

Case 3

paediatric Neurology

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Learning objectives

- Understand the recommendation for screening for autism spectrum disorders
- Become familiar with Mchat screening tool
- Understand the needed investigations
- Understand the management plan



References

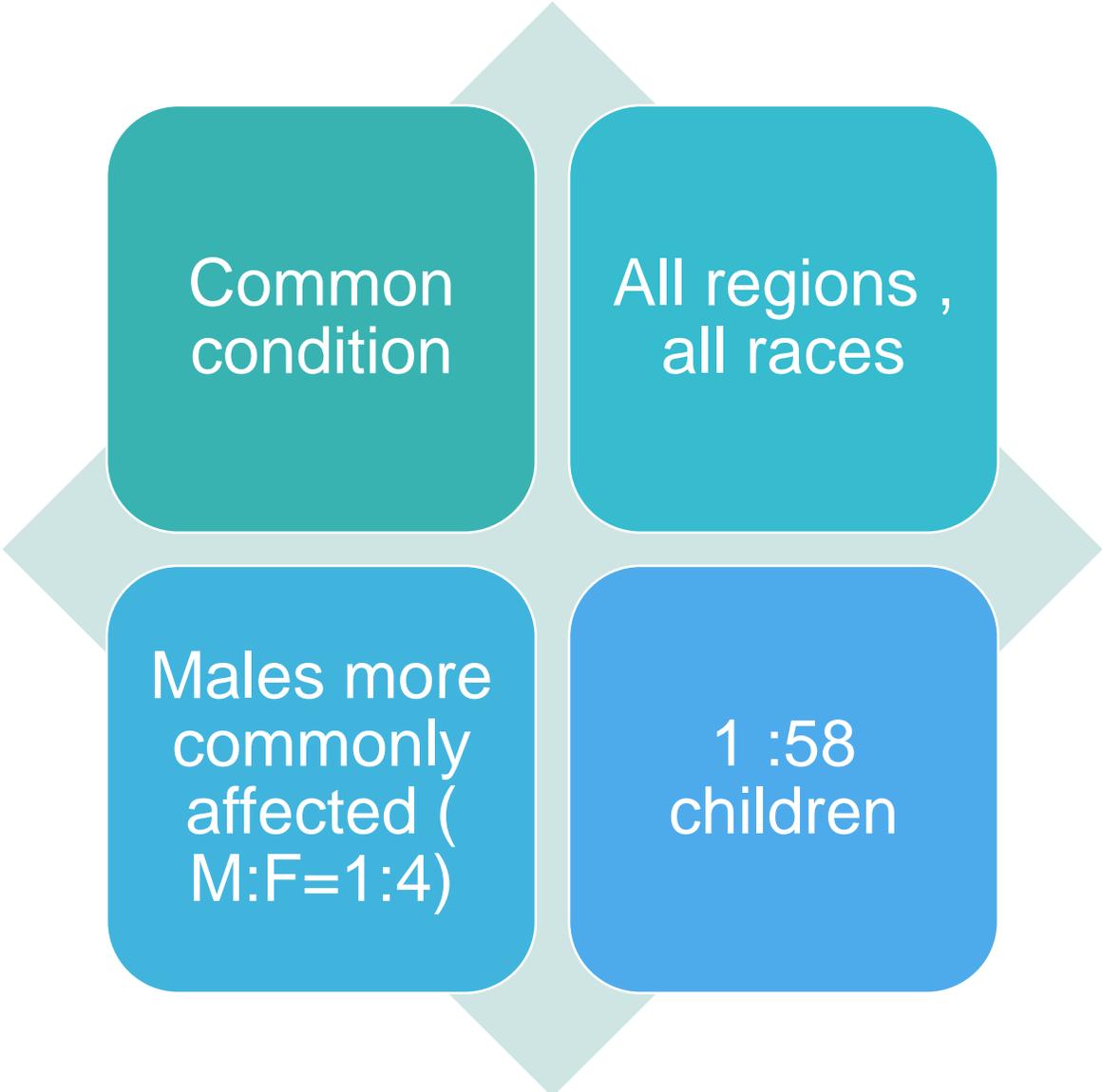
- Nelson textbook of paediatrics
- Paediatrics in review 2014;35(2):62-78



Brief introduction



Autism spectrum disorder



Common
condition

All regions ,
all races

Males more
commonly
affected (
M:F=1:4)

1 :58
children

Autism spectrum disorder :biologically based neurodevelopmental disorder

- characterized by impairments in two major domains:
 - 1) deficits in social communication and social interaction
 - 2) restricted repetitive patterns of behavior, interests, and activities

TERMINOLOG Y

DSM-5

1) persistent deficits in social communication and interaction (eg, deficits in social reciprocity; nonverbal communicative behaviors; and skills in developing, maintaining, and understanding relationships)

2) restricted, repetitive patterns of behavior, interests, or activities

The symptoms must be present in early development, but may not become manifest until social demands exceed limited capacities thus precluding the previous criteria of symptoms before a specified age cutoff

Clinical

Delay from the early months (50%) or regression (50%)

9-10 months

Decrease crying ,
feeding , motor
activity

Delayed language
development

No appropriate
response to noises (
axaggerated or
decreased)

Motor milestones :
often normal

Some remain normal
until 18-24 months of
age then lose social
and language
milestones

- Fascinated with a particular toy
- Stereotypic behavior or gesture
 - Movements: flapping the hands and arms,
 - Head banging rhythmic movements ,
rocking from the pelvis
- Better verbal than non verbal skills
- Echolalia
- Expressive and comprehensive problems



- **Protodeclarative pointing**

- Protodeclarative pointing is the use of the **index finger** to indicate an item of interest to another person.
- The absence of protodeclarative pointing is **predictive** of the later diagnosis of autism.
- Screening questions include "Does your child ever use his/her index finger to point, to indicate interest in something?"





- **Environmental stimuli**

- Parents report unusual responses to environmental stimuli, including **excessive** reaction or an unexpected **lack** of reaction to sensory input.
- Children with autistic disorder may also display exaggerated responses or rage to everyday sensory stimuli, such as **bright lights**



- ***Social interactions***

- Separation from parents may elicit a lack of appropriate eye contact
- Absence of typical responses to pain and physical injury.
- Rather than crying and running to a parent when cut or bruised, the child may display no change in behavior.

- Difficulties in social interactions are common.
- Problems making friends
- show attachments to objects not normally predicted to be child oriented.



- 
- Speech abnormalities are common
 - language delays and deviations.
 - Pronominal reversals are common, including saying "you" instead of "I."

- **Play**

- Absence of symbolic play in infants and toddlers is highly predictive of the later diagnosis of autism.
- Odd play : interest in parts of objects instead of functional uses of the whole object.





-
- **Spinning a wheel of a car**
 - **Enjoy repeatedly lining up or dropping objects from a particular height.**
 - **fascinated with items that are not typical toys, such as pieces of string.**
 - **They may spend hours watching traffic lights, fans, and running water.**



Self-injurious behaviors: in minority of patients

- Skin picking
- Self biting
- Head punching and slapping
- Head-to-object and body-to-object banging;
body punching and slapping
- Poking the eye, the anus, and other body
parts
- Lip chewing; removal of hair and nails; and
teeth banging.



Table 2. Comparison of Changes in the DSM-IV and DSM-5 for ASD

DSM-IV for ASD	DSM-V Changes for ASD
1. Rett disorder	1. Rett disorder is eliminated because it is considered a genetic disease
2. Pervasive developmental disorder not otherwise specified, Asperger disorder, and childhood disintegrative disorder	2. These 3 disorders will now officially be called ASD
3. Unusual sensory behaviors not part of the criteria.	3. Unusual sensory behaviors will be added to the criteria
4. 3 symptom categories (impairment in social interaction, impairment in communication, and repetitive and restrictive behaviors)	4. 2 symptom categories (deficits in social communication and social interaction combined, and repetitive and restrictive behaviors) but more criteria required per category
<p>ASD=autism spectrum disorder; DSM-IV=<i>Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition</i>; DSM-5=<i>Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition</i>.</p>	

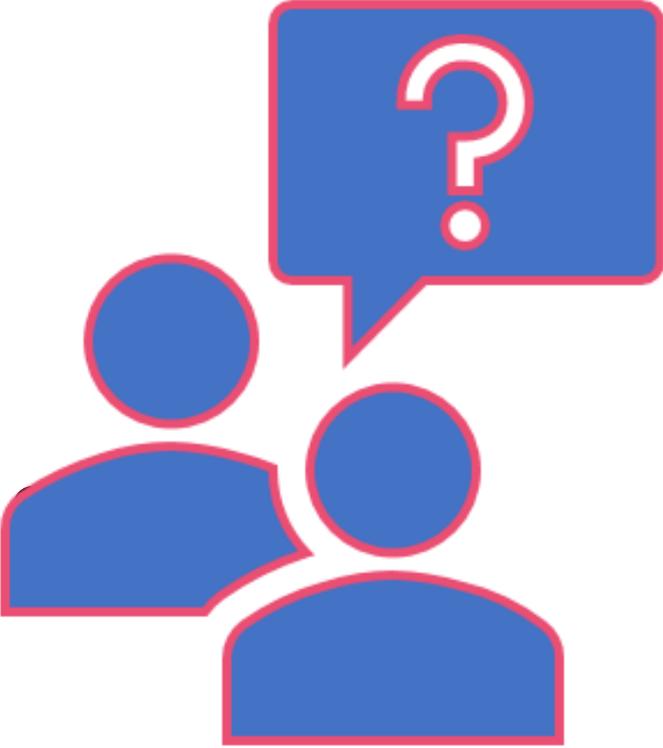
Case study :Salma

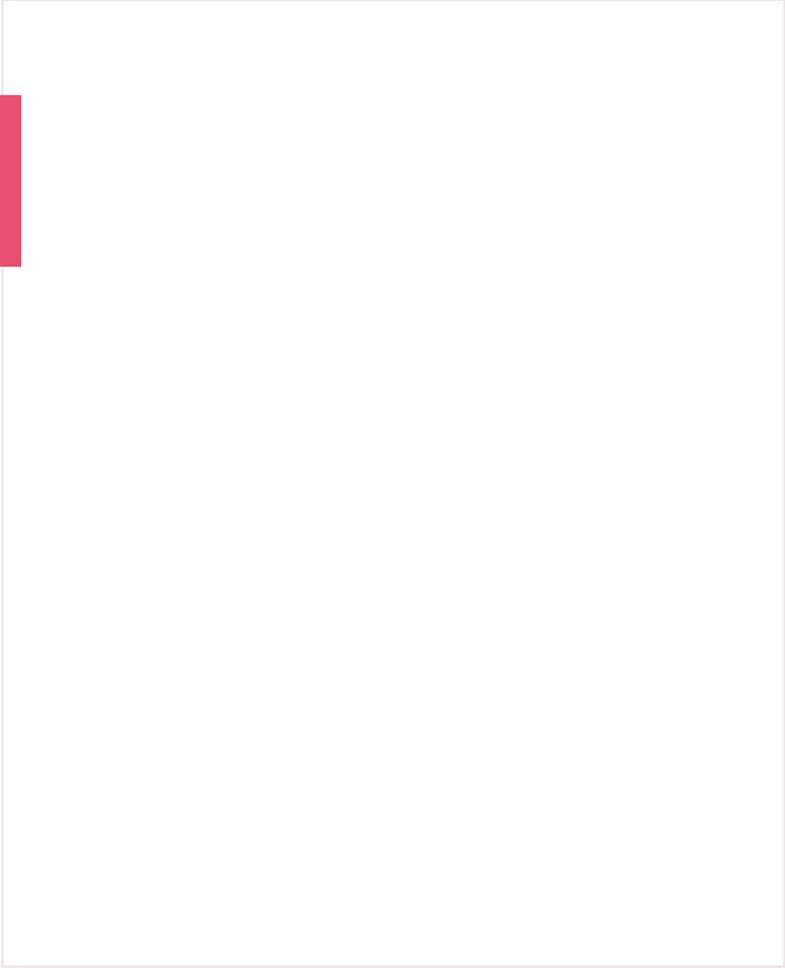
- Salma is an 18 month old child who presented to you for routine check up
- Because you are aware of the importance of routine screening for autism at the age of 18 months , you are going to screen Salma for autism

Screening for autism

- **All children** : at **18 and 24 months**=screened for autism

Why is screening for autism important





The earlier the
identification

The earlier the referral
for rehabilitation

The better the outcome



What screening tool are you going to use

Table 4. **Screening Tools for Autism Spectrum Disorder**

Measure	Acronym	Age Range	Description
Infant and Toddler Checklist also called Communication and Symbolic Behavior Scales and Developmental Profile	ITC CSBS-DP	9-24 mo	Designed to screen for communication delays but recently has tested well for early autism screening (http://firstwords.fsu.edu/pdf/checklist.pdf)
Modified Checklist for Autism in Toddlers	M-CHAT	16-30 mo	23-Item yes/no questionnaire (www.firstsigns.org and www.m-chat.org) (online free versions with scoring)
Childhood Autism Screening Test	CAST	4-11 y	Has some research toward use as a universal screening device (http://www.autismresearchcentre.com/project_9_cast) (public domain)

M-CHAT Scoring Instructions

A child fails the checklist **when 2 or more critical items** are failed OR when **any three items** are failed.

Bold capitalized items are CRITICAL items.

Not all children who fail the checklist will meet criteria for a diagnosis on the autism spectrum.

children who fail the checklist should be evaluated in more depth by the physician or referred for a developmental evaluation with a specialist.

Critical :2,7,9,13,14,15



1. No	6. No	11. Yes	16. No	21. No
2. NO	7. NO	12. No	17. No	22. Yes
3. No	8. No	13. NO	18. Yes	23. No
4. No	9. NO	14. NO	19. No	
5. No	10. No	15. NO	20. Yes	

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- M chat screen : translated to many language including Arabic

M-CHAT
EMACAPAP 2006
قائمة استبيان التوحد عند الأطفال

الرجاء الاجابه على كل الأسئلة التالية (نعم / لا) موضحا كيف يكون تصرف الطفل دائما. و إذا كان التصرف نادرا (مثال: رأته أم مرة أو مرتين)؛ الرجاء الإجابة كما لو كان الطفل لا يقوم به.

	نعم	لا
1- هل يستمتع طفلك بالأرجحة أو بالهددة (يهزهز) على ركبتيك (فوق حرك) ؟		
2- هل لطفلك اهتمام بالأطفال الآخرين ؟		
3- هل يحب طفلك التسلق(التشعيط) على الأشياء مثل صعود السلم (الدرج) ؟		
4- هل يستمتع طفلك بلعبة الاختباء والاختفاء(الغميضة / الأستغمايه)؟		
5-هل يتظاهر طفلك بالحديث في التليفون (الهاتف) أو الاعتناء بالدمى (العروسه) أو التظاهر بأشياء أخرى ؟		
6-هل يستخدم طفلك إصبعه (سبابته) للإشارة أو السؤال عن شيء؟		
7-هل يستخدم طفلك إصبعه (سبابته) للتعبير عن اهتمامه بشيء معين ؟		
8-هل يلعب طفلك كما ينبغي باللعب الصغيرة مثل السيارات، المكعبات (الكراهب أو الليجو)بدون أن يضعها في فمه أو يعبث بها أو يرميها؟		
9-هل يحاول طفلك أن يجلب أشياء لكي يريك شيء ما؟		
10-هل يمكن لطفلك أن ينظر(يخزر، يحدق) في عينيك لأكثر من ثانية؟		
11-هل يبدو طفلك حساسا للضوضاء و الأصوات (مثال يخلق أو يسد أذنيه ؟)		
12-هل يتجاوب طفلك لابتسامتك أو نظرتك بابتسامه ؟		
13-هل يقلدك طفلك (مثل يقوم بتقليد وجهك معبرا عن الفرح أو الحزن؟)		

14- هل يستجيب (يلتفت أو يتلفتشي) الطفل عندما تتأديه باسمه ؟		
15- عندما تشير (اتوري) إلى لعبة في الغرفة، هل ينظر طفلك إليها ؟		
16- هل يمشي طفلك ؟		
17- هل ينظر (يخزر) طفلك إلى الأشياء التي تنظر (تخزر) إليها؟		
18- هل يقوم طفلك بحركات غير اعتيادية بأصابعه أمام وجهه؟		
19- هل يحاول طفلك جذب (لفت) انتباهك إلى ما يقوم به (يفعله) ؟		
20- هل تساءلت يوماً " إذا كان طفلك أصم (لا يسمع)؟		
21- هل يفهم طفلك ما يقوله الآخرون (الناس) ؟		
22- هل يحدق (يخزر) طفلك أحياناً في شيء غير معين أو يتجول بدون هدف ؟		
23- هل ينظر (يخزر) طفلك إلى وجهك لمعرفة إحساسك أو رد فعلك عندما يواجه شيئاً غير مألوف (معتاد عليه)		

- 
- On M chat screen , Salma does not use her index finger to point to indicate interest , she does not pretend in playing she does not imitate her parents , and she does not speak any word
 - What do the above results indicate ?
 - What is you next step ?

Score of failed answers is 4



Bring Salma for follow up evaluation



Elaborate more on the failed questions

M-CHAT-R™

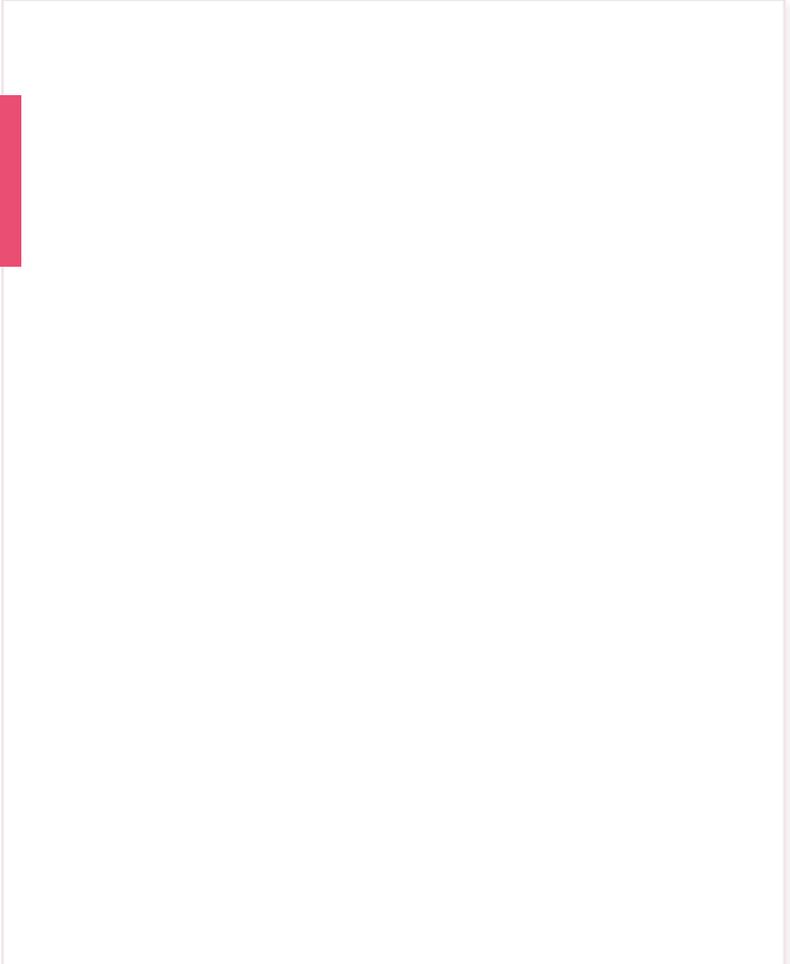
Please answer these questions about your child. Keep in mind how your child usually behaves. If you have seen your child do the behavior a few times, but he or she does not usually do it, then please answer **no**. Please circle **yes** or **no** for every question. Thank you very much.

1. If you point at something across the room, does your child look at it? (FOR EXAMPLE, if you point at a toy or an animal, does your child look at the toy or animal?)	Yes	No
2. Have you ever wondered if your child might be deaf?	Yes	No
3. Does your child play pretend or make-believe? (FOR EXAMPLE, pretend to drink from an empty cup, pretend to talk on a phone, or pretend to feed a doll or stuffed animal?)	Yes	No
4. Does your child like climbing on things? (FOR EXAMPLE, furniture, playground equipment, or stairs)	Yes	No
5. Does your child make <u>unusual</u> finger movements near his or her eyes? (FOR EXAMPLE, does your child wiggle his or her fingers close to his or her eyes?)	Yes	No
6. Does your child point with one finger to ask for something or to get help? (FOR EXAMPLE, pointing to a snack or toy that is out of reach)	Yes	No
7. Does your child point with one finger to show you something interesting? (FOR EXAMPLE, pointing to an airplane in the sky or a big truck in the road)	Yes	No
8. Is your child interested in other children? (FOR EXAMPLE, does your child watch other children, smile at them, or go to them?)	Yes	No
9. Does your child show you things by bringing them to you or holding them up for you to see – not to get help, but just to share? (FOR EXAMPLE, showing you a flower, a stuffed animal, or a toy truck)	Yes	No
10. Does your child respond when you call his or her name? (FOR EXAMPLE, does he or she look up, talk or babble, or stop what he or she is doing when you call his or her name?)	Yes	No
11. When you smile at your child, does he or she smile back at you?	Yes	No
12. Does your child get upset by everyday noises? (FOR EXAMPLE, does your child scream or cry to noise such as a vacuum cleaner or loud music?)	Yes	No
13. Does your child walk?	Yes	No
14. Does your child look you in the eye when you are talking to him or her, playing with him or her, or dressing him or her?	Yes	No
15. Does your child try to copy what you do? (FOR EXAMPLE, wave bye-bye, clap, or make a funny noise when you do)	Yes	No
16. If you turn your head to look at something, does your child look around to see what you are looking at?	Yes	No
17. Does your child try to get you to watch him or her? (FOR EXAMPLE, does your child look at you for praise, or say “look” or “watch me”?)	Yes	No
18. Does your child understand when you tell him or her to do something? (FOR EXAMPLE, if you don’t point, can your child understand “put the book on the chair” or “bring me the blanket”?)	Yes	No
19. If something new happens, does your child look at your face to see how you feel about it? (FOR EXAMPLE, if he or she hears a strange or funny noise, or sees a new toy, will he or she look at your face?)	Yes	No
20. Does your child like movement activities? (FOR EXAMPLE, being swung or bounced on your knee)	Yes	No

M-CHAT-R Scoring Instructions

- use this list of failed responses to compare the parents' responses on the screener.
- The child receives **one point for each failed** response.
- A child demonstrates Medium-Risk for ASD if the total score is 3-7, and a Follow-Up Interview should be performed.
- If a child's total score is 8-20 points they are at High-Risk for ASD and a Follow-Up Interview can be performed to gain clarity on at-risk responses or you can skip this step and refer the child for a diagnostic evaluation and early intervention services
- . A total score of 0-2 means the child passed the screener and surveillance should continue at all subsequent health supervision visits.

- 
- Salma came for a follow up evaluation and the Mchat screen again showed that Salma is failing in 4 items
 - What is your next step after screening ?



Salama needs to be Referred for further diagnostic evaluation (ADOS)

Needs examination: look for dysmorphic features , skin

Co occurring conditions

investigation for possible underlying aetiology

Table 3. Syndromes Associated With Autism^a

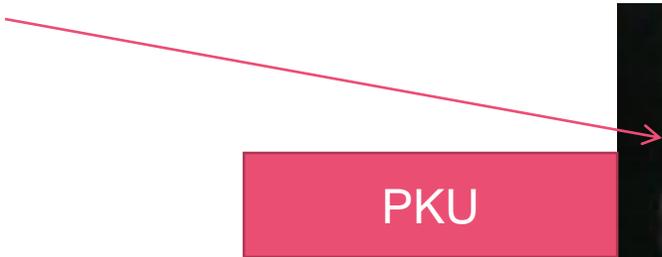
Autism-Related Syndrome	Physical Examination and/or History Findings	Associated Gene(s)	Patients With Syndrome Who Have Autism, %	Patients With Autism Who Have Syndrome, %	Testing to Consider
Tuberous sclerosis	Ash leaf spots, adenoma sebaceum, shagreen patches, tubers, seizures, and intellectual disability	<i>TSC1</i> and <i>TSC2</i>	20–40	1	MRI, ophthalmology, cardiac and renal evaluation
Neurofibromatosis	2 criteria of the following: 6 café au lait spots, ≥2 neurofibromas or 1 plexiform, axillary or inguinal freckling, optic glioma, ≥2 Lisch nodules, sphenoid dysplasia or tibial pseudoarthrosis, first-degree relative with neurofibroma type 1	<i>NF1</i>	40–50 in some studies	0.3	Ophthalmology consultation, MRI, spinal examination for scoliosis, cardiac for murmurs, and blood pressure for hypertension
Angelman syndrome	Language and Intellectual deficits, seizures, hypermotoric and ataxic movements, paroxysms of laughter, and happy disposition	<i>UBE3A</i>	50	Rare	FISH or microarray testing for 15q11.2–q13, EEG, MRI
Fragile X syndrome	Inconsistent physical examination findings, microcephaly and macrocephaly, large jaw, large hands, macro-orchidism	<i>FMR1</i>	25 (males) and 6 (females)	1–2	Fragile X testing looking for CGG repeats >200
Rett syndrome	Regression in development, hand-wringing behavior, female, microcephaly	<i>MECP2</i>	All females, but with DSMV will be considered separate disorder	Rare	EEG, <i>MECP2</i> gene testing

EEG=electroencephalography; FISH=fluorescent in situ hybridization; MRI=magnetic resonance imaging.

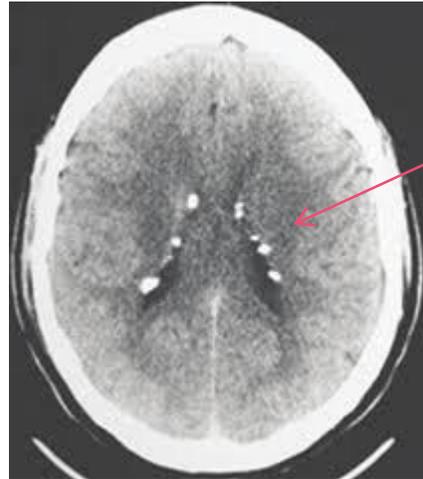
^aOther disorders associated with autism are as follows: 15 q duplication, 16p11 deletion, 22q deletion, cortical dysplasia-focal epilepsy syndrome, Joubert syndrome, Potocki-Lupski syndrome, *PTEN* hamartoma tumor syndrome, Smith-Lemli-Opitz syndrome, trisomy 21, and Timothy syndrome. (5)



Fragile X



PKU



Tuberous sclerosis



Down syndrome



Neurofibromatosis 1



Angelman syndrome



Co-occurring Diagnoses

Intellectual disability :in 50% of cases

Medical problems:sleep disorders, constipation, and irritability

Anxiety and phobia

ADHD

disruptive behaviors

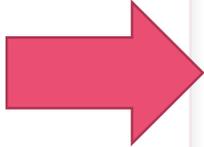
Obsessive compulsive disorder

Depression

Bipolar disorders

- 
- 
- The general and neurological examination for Salma are normal
 - What investigations will you order ?

**Investigation
for possible
underlying
aetiology**



Hearing test : auditory evoked potentials

High resolution microarray : to rule out chromosomal abnormality

FMR1 gene :to rule out fragile x

Consider metabolic work up especially if not done in neonatal period as neonatal screen

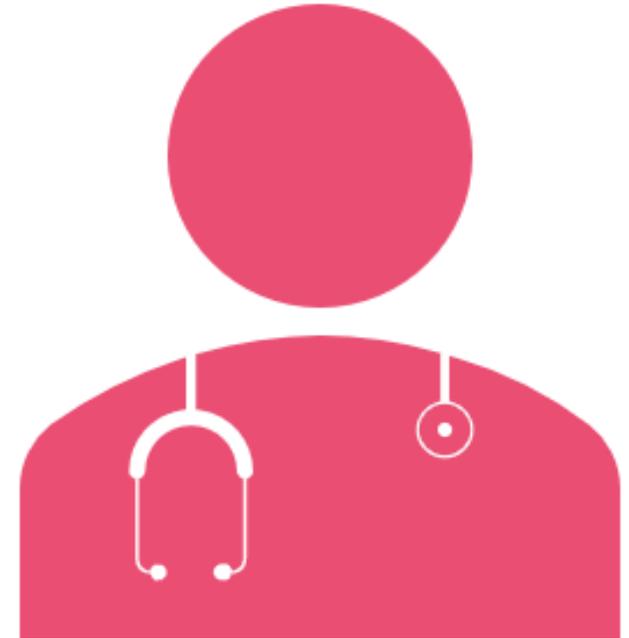
Consider whole exome sequencing or whole genome sequencing

- 
- MRI brain : not routinely indicated
 - EEG : not routinely indicated , only if seizures

No supporting evidence

- hair analysis
- celiac antibodies
- allergy testing (particularly food allergies for gluten, casein, *Candida*, and other molds)
- immunologic or neurochemical abnormalities
- micronutrients such as vitamin levels
- intestinal permeability studies
- stool analysis
- urinary peptides
- mitochondrial disorders (including lactate and pyruvate),
- thyroid function tests
- erythrocyte glutathione peroxidase studies.

What is your treatment plan for Salma ?



Treatment

There's no cure for autism, and there's no "one-size-fits-all" treatment

Behavioral and communication therapies : ABA

Drug therapies : for associated conditions

Complementary and alternative therapies: needs to be discussed with parents

Needs prolonged and skilled effort

- 
- The mother is asking you about complementary therapy what are you going to answer her ?

Complementary and alternative therapies

- Lack of evidence
- Some cause harm
- Discuss with parents : dietary changes (gluten free), vitamins, chelation, hyperbaric oxygen , etc ..

- 
- The mother is worried about vaccination

What are you going to answer her ?



No evidence of correlation
between autism and vaccine



Salma needs to take all her
vaccines

- 
- Salama's mother is asking you about the severity of salma's conditions
 - What are you going to answer her ?

Table 1. **Severity Levels for Autism Spectrum Disorder**

Severity Level	Social Communication	Restricted, repetitive behaviors
Level 3: Requiring very substantial support	Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning, very limited initiation of social interactions, and minimal response to social overtures from others. For example, a person with few words of intelligible speech who rarely initiates interaction and, when he or she does, makes unusual approaches to meet needs only and responds to only very direct social approaches.	Inflexibility of behavior, extreme difficulty coping with change, or other restricted/repetitive behaviors markedly interfere with functioning in all spheres. Great distress/difficulty changing focus or action.
Level 2: Requiring substantial support	Marked deficits in verbal and nonverbal social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions; and reduced or abnormal responses to social overtures from others. For example, a person who speaks simple sentences, whose interaction is limited to narrow special interests, and who has markedly odd nonverbal communication.	Inflexibility of behavior, difficulty coping with change, or other restricted/repetitive behaviors appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Distress and/or difficulty changing focus or action.
Level 1: Requiring support	Without supports in place, deficits in social communication cause noticeable impairments. Difficulty initiating social interactions, and clear examples of atypical or unsuccessful responses to social overtures of others. May appear to have decreased interest in social interactions. For example, a person who is able to speak in full sentences and engages in communication but whose to-and-fro conversation with others fails, and whose attempts to make friends are odd and typically unsuccessful.	Inflexibility of behavior causes significant interference with functioning in one or more contexts. Difficulty switching between activities. Problems of organization and planning hamper independence.

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- 
- The mother is asking you about the prognosis of Salma's condition
 - What will you answer her ?

Evolution+ prognosis

- Continue to develop albeit at a slower rate than expected and do not deteriorate
- Intelligence quotient of the individual is highly correlated with the prognosis

- 
- ***Low-functioning*** patients : never live independently(need home or residential care for the rest of their lives)
 - ***High-functioning*** patients : live independently, hold jobs successfully, and even marry and have children.
 - High-functioning individuals with autistic disorder are similar to people with Asperger syndrome

Factors that have been associated with positive outcomes

- Presence of joint attention
- Functional play skills
- Higher cognitive abilities
- Decreased severity of autism symptoms
- Early identification
- Involvement in intervention
- A move toward inclusion with typical peers



Factors associated with less favorable outcomes

- Lack of joint attention by four years of age
- Lack of functional speech by five years of age
- IQ <70
- Seizures or other comorbid medical or neurodevelopmental conditions
- Severe autism symptoms

- 
- The mother asks you about the recurrence risk in future pregnancy
 - What are you going to answer her ?

- 
- Risk of recurrence depends on underlying aetiology (if identified)
 - Identification rate of an underlying aetiology is 5-20 %
 - In general (if no aetiology could be identified) :the risk of recurrence is up to 25 %

End of case 3

