



Measles Update: A Primer for Health Care Providers

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Measles Update: A Primer for Health Care Providers

A Nelson El Amin, MD, MPH





Overview

- Current outbreak & background
- Measles 101
 - Clinical presentation
 - Diagnosis
 - Treatment
- Preventing transmission
- Vaccine failure & modified measles
- Open discussion/Q&A



Measles Outbreak



Measles Cases and Outbreaks

During 2014*

644

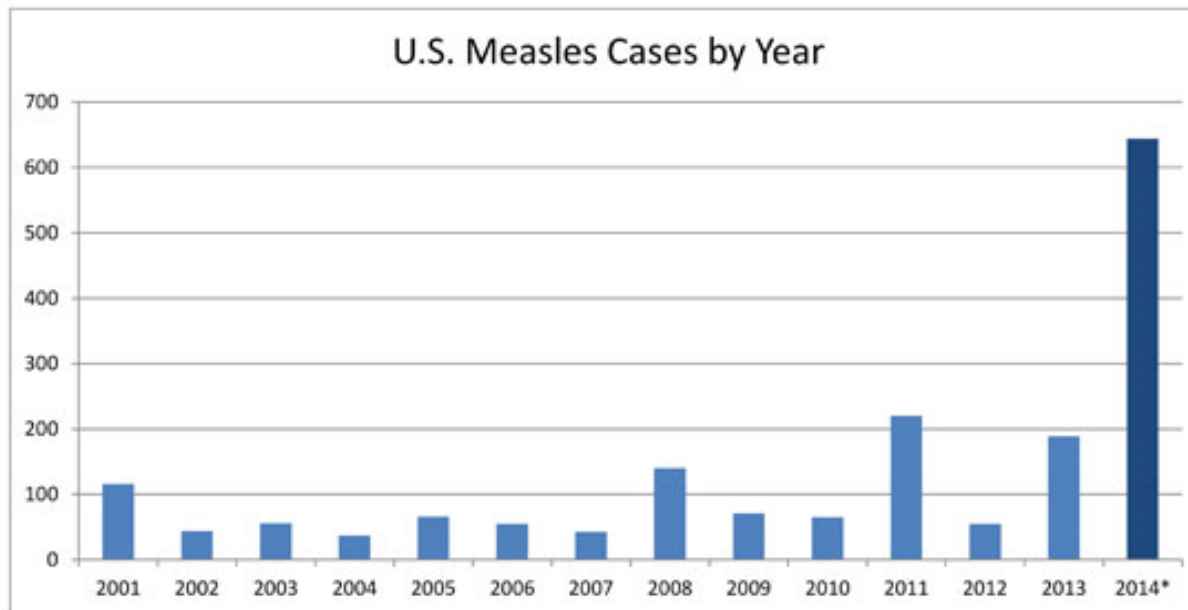
Cases

23

Outbreaks

reported in 27 states: Alabama, California, Colorado, Connecticut, Hawaii, Illinois, Indiana, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, Wisconsin

representing 89% of reported cases this year



*Provisional data reported to CDC's National Center for Immunization and Respiratory Diseases





California Measles Outbreak

	Total number of confirmed cases
CALIFORNIA	113
ALAMEDA	6
CONTRA COSTA	1
LOS ANGELES	20
City of Long Beach*	2
City of Pasadena*	4
MARIN	2
ORANGE	35
RIVERSIDE	6
SAN BERNARDINO	6
SAN DIEGO	13
SAN MATEO	3
SANTA CLARA	2
SOLANO	1
VENTURA	12

*City health jurisdictions not included in county total

California Department of Public Health as of 2/13/15:

<http://www.cdph.ca.gov/HealthInfo/discond/Pages/MeaslesSurveillanceUpdates.aspx>



Measles Background

- Highly contagious viral illness
- First described in the 10th century
- Near universal infection in childhood in pre-vaccination era
- Common and often fatal in developing countries
- As a result of a successful vaccination program, endemic circulation of measles was eliminated from the Americas in 2002



Measles Pathogenesis

- Generalized infection
- Replicates in many tissues
- Respiratory airborne & droplet transmission
- Airborne 1-2 hours
- 90% attack rate





Clinical Presentation of Measles





Clinical Presentation-Prodrome

- Stepwise increase in fever usual to 103°F or higher
- 3C's:
 - Cough
 - Coryza
 - Conjunctivitis
- Koplik spots (lesions on mucous membranes)



CDC Public Health Image Library



Clinical Presentation-Rash

- 2-4 days after prodrome
(12 days after exposure)
- DESCENDING rash that starts on face & hairline/head/neck
 - Maculopapular, becomes confluent
 - Descends to cover trunk & whole body
- Persists 5-6 days
- Fades in order of appearance
i.e. face/head clears first



CDC Public Health Image Library



It is unlikely to be measles if:

- NO rash on face/head/neck
- Rash started on trunk or legs
- No concurrent fever with rash
 - *if report of fever first, then breaks, then rash develops-- it isn't measles*
- Child feels well
 - *(Children with measles feel miserable. Adults may be less miserable-especially if previously vaccinated)*



Diseases/Conditions often Confused with Measles

- Kawasaki syndrome
- Drug eruption
- Other allergic rash
- Other viral exanthem including enteroviral syndromes



CDC Public Health Image Library



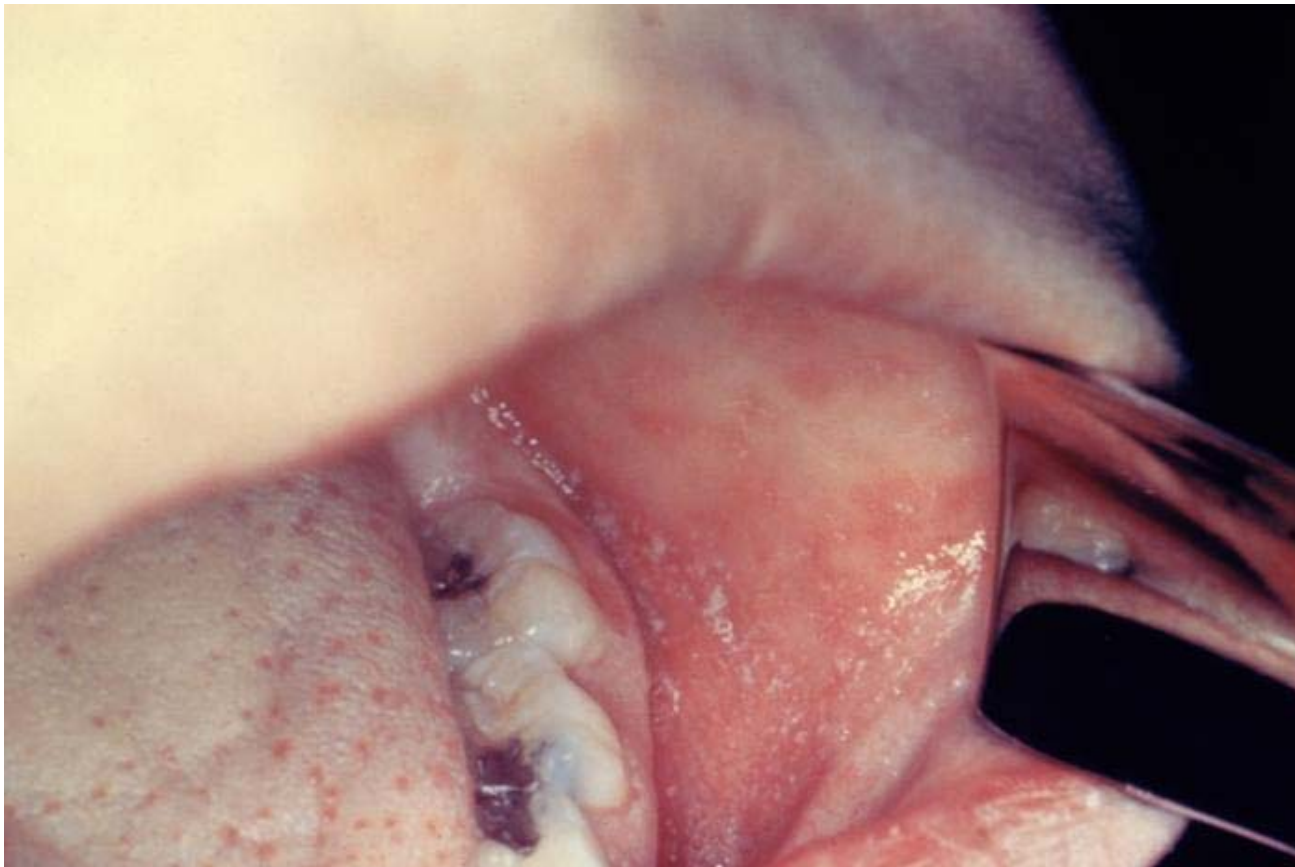
CDC Public Health Image Library



CDC Public Health Image Library



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CDC Public Health Image Library



CDC Public Health Image Library



Measles Complications in US - Seen in 30% of Cases

Condition	Percent reported (U.S. data prior to vaccines)	
Diarrhea	8	
Otitis media	7	
Pneumonia	6	(but 60% of deaths)
Encephalitis	0.1	(case fatality 15%)
Hospitalization	18	
Death	0.2	

Note: SSPE exceedingly rare 1/100,000



Diagnosis of Measles





Measles Diagnosis

- Obtain a history: “when did it start and how did it spread?”
- Clinical diagnosis:
 - Cough, coryza, conjunctivitis
 - Fever ($\geq 101^{\circ}\text{F}$ or 38.3°C)
 - Followed by rash that starts AT HEAD/neck and descends
- Obtain vaccination history
- Laboratory confirmation (important—but report suspect case without waiting for results)



Measles Laboratory Diagnosis

- Isolation of measles virus RNA from clinical specimen (PCR)
 - Nasopharynx or throat
 - Urine
- Serology
 - Positive measles IgM
 - Significant rise in measles IgG



CDC Public Health Image Library



Requested Laboratory Specimens-PCR*

- If within 7 days of rash onset, collect:
 - Throat swab (NP also, acceptable) and
 - Urine specimen for PCR
- If after 7 days but within 10 days of rash onset, collect:
 - Urine specimen for PCR

PCR specimen collection:

- Throat/NP: use viral transport media (Dacron swab; same kit as for influenza)
- Urine: 50-100 mL of urine in a **sterile centrifuge tube or urine specimen container**

* Specific to LAC DPH—other HD may have different testing



PCR-Examples of Transport Media



Swabs should not be cotton or calcium alginate

Requested Lab Specimens-Serology*

- Draw blood for both measles IgM and IgG antibodies
 - Draw 7-10 mL of blood in a red top or serum separator tube; spin down serum if possible
- No special processing needed-use regular laboratory



*Specific to LAC DPH—other HD may have different testing



Submitting PCR Specimens

- Notify your local health department
 - In LAC: contact Los Angeles County Immunization Program (LACIP) 213-351-7800
 - LACIP will assist with coordination of specimen pick-up and submission to public health lab.
- NOTE: for suspect cases residing outside LAC please consult your local HD for coordination of PCR submission



Treatment of Measles





Treatment of Measles

- Treatment is primarily supportive
- Vitamin A has been demonstrated to decrease complications such as diarrhea and pneumonia in persons with vitamin A deficiency
- No prophylactic antibiotics
- Bacterial superinfections should be treated with the appropriate antibiotic.



Preventing Transmission of Measles





Immunization, the Best Prevention

- **Routine vaccination of children:**
 - first dose at 12 – 15 months of age
 - second dose at time of school entry (4 to 6 years of age)
(traveling infants-first dose as early as 6 months but must be repeated at age 12 months)
 - Note: During CA outbreak, CA Department of Public Health Immunization Branch supports providing 2nd dose any time >28 days after first dose opportunistically
- **Adults working in sensitive occupations** such as health care or childcare and education need two doses to be fully protected unless had disease in the past



Actions requested of providers

- SUSPECT measles in patients with acute rash illness with fever
- ISOLATE and institute respiratory and airborne precautions
- OBTAIN SPECIMENS for confirmation of diagnosis
- REPORT suspect cases to PUBLIC HEALTH IMMEDIATELY
- COLLECT LIST of all exposed patients and staff
- PROVIDE POST EXPOSURE PROPHYLAXIS
 - Offer immunoglobulin to all high risk immunocompromised within 6 days
 - Protect immunocompetent non-immune persons by vaccinating within 72 hours following exposure
- PROTECT YOURSELF AND STAFF-all HCW should be IMMUNE



Suspect Measles

Consider posting resources such as CA DPH Measles Alert Poster for Clinicians

available at:
<http://eziz.org/assets/docs/IMM-908.pdf>

Fever and Rash?.....Consider Measles

Measles is highly contagious. Please protect patients, visitors, and staff!

✓ Keep an eye out for measles symptoms:

Suspect Measles in patients with fever, rash, and who have been in the last 3 weeks:

- In contact with a person with measles or febrile rash illness
- In locations or communities with cases of measles
- Outside of the U.S. or in contact with international visitors
- Visited sites popular with international visitors (tourist attractions, airports, etc.)

Note: A history of 2 doses of MMR vaccine does not exclude a measles diagnosis.

Prodrome

- Mild to moderate fever
- Cough
- Coryza
- Conjunctivitis

Rash onset

- Fever spikes, often as high as 104° to 105° F
- Red, maculopapular rash that may become confluent—typically starts at hairline, then face, and spreads rapidly down body
- Koplik's spots (tiny blue/white spots on the bright red background of the buccal mucosa) may be present



✓ Act immediately if you suspect measles:

- Immediately use airborne infection control precautions. Mask and isolate patient, in a negative pressure room whenever possible.
- Permit only staff immune to measles to be near the patient. Staff should use N95 respirators, if available.
- Notify your local health department immediately; arrange for expedited PCR testing at a public health lab.
- Protect others: Ensure airborne infection control precautions during medical transport and at receiving facilities.
- Do not use any regular exam room for at least 1 hour after a suspected measles patient has left.



Visit www.GetImmunizedCA.org for more information



Isolate and Reduce Exposures to Suspect Case

If suspect case PHONES/EMAILS:

- Arrange to see at end of day
- Enter through side door masked
- Be creative to minimize exposure to susceptible patients

If suspect case physically presents for care:

- Immediately isolate
 - place surgical mask on patient
 - place into a private examination room (negative pressure if available) with door closed as soon as they are identified



Infection Control after Suspect Measles Case

- Collect names of all persons in waiting room and staff
- Do not use a room in which a measles suspect was examined (or placed within) for at least two hours



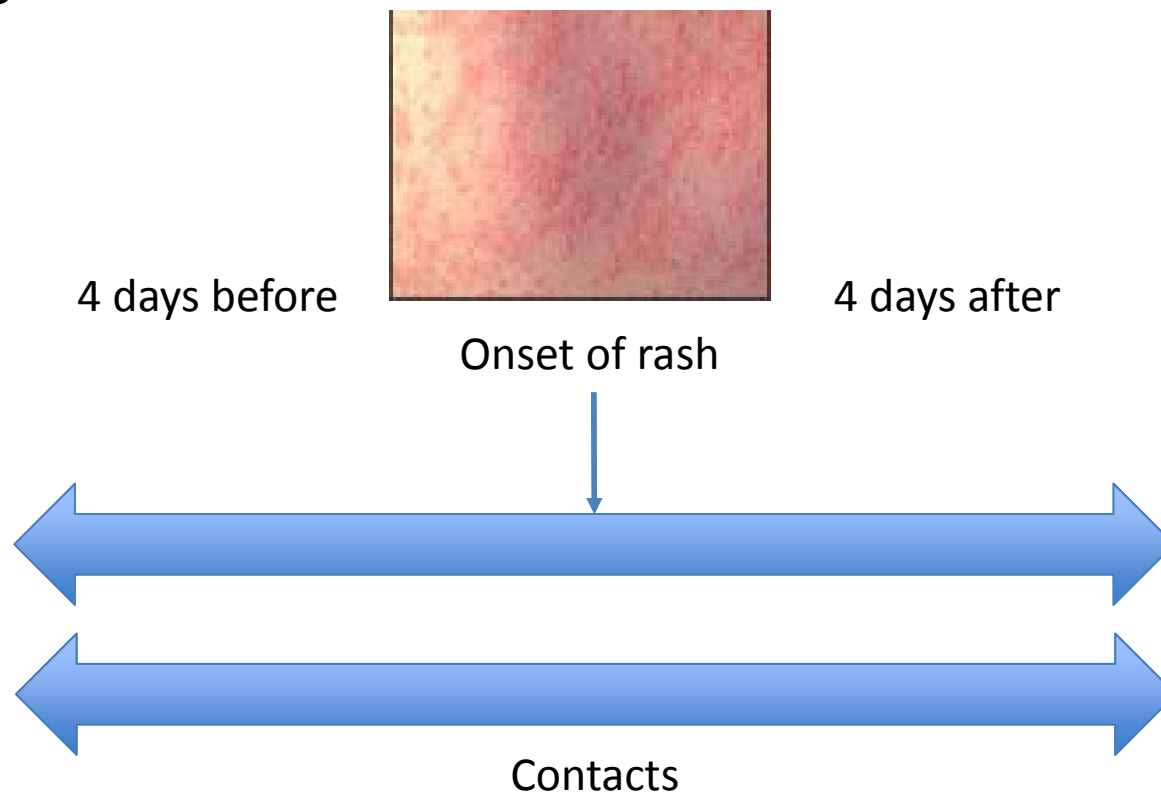
Report Suspect Measles Cases Immediately

- To your facility's infection control practitioner
- To local health department by phone IMMEDIATELY
 - *Reporting suspect cases in Los Angeles County:*
 - Weekdays 7:30 am-5:00 pm call 888-397-3993
 - Non-business hours (before 7:30 am, after 5:00 pm, or weekends) call 213-974-1234
 - *Reporting suspect cases in the city of Long Beach:*
 - 562-570-4302
 - *Reporting suspect cases in the city of Pasadena:*
 - 626-744-6403
- DO NOT WAIT FOR LABORATORY CONFIRMATION



Who is a Contact?

- Anyone who was “around” the measles case four days before the measles case developed rash, through 4 days after the rash first began





Post Exposure Prophylaxis for Susceptible Contacts

- Susceptible contacts have <2 doses of MMR or lack evidence of immunity on testing.
- If within 72 hours of exposure → VACCINATE (MMR) all unvaccinated persons $\geq 6^*$ months of age for whom a live vaccine is not contraindicated
 - If AFTER 72 hours from time of exposure, do not vaccinate
It will not protect against this measles exposure AND it can complicate the diagnosis of measles if post vaccination rash and fever occur
- Give second dose MMR to children who have received the first dose (if >28 days since first dose)

* IG preferred for infants age 6 months to 12 months (see next slide)



Who should receive immune globulin (IG)?

- Immune globulin should be given to:
 - All non-immune persons who are at risk of having severe measles complications (infants, pregnant women)
 - Severely immunocompromised vaccinated persons
- Immune globulin, 0.5 ml/kg (max dose 15 ml) IM, within 6 days of exposure (best if within 3 days)
 - Non-immune pregnant women:
 - 400mg/kg of IG given intravenously
 - Severely immunocompromised persons:
 - 400mg/kg of IG given intravenously

CDC
CENTERS FOR DISEASE CONTROL
AND PREVENTION

December 26, 1997 / Vol. 46 / No. RR-18

MMWR[™]

*Recommendations
and
Reports*

MORBIDITY AND MORTALITY WEEKLY REPORT

**All persons who work in
medical facilities should be
immune to measles**

Immunization of Health-Care Workers

**Recommendations of the Advisory Committee
on Immunization Practices (ACIP) and the Hospital
Infection Control Practices Advisory Committee
(HICPAC)**

Reprinted January 1998



Ensure all health care personnel are immune

- All persons who work in healthcare facilities should be immune to measles*
- Cal/OSHA requires that measles immunity be assessed in employees covered by the Aerosol Transmissible Diseases standard
 - Non-immune employees must be offered MMR
 - If MMR is refused, a declination must be signed

*CDC. Immunization of Health-Care Personnel. Recommendations of the Advisory Committee on Immunization Practices (ACIP).MMWR 2011;60(No.7)



Modified Measles & Vaccine Failure

Dr. James Cherry





Measles Epidemic in Saint Louis: 1971-1972

- We described primary vaccine failure
- We described secondary vaccine failure and mild modified measles
- We presented evidence that a two dose schedule would be necessary



May, 1973
802 *The Journal of PEDIATRICS*

*A clinical and serologic study of 103 children
with measles vaccine failure*

James D. Cherry, M.D.,* Ralph D. Feigin, M.D.,** Penelope G.
Shackelford, M.D., Daniel R. Hinthorn, M.D.,*** and Rose Rita Schmidt, M.A.,
St. Louis, Mo.



August, 1972
The Journal of PEDIATRICS 217

*Urban measles in the vaccine era: A clinical,
epidemiologic, and serologic study*

James D. Cherry, M.D.,* Ralph D. Feigin, M.D.,** Louis A. Lobes, Jr., M.D.,***

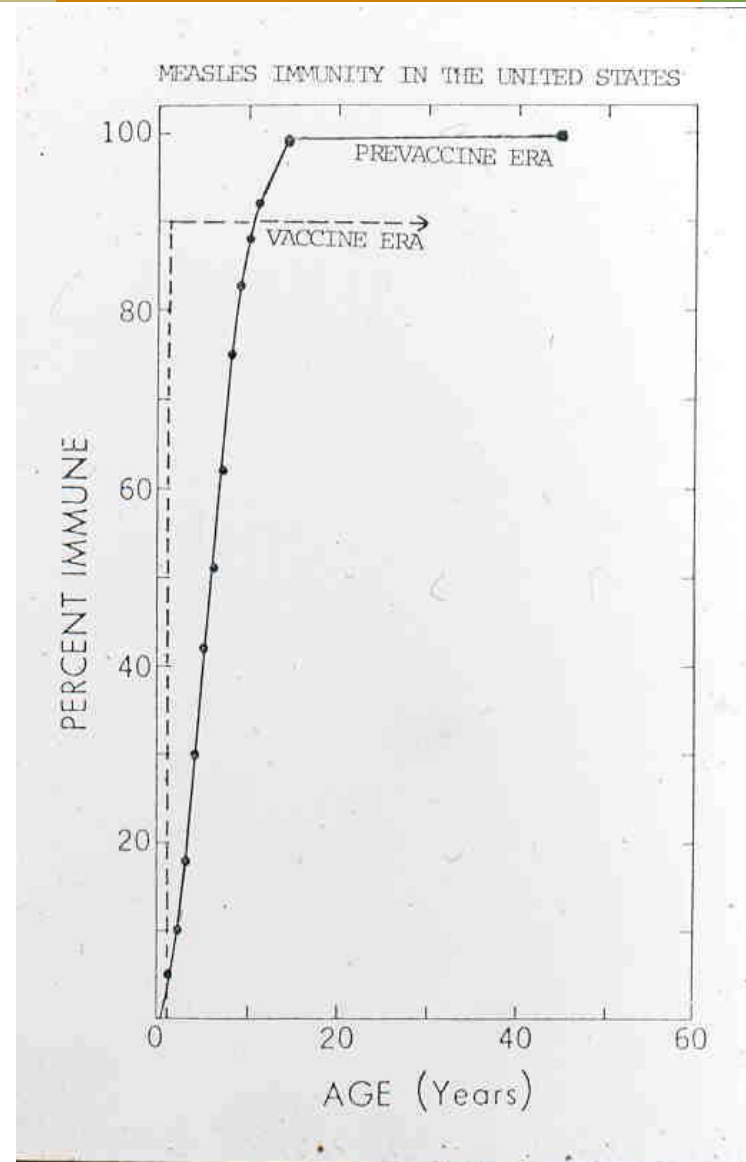
Daniel R. Hinthorn, M.D.,*** Penelope G. Shackelford, M.D., Richard H.

Shirley, B.S., Robert D. Lins, M.D., and Sung C. Choi, Ph.D., *St. Louis, Mo.*



Primary Vaccine Failure

- Results in typical measles
- With one dose of vaccine the primary vaccine failure rate is 5%
- With two doses of vaccine the primary vaccine failure rate is <1%



Modified from Cherry J.D. et al. Journal of Pediatrics.
1972; 81: 217-230



Secondary Vaccine Failure and Mild Modified Illness

- In 1971-1972 it had multiple causes relating to vaccines and their use
- Today it is due to waning vaccine induced antibody titers
- In the present epidemic in California there are 8 probable secondary vaccine failure cases



Photo: James Cherry, MD



Photo: James Cherry, MD



Important Aspects in the Diagnosis of Exanthematous Illness

1. Exposure
2. Season
3. Incubation period
4. Age
5. Previous exanthems
6. Relation of rash to fever
7. Adenopathy
8. Type of rash
9. Distribution of rash
10. Progression of rash
11. Enanthem
12. Other associated symptoms
13. Laboratory tests



Laboratory Diagnosis of Modified Measles

- PCR throat/NP and urine
- IgM serum antibody test may be negative



Photo: David Bronstein, MD



Type your questions into the “Question Pane”



Acknowledgments

- CA DPH Immunization Program
 - Kathleen Harriman
 - Jill Hacker
- Alameda County Public Health Department
 - Erica Pan



Measles Resources

- **California DPH measles webpage**



- Health professional section, FAQs, posters

- <http://www.cdph.ca.gov/HealthInfo/discond/Pages/Measles.aspx>

- **LAC DPH**



- Measles webpage

- <http://publichealth.lacounty.gov/media/measles/index.htm>

- Immunization program: 213-351-7800

Information for Health Care Providers	
Measles Disease, Vaccine, and Reporting Information	>
Measles Outbreak Resources for Providers	>
Measles Update Webinar for Providers	>



- **Centers for Disease Control (CDC) measles webpage**

- <http://www.cdc.gov/measles/index.html>