Smith-Magenis Syndrome

Debbie Brooks, B.Mus., B.Ed. and SMS Parent
What is Smith-Magenis Syndrome (SMS)?

Smith-Magenis Syndrome (SMS) is a neurobehavioral disorder caused by a deletion or mutation of the \textit{RAI1} gene found in the chromosomal region 17p11.2
What is the incidence of SMS?

SMS is a rare disorder that occurs in about 1/15,000 to 1/25,000 births.

Although the number of individuals diagnosed with SMS has increased in recent years due to better diagnostic tools, the syndrome likely remains underdiagnosed.

SMS does not typically run in families.
Diagnosis

If a doctor recognizes the possibility of Smith-Magenis syndrome in an individual, the diagnosis is usually made using a genetic test called a chromosomal microarray analysis (CMA), or more commonly, a microarray.

A microarray can detect extra or missing pieces of genetic material.

When SMS is specifically suspected, targeted genetic tests, such as FISH (fluorescence in situ hybridization) or RAI1 mutation analysis can be ordered instead of a microarray.
Common Features

A specific pattern of physical, developmental, and behavioral characteristics has been found in individuals with SMS. These features include:

- Developmental delay/intellectual disability
- Hypotonia
- Poor gross motor and fine motor skills
- Feeding problems in infancy
- Speech delay
- Short fingers and toes
- Broad-based gait
- Characteristic facial appearance
- Hearing impairment
- Scoliosis
- Decreased sensitivity to pain
- Constipation
- Sleep disturbance
- Self-injurious behaviors
- Arm hugging/hand squeezing
- Endearing and engaging personalities
- Excellent long-term memory
- Eagerness to please
14 years later…

These are the concerns that eventually lead to my daughter’s diagnosis:

- She was always hungry! (Obesity common with RAI1 deletion)
- Self Injurious behaviour (Never leave the house without bandages!)
- Aggression
- High tolerance for pain – She kept picking at her nails and often pulled them off. (Onychotillomania)
- Sleep Problems: Although she could easily fall asleep, she could not STAY asleep (Despite strict adherence to sleep hygiene protocols and work with a sleep specialist at Sick Kids Hospital)
# Genetic Syndromes & Problem Behavior

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Self-Injury</th>
<th>Aggression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual Disability</td>
<td>27%</td>
<td>46%</td>
</tr>
<tr>
<td>Smith Magenis</td>
<td>93%</td>
<td>74%</td>
</tr>
<tr>
<td>Angelman</td>
<td>45%</td>
<td>73%</td>
</tr>
<tr>
<td>Cri du Chat</td>
<td>77%</td>
<td>70%</td>
</tr>
<tr>
<td>Cornelia de Lange</td>
<td>70%</td>
<td>40%</td>
</tr>
<tr>
<td>Fragile X</td>
<td>51%</td>
<td>52%</td>
</tr>
<tr>
<td>Prader-Willi</td>
<td>52%</td>
<td>43%</td>
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<tr>
<td>Lowe</td>
<td>64%</td>
<td>65%</td>
</tr>
<tr>
<td>Autism Spectrum Disorder</td>
<td>50%</td>
<td>68%</td>
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</tbody>
</table>

(Arron, Oliver, Berg, Moss, & Burbidge, 2011; Baghdadli, Pascal, Grisi, & Aussilloux, 2003; Kanne & Mazeurek, 2011)
Types of Self-Injury in SMS

- Hits self with objects (e.g., hitting head with a toy)
- Bites self (e.g., hand biting)
- Pulls self (e.g., pulling hair or nails)
- Picking at nails (onychotillomania)
- Insertion of objects into orifices (polyembolokoilamania)
- Hits self with body (e.g., face slapping)
- Hits self against objects (e.g., head banging)

(Arron, Oliver, Berg, Moss, & Burbidge, 2011; Finucane & Haas-Givler, 2009)
SMS and Problem Behavior

Communication Deficits → Problem Behavior as a Mode of “Communication”

Sleep Issues or Discomfort → Lower Tolerance for Stress and Increased Problem Behavior

Repetitive Behavior → Intensifies to Self-Injurious Behavior

Attention Seeking → Aggression to Get a Reaction from Caregivers

(Dykens & Smith, 1998; Finucane & Haas-Givler, 2009)
SMS and Medication

Some of the challenges that may be addressed with medication include:

- Aggressive Behaviors, (self-injury and/or aggression towards others)
- Attention Deficit Disorder
- Depression
- Social anxieties
- Sleep issues
- Seizures
- Constipation
- Gastric reflux
SMS and Medication

Concerns about medication

There has been very little research with SMS patients regarding the effectiveness of psychotropic medications and NO published clinical trials.

SMS individuals often require several different medications to treat a wide array of psychiatric symptoms. Use of multiple medications increases the need for an understanding of the usefulness and side effects of drug-drug interactions and which drugs may amplify or reduce the effects of other drugs.
SMS Around the World

United States of America
• PRISMS
• Smith-Magenis Syndrome Research Foundation
• Taylor Bug Kisses

United Kingdom
• Smith-Magneis Syndrome Foundation UK

Germany
• Sirius

Austria
• Smith-Magenis-Syndrom Österreich

Mexico
• Smith-Magenis Mexico

Italy
• Associazione Smith Magenis ASM17 Italia
• Smith-Magenis Syndrome Italia
• Smith Magenis Italia

France
• ASME: Asociación Española del Síndrome de Smith-Mageniss
• Pas a Pas Avec Alexia SMS French Foundation

Denmark
• Smith-Magenis syndrom forening

Australia
• SMS Australia

Netherlands
• Smith Magenis Syndroom

Puerto Rico
• Smith-Magenis Puerto Rico

Sweden
• Föreningen Smith-Magenis Syndrom

Canada?
Compulsivity (e.g., Paterson et al. 2013)

Neural Development (e.g., Buchmann et al. 2011)

Emotional Regulation (e.g., Gregory and Sadeh 2012; Baum 2014)

Brain Sensitivity (e.g., Lautenbacer et al. 2006)

Memory consolidation (e.g., Kopasz et al. 2010)

Impulsivity (e.g., Owens et al. 2016)

Attention (e.g., Curcio et al. 2006; Lo et al. 2016)

Health Outcomes (e.g., Kong et al. 2011; Fernandez-Mendoza 2016)
Impact on our Family

- Everyone is tired and grumpy
- Elizabeth is often unable to sufficiently regulate her emotions to attend school (This means there always has to be someone available to pick her when this happens.)
- In public, meltdowns has attracted attention from police officers and concerned citizens
- Financial impact
- Impulse control – Loves to give herself haircuts (affects appearance)
- The skin picking and bleeding causes unwanted public attention by people who are concerned that she is being abused.
- Financial impact
- Many medical appointments (Dental problems, diabetes,
- She has fallen asleep EVERYWHERE!! When this happens, we need to stop.
References and Special Thanks

• Dr. Mindy Scheithauer, Emory University School of Medicine and Marcus Autism Center

• Dr. Christopher-James Harvey, University of Oxford, Nuffield Department of Clinical Neurosciences

• PRISMS (Parents and Researchers Interested in Smith-Magenis Syndrome)

• Smith-Magenis Syndrome Foundation UK

• Salli Hunt, SMS Mom and Creator of the “Diagnosed with SMS Map”
For More Information

To learn more about Smith-Magenis syndrome:

Visit [www.prisms.org](http://www.prisms.org) or [www.smith-magenis.org](http://www.smith-magenis.org)