OIF**
4+	**=**	**10-100**	**PER**	**OIF**
5+	**=**	**100-1000**	**PER**	**OIF**
6+	**=**	**1000+**	**PER**	**OIF**

(OIF = OIL IMMERSION FIELD)

AMERICAN ACADEMY OF FAMILY PHYSICIANS

Punch biopsy [4 mm] may be used to confirm or to classify leprosy where histologist is available, but biopsy [and especially PCR] are not mandatory tests. Thus they are rarely used in low-resource settings.

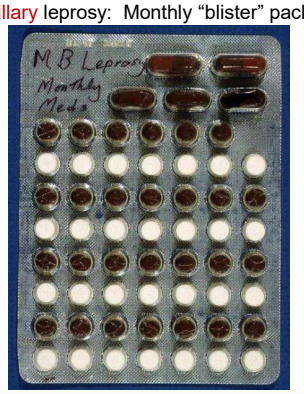
WHO REGIMEN for multibacillary leprosy: Monthly "blister" pack

Dapsone 100 mg daily
Rifampin 600 mg monthly--DOT
Clofazimine 300 mg monthly—DOT
plus 50 mg daily

If 2018 WHO recommendations take hold, *ALL* patients would get *this* monthly packet for 12 months.

Article in press [2019] by Diane Lockwood et.al. strongly opposes this one-size-fits-all approach.

WHO standard is unlikely to be adopted by NHDP in USA



SKIN BIOPSIES IN LEPROSY

- **PUNCH BIOPSY: 4-6 MM (IN FACE, 2-3 MM)**
- **MUST BE DEEP ENOUGH TO INCLUDE SUBCUTANEOUS TISSUE AND FAT**
- **FIX PROMPTLY IN AT LEAST 10 VOLUMES OF 10% FORMALIN [10 -30 ml]**
- **MAIL [at no charge for histology] to:**

NATIONAL HANSEN'S DISEASE PROGRAM
1770 Physicians Park Drive [attn: lab]
Baton Rouge, LA 70816
1-800-642-2477 Toll-free for all consults

Update: Single dose Rifampin [SDR] to prevent leprosy in close/ household contacts of all new cases…

Recommended in the same WHO 2018 leprosy guideline, based largely on the COLEP study:

Moet FJ, et al. Effectiveness of single dose rifampicin in preventing leprosy in close contacts of patients with newly diagnosed leprosy. BMJ 2008;336;761-4.

But is *disputed* by…

Lockwood DNJ, et al. Single-dose rifampicin chemoprophylaxis protects those who need it least and is not a cost-effective intervention. PLoS Neglected Tropical Diseases 2018;12:e0006403

Regimens

WHO LEPROSY REGIMENS
PAUCIBACILLARY [PB]: Rx 2 drugs for 6 Months
Dapsone 100 mg daily
Rifampin 600 mg monthly
2018: WHO proposes the 3 MB drugs/12 months regimen for *ALL* new cases: MB ***and PB—very* controversial UPDATE !**
MULTIBACILLARY [MB]: Rx 3 drugs for12 Months
Dapsone 100 mg daily
Rifampin 600 mg monthly [by DOT = directly-observed therapy]
Clofazimine 300 mg monthly [by DOT] plus 50 mg daily

USA LEPROSY REGIMENS: *All medications daily*
PAUCIBACILLARY: 12 Months ["*2 drugs for 1 year*"]
Dapsone 100 mg daily
Rifampin 600 mg daily
MULTIBACILLARY: 24 Months ["*3 drugs for 2 years*"]
Dapsone 100 mg daily
Rifampin 600 mg daily
Clofazimine 50 mg daily

MONITORING RESPONSE TO TREATMENT IN LEPROSY

- **EXAMINATION OF EYES, HANDS AND FEET for complications [due to insensitivity]**
- **EXAMINATION OF SKIN for lesion regression**
- **EXAMINATION for Type I or Type II "reactions"—see next slides**
- **REPEAT SKIN SMEARS q. 6-12 months in multibacillary [LL, BL, BB] patients**
- **REPEAT BIOPSY in 6-12 months in paucibacillary [BT, TT] patients [rarely needed if patient is adherent and improving on the drug regimen]**

Reactions Immunologic reactions in leprosy

Type 1 = "upgrading" reaction [as CMI increases]

- May occur in BT,BB,BL [ie, any borderline case]
- *Inflammation, edema of nerves* and "old" skin lesions
- If severe, it can lead over days to permanent loss of motor nerve function. Rx: Prednisone 60-80 mg/day
- The only *true emergency* in leprosy, esp. when there is weakness and swelling of motor nerves.

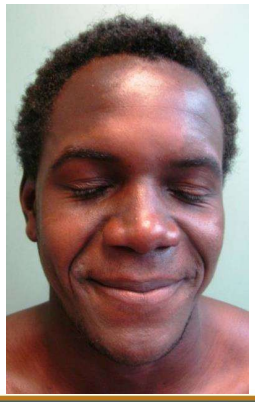
Type 2 = ENL [Erythema Nodosum Leprosum]

- May occur in LL & BL: unpredictable in onset, duration
- Large *subdermal* nodules; often edema, fever, systemic malaise; sometimes iritis or orchitis
- Rx: Thalidomide 400mg/day; may start with steroids

JB, 19 year old baseball outfielder on Milwaukee Brewers Phoenix farm team.

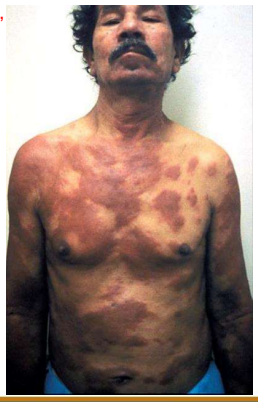
Recruited from Dominican Republic, he bats and throws right-handed.

Note hypopigmented , anesthetic macules on his forehead and right cheek, typical of BT leprosy, though not currently in reaction.

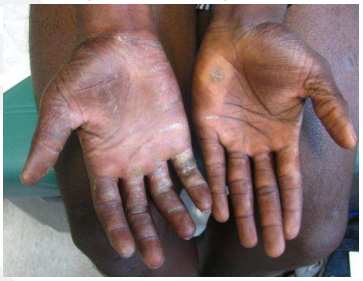


Type 1 reaction = "upgrading"
[~ Coombs type 4 = Delayed-type hypersensitivity]
Occurs as cell-mediated immunity increases, i.e., "upgrades," shifting toward tuberculoid end of spectrum.

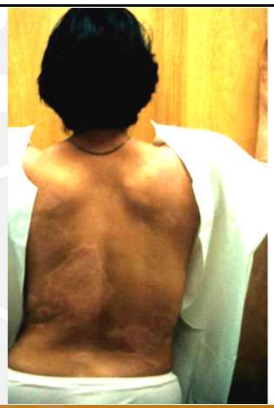
58 year old baker with Borderline [BB], first seen when in reaction:
Flat lesions are now inflamed, raised.
Many leprosy patients are first seen in reaction !
The only leprosy *emergency,*
Type 1 reactions need prednisone 60-80 mg/day



JB came to us after 3 months of management--by the Brewers' hand surgeon--of acute right hand dysfunction and dorsal swelling… *What do you see* ? [including classic PB anhidrosis in his R hand]



The sequelae of 3 months of his untreated Type 1 reaction: atrophic loss of R ulnar & median motor nerve function—and "iatrogenic" career loss. He returned to the Dominican Republic…



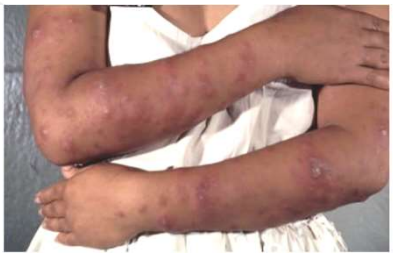
SKIN…[duplicate of a prior slide in this presentation]

Now, what else do you notice about her large, anesthetic skin plaques?

She, too, has Type 1 reaction.

She also has prior facial nerve palsy…

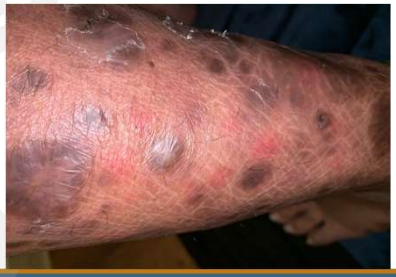
Type 2 reaction = ENL [Erythema Nodosum Leprosum]



Classic, and extensive ENL on extensor surfaces of arms [and legs]. Patient may be quite systemically ill with fever, malaise and other inflammatory manifestations of Type 2 reaction [eyes, testes, etc]

McDougall AC, Yuasa Y. *A New Atlas of Leprosy.* Sasakawa Memorial Health Foundation; Tokyo; 2001.

Type II Reaction [~ Coombs type 3 = immune complex] is called Erythema Nodosum Leprosum [ENL]. M/23 migrated from Guam, where his MB leprosy treatment was completed in 2017. Seen in Sept 2019 in Arizona, with new fevers, malaise, and many red [and brown] subdermal nodules in stages of evolution over past 3 months of undiagnosed ENL. His ENL responded rapidly to thalidomide, confirmed when seen in Arizona NHDP Clinic on 1 October, 2019.

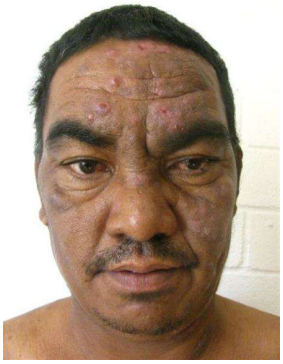


P.A. 33 yr old Hilton hotel worker came to Tucson in 2005 from Republic of The Marshall Islands [in Micronesia, which has highest leprosy rate in world.

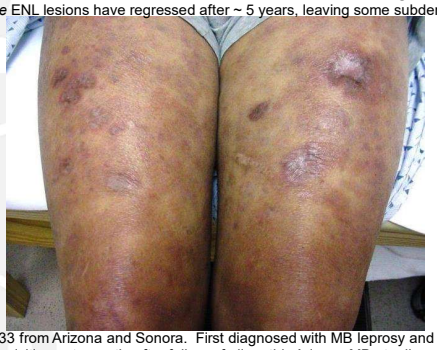
Woodall P, Scollard D, Ryan L. Hansen Disease among Micronesian and Marshallese persons living in the United States. Emerging Inf Dis 2011;17:1202-8

Oct 2010, he stopped work due to fever, malaise, and 70-80 red nodules, treated as Staph furuncles. None of these nodules had ever burst or drained.

You and a medical student now meet P.A. on November 26, 2010



Classic distribution of ENL: extensor surface of thighs & forearms
[*These* ENL lesions have regressed after ~ 5 years, leaving some subdermal atrophy]



M/33 from Arizona and Sonora. First diagnosed with MB leprosy and ENL by an inquisitive naturopath, after failure of allopathic Arizona MDs to diagnose.

Many of the nodules are regressing. P.A. said he had a similar, milder episode in 2007 that resolved "on its own." [ENL may do that.]

Note his enlarged, nodular left ear. Eyebrows and nose appear intact.

How to diagnose?
How to treat?
What else would you do—since you are also a public health professional?

Treatment of choice for Type 2 [ENL] reactions is usually daily Thalidomide, in decreasing doses until ENL is no longer clinically apparent…several days to a few years.

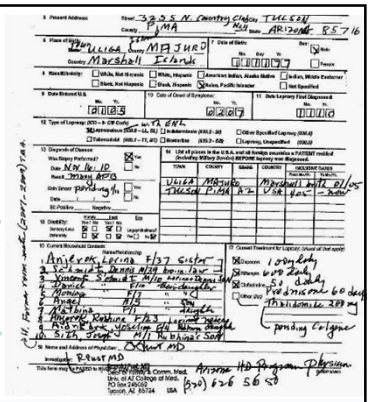
Thalidomide's history … and current dermatological applications
Anthony J Perri III, and Sylvia Hsu MD
Dermatology Online Journal 9 (3): 5

In 1956, thalidomide was introduced … as a sedative….
By 1958, it permeated the world market, and its use expanded beyond simply combating insomnia. Pregnant women frequently treated their nausea of pregnancy with thalidomide. [3] Soon thalidomide's teratogenic effects became apparent, and it was withdrawn from the market in 1961. Fortunately, thalidomide had never been approved in the United States [1, 3]…

Thalidomide resurfaced in 1965 when Sheskin, a dermatologist from Israel, made a fortuitous discovery while treating his leprosy patients with thalidomide. Prescribing thalidomide to his leprosy patients for its sedative properties, Dr. Sheskin noticed that those with erythema nodosum leprosum had resolution or improved markedly within 2 days…

You send a Case Report to USPHS National Hansen's Disease Program [NHDP] in Baton Rouge, LA. Then, since he has MB leprosy with 6+ skin AFB smears, you examine his household contacts.

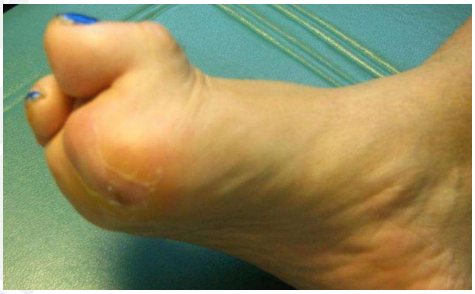
Would you treat his 11 contacts with a single dose of rifampin [WHO]?



Rehabilitation

Ronald Favors, Pedorthotist at the Arizona Hansen's Disease Clinic

AMERICAN ACADEMY OF FAMILY PHYSICIANS

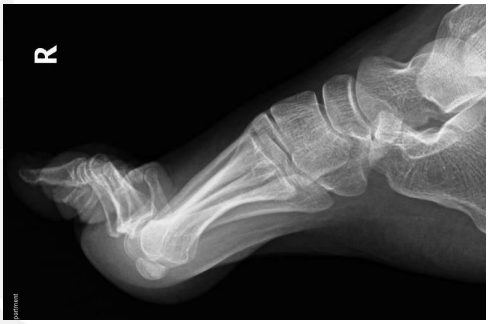


Pressure has destroyed the plantarflexion tendon, leading to dorsal subluxation of the great toe…

AMERICAN ACADEMY OF FAMILY PHYSICIANS

Shoes made for the deformed and/or insensitive foot in leprosy—similar in diabetes
Shoes shown are produced by R. Favors, Az NHDP Clinic.

AMERICAN ACADEMY OF FAMILY PHYSICIANS



…requiring a surgical approach: arthroplasty to restore plantar flexion at the first metatarso-phalangeal joint [which was successful]

AMERICAN ACADEMY OF FAMILY PHYSICIANS

At first glance, a classic plantar ulcer of an insensitive foot in leprosy—or diabetes…but this one is harder to treat because…

AMERICAN ACADEMY OF FAMILY PHYSICIANS

Resources & Referrals for Leprosy

Arizona Hansen's Disease Clinic at Wesley CHC in Phoenix, Arizona
Ronald E. Pust MD rpust@email.arizona.edu cell (520) 668-6441
Office (520) 626-1992 www.globalhealth.arizona.edu in Tucson

- National Hansen's Disease Program (NHDP) http://www.hrsa.gov/hansens/ (Toll free 1-800-642-2477 for consults)
- American Leprosy Mission. http://www.leprosy.org/
- The British Leprosy Relief Association (LEPRA) http://www.lepra.org.uk (includes journal, *Leprosy Review*)
- International Federation of Anti-Leprosy Associations. http://www.ilep.org.uk/
- World Health Organization Action Program for the Elimination of Leprosy. http://www.who.int/lep

AMERICAN ACADEMY OF FAMILY PHYSICIANS

Summary of Updates [buried ?😐😊] in this Presentation

M. lepromatosis, clinically, is a variant of M. *leprae*, and should be treated the same as *M.leprae*. Scollard DM. Infection with *Mycobacterium lepromatosis*. Am J Trop Med Hyg 2016;95:500-501.

Armadillos: [an "Update" that is not so new]

- May have leprosy
- May transmit leprosy to humans, but rarely. [Can humans transmit leprosy to armadillos? This is the author's favorite irrelevant question.]
- Are a great animal model for researching leprosy in vivo

Truman RW, et al. Probable Zoonotic Leprosy in the Southern United States. NEJM 2011;364:1626.

WHO: Global Leprosy

- WHO and USA leprosy drug treatment regimens differ—and will likely differ even more as 2018 WHO protocols are adopted by many nations.

WHO. Guidelines for the diagnosis, treatment and prevention of leprosy . New Delhi: WHO Regional Office for South East Asia; 2018

Lockwood DNJ, et al . Little evidence to support a major change in paucibacillary leprosy treatment in the 2018 WHO treatment guidelines. Leprosy Mailing List Dec. 23, 2018.

- WHO in 2018 proposed that all household or "close" contacts of new cases of all types [MB—and PB!] of leprosy be given a single dose of rifampin [SDR] as a means of preventing leprosy and decreasing future population incidence.

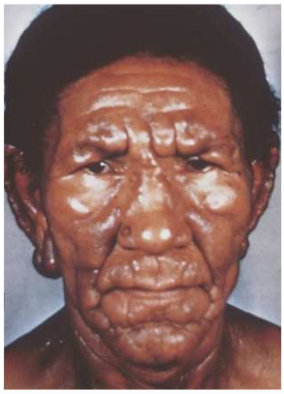
Moet FJ, et al. Effectiveness of single dose rifampicin in preventing leprosy in close contacts of patients with newly diagnosed leprosy. BMJ 2008;336;761-4.

Lockwood DNJ, et al. Single-dose rifampicin chemoprophylaxis protects those who need it least and is not a cost-effective intervention. PLoS Neglected Tropical Diseases 2018;12:e0006403

One final case:
[from National Hansen's Disease Program case archives]:

What type of clinical leprosy does this man have?

How would you confirm your diagnosis?



REFERENCES

Pust RE, Scollard D. Leprosy In: Control of Communicable Disease Manual: *CCDM Clinical Manual* APHA [in press 2019]

Scollard D. Leprosy. In: UpToDate. Current at: www.uptodate.com

Pust RE. Leprosy. In: Rakel RE. *Saunders Manual of Medical Practice*. WB Saunders; 2000. pp. 1162-5.

...and from prior slides in this presentation:

WHO. Guidelines for the diagnosis, treatment and prevention of leprosy . New Delhi: WHO Regional Office for South East Asia; 2018.

Lockwood DNJ, et al . Little evidence to support a major change in paucibacillary leprosy treatment in the 2018 WHO treatment guidelines. Leprosy Mailing List [Dec. 23, 2018.] [not yet formally published]

Moet FJ, et al. Effectiveness of single dose rifampicin in preventing leprosy in close contacts of patients with newly diagnosed leprosy. British Med J 2008;336;761-4.

Lockwood DNJ, et al. Single-dose rifampicin chemoprophylaxis protects those who need it least and is not a cost-effective intervention. PLoS Neglected Tropical Diseases 2018;12:e0006403

Scollard DM. Infection with *Mycobacterium lepromatosis*. Am J Trop Med Hyg 2016;95:500-501.

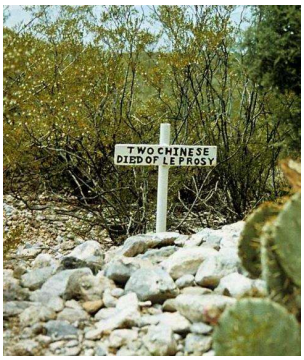
Truman RW, et al. Probable Zoonotic Leprosy in the Southern United States. NEJM 2011;364:1626.

Woodall P, Scollard D, Ryan L. Hansen's Disease among Micronesian and Marshallese persons living in the United States. Emerging Infectious Diseases 2011;17:1202-8

Leprosy…and its stigma:

Boot Hill Cemetery,
Tombstone, Arizona
[80 miles SE of Tucson]

"Two Chinese died of leprosy" about 1882—the most prosperous year in Tombstone



[photograph by R. Pust, MD]

Review—The final "R"

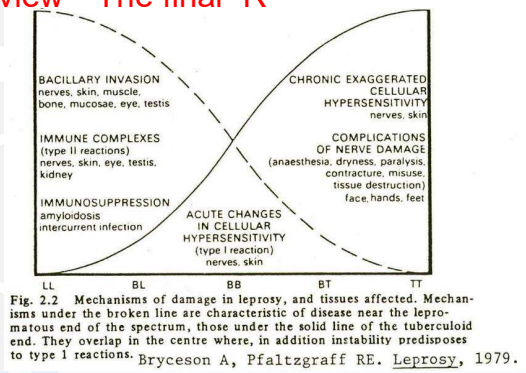


Fig. 2.2 Mechanisms of damage in leprosy, and tissues affected. Mechanisms under the broken line are characteristic of disease near the lepromatous end of the spectrum, those under the solid line of the tuberculoid end. They overlap in the centre where, in addition instability predisposes to type 1 reactions. Bryceson A, Pfaltzgraff RE. Leprosy, 1979.

Have you ever
met this man?

Working with leprosy in USA or abroad can be a most satisfying aspect of global health.

We thank you for viewing this leprosy presentation…
R. E. Pust MD—for the USPHS National Hansen's Disease Program & AAFP

Photo from USPHS NHDP case archives