The background features abstract, overlapping geometric shapes in various shades of blue, ranging from light sky blue to deep navy blue. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The central text is positioned on a white background that is partially framed by these blue shapes.

Bad Science: The Measles, Mumps, and Rubella Vaccine Causes Autism

Presented by Jaclyn Wrona

Current Misconception

- ▶ Opinion Differences Survey from Pew Research Center 2014
- ▶ “Childhood vaccines such as MMR should be required.”
 - ▶ 68% U.S. adults ages 15-25 agree
 - ▶ 86% American Association for the Advancement of Science (AAAS) Scientists agree
- ▶ The MMR vaccines causes autism.



http://www.iflscience.com/sites/www.iflscience.com/files/styles/ifls_large/public/blog/%5Bnid%5D/Vaccine.jpg?itok=DKUgbdck

Funk, C.; Rainie, L. Public and Scientists' Views on Science and Society. Pew Research Center 2015.

MMR Connection to Autism

- ▶ Wakefield et. all 1998
- ▶ Researched children with enterocolitis and regressive developmental disorder

MMR Connection to Autism

- ▶ Wakefield et. All 1998
- ▶ Researched children with enterocolitis and regressive developmental disorder
 - ▶ Enterocolitis - The inflammation of the colon and small intestine
 - ▶ Regressive developmental disorder - Previous normal development but then over time leading to loss in acquired skills

AnonymousEnterocolitis. <http://www.merriam-webster.com/dictionary/enterocolitis> (accessed 03/19, 2016).

Wakefield, A.; Murch, S.; Anthony, A.; Linnell, J.; Casson, D.; Malik, M.; Berelowitz, M.; Dhillon, A.; Thomson, M.; Harvey, P.; Valentine, A.; Davies, S.; Walker-Smith, J. Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children. The Lancet 1998, 351, 637.

MMR Connection to Autism

- ▶ Wakefield et. All 1998
- ▶ Researched children with enterocolitis and regressive developmental disorder
- ▶ Studied 12 children
 - ▶ 1 Female, 11 Male
 - ▶ Ages 3-10
- ▶ “Parents associated behavioral symptoms with MMR vaccination”
- ▶ Reported: “Casual link between MMR vaccine and this syndrome”

MMR Connection to Autism: No Substantial Data

- ▶ The Lancet Editorial Retracted Statement 2002
- ▶ Measles Virus Genome Study
 - ▶ Children with developmental disorder: 82.4%
 - ▶ Children with no developmental disorder: 10.0%
- ▶ But there is no vaccine-specific strain data presented
- ▶ Retracted in 2004

Early report

Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dhillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith

Summary

Background We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

Methods 12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible. Biochemical, haematological, and immunological profiles were examined.

Findings Onset of behavioural symptoms was associated with the parents, with measles, mumps, and rubella vaccination in eight of the 12 children, with measles infection in one child, and otitis media in another. All 12 children had intestinal abnormalities ranging from lymphoid nodular hyperplasia to atrophic ulceration. Histology showed patchy chronic inflammation in 11 children and reactive ileal lymphoid hyperplasia in seven, but no granulomas. Behavioural disorders included autism (nine), disintegrative psychosis (one), and possible postviral or vaccinal encephalitis (two). There were no focal neurological abnormalities and MRI and EEG tests were normal. Abnormal laboratory results were significantly raised urinary methylmalonic acid compared with age-matched controls ($p=0.03$), low haemoglobin in four children, and low serum IgA in four children.

Interpretation We identified associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time with possible environmental triggers.

Lancet 1998; **351**: 637–41
See Commentary page

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Introduction

We saw several children who, after a period of apparent normality, lost acquired skills, including communication. They all had gastrointestinal symptoms, including abdominal pain, diarrhoea, and bloating and, in some cases, food intolerance. We describe the clinical findings and gastrointestinal features of these children.

Patients and methods

12 children, consecutively referred to the department of paediatric gastroenterology with a history of a pervasive developmental disorder with loss of acquired skills and intestinal symptoms (abdominal pain, abdominal pain, bloating and food intolerance), were investigated. All children were admitted to the ward for a week, accompanied by their parents.

Clinical investigations

We took history, including details of immunisations and exposure to infectious diseases, and assessed the children. In 11 cases the history was obtained by the senior clinician (JW-S). Neurological and psychiatric assessments were done by consultant staff (PH, MB) with HMS-4 criteria.¹ Developmental assessment included a review of prospective developmental records from parents, health visitors, and general practitioners. Four children did not undergo psychiatric assessment in hospital; all had been assessed professionally elsewhere, so these assessments were used as the basis for their behavioural diagnosis.

After bowel preparation, ileocolonoscopy was performed by SHM or MAT under sedation with midazolam and pethidine. Paired frozen and formalin-fixed mucosal biopsy samples were taken from the terminal ileum; ascending, transverse, descending, and sigmoid colons, and from the rectum. The procedure was recorded by video or still images, and were compared with images of the previous seven consecutive paediatric colonoscopies (four normal colonoscopies and three on children with ulcerative colitis), in which the physician reported normal appearances in the terminal ileum. Barium follow-through radiography was possible in some cases.

Also under sedation, cerebral magnetic-resonance imaging (MRI), electroencephalography (EEG) including visual, brain stem auditory, and sensory evoked potentials (where compliance made these possible), and lumbar puncture were done.

Laboratory investigations

Thyroid function, serum long-chain fatty acids, and cerebrospinal-fluid lactate were measured to exclude known causes of childhood neurodegenerative disease. Urinary methylmalonic acid was measured in random urine samples from eight of the 12 children and 14 age-matched and sex-matched normal controls, by a modification of a technique described previously.² Chromatograms were scanned digitally on computer, to analyse the methylmalonic-acid zones from cases and controls. Urinary methylmalonic-acid concentrations in patients and controls were compared by a two-sample *t* test. Urinary creatinine was estimated by routine spectrophotometric assay.

Children were screened for antiendomyxal antibodies and boys were screened for fragile-X if this had not been done

AnonymousTime to look beyond MMR in autism research. *The Lancet* **2002**, 359, 637.

Wakefield, A.; Murch, S.; Anthony, A.; Linnell, J.; Casson, D.; Malik, M.; Berelowitz, M.; Dhillon, A.; Thomson, M.; Harvey, P.; Valentine, A.; Davies, S.; Walker-Smith, J. Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children. *The Lancet* 1998, 351, 637.

Follow Up MMR and Autism Study

- ▶ Goin-Kochel et. al 2016
- ▶ If vaccines led to autism in children, then the vaccine receipt should be higher in children with regressive-onset autism compared with other patterns.

Follow Up MMR and Autism Study

- ▶ Goin-Kochel et. al 2015
- ▶ If vaccines led to autism in children, then the vaccine strain should be higher in children with regressive-onset autism compared with other patterns.
- ▶ 2755 children studied
- ▶ Varied
 - ▶ Early onset autism
 - ▶ Gender
 - ▶ Ethnicity
 - ▶ Age
 - ▶ Vaccines Received
 - ▶ Polio, Chicken Pox, Hib (influenza), MMR, and Hepatitis B

Follow Up MMR and Autism Study

▶ Results

- ▶ Validated Autism Diagnostic Interview Conducted
- ▶ No vaccine associated onset autism

▶ Limitations

- ▶ Parental documentation of vaccines
- ▶ Varied dose of vaccine received due to age difference

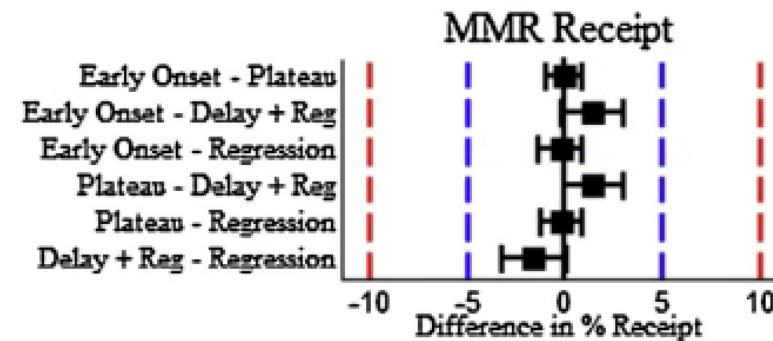


Figure 1: Reported mean differences between difference autism onset groups.

Why are vaccines still feared?

- ▶ Media coverage lead to distrust
 - ▶ Less than 1/3 media coverage reported no link with MMR and autism
- ▶ Parents are concerned
 - ▶ Undocumented Adverse Drug Reactions (ADR)



<http://vaccineresistancemovement.org/wp-content/uploads/2010/05/Universal-Flu-Vaccine1.jpg>

Goldacre, B. The Wakefield MMR verdict. <http://www.badscience.net/2010/01/the-wakefield-mmr-verdict/> (accessed 03/18/2016).

Casiday, R.; Cox, A. Restoring Confidence in Vaccines by Explaining Vaccine Safety Monitoring. *Drug Safety* **2006**, 29, 1105.

Undocumented Adverse Drug Reactions

- ▶ Doctors not reporting adverse effects
 - ▶ Study conducted by Dr. Casiday from 2002 to 2004
 - ▶ 12.6% care takers reported doctors did not take their claims seriously.
- ▶ Parents are unaware on how adverse drug reactions (ADR) are tested.



Patient Reporting

- ▶ Discover safety signal earlier than professional reporting
- ▶ Study in Netherlands reported ADRs 7 months earlier than professionals
- ▶ Patients provide qualitatively different results
- ▶ National Health Service Direct performed study in 2003
 - ▶ Limited number of reports filed
 - ▶ Professional involvement limited qualitative responses
 - ▶ Parents still receiving lack of concern from professionals



Conclusion

- ▶ Misconception that the MMR vaccine causes autism is still prevalent
- ▶ Patient Reporting
 - ▶ Increased communication about ADR might frighten community further
 - ▶ Patient reporting can be bias from media
- ▶ Rebuild vaccine trust with community.

