AUTISM SPECTRUM DISORDERS AND STEM CELL THERAPIES: A PROMISING NEW DIRECTION

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ASD = Autism *Spectrum* Disorder
Review

Immunological and autoimmune considerations of Autism Spectrum Disorders

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IF 7.641

Quoted in >100 papers
Witebsky-Rose Criteria for Auto-Immune Disease

A. DIRECT PROOF

Non-pathogenic maternal antibodies may produce disease in infant

1. Presence of Non-pathogenic IgG antibodies
   • NO clinical effect in adults
   • Autoimmune disease ± family history of ASD
     (=“Circumstantial Evidence”)

2. During Pregnancy – maternal IgG antibodies
   • Effect on Fetal Brain Development

3. Postnatally:
   • Child presents clinically with features of ASD
   • Maternal antibodies in child with ASD

4. Maternal antibodies injected to pregnant mouse
   Braunschweig et al. Maternal autism-associated IgG antibodies delay development and produce anxiety in a mouse gestational transfer model.
Immunology in the Pathogenesis of Autism

Intra-uterine and/or Trans-placental Exposure to Maternal Antibody

Hypothesis: Autism has Auto-Immune Aspects
Laboratory Diagnosis early in life (→ Treatment)

AAA = Auto-Immunity Associated Autism

✓ Routine blood sample collection for lab analysis
Cell El’s Preliminary Findings

ASD (>100)  TD (>50)

+1,000 Biomarkers in Serum
>20 Immunological Markers
→ Early Laboratory Diagnosis → Monitoring
Clinical Research of bone marrow-derived MSCs: Neurogenesis, Regenerative Medicine

**Neurodegenerative Diseases:**
- Parkinson’s Disease
- Alzheimer’s disease
- ALS
- Huntington’s Disease
- Spinal cord injury
- Stroke (CVA)
- HIE

**Autism?**

**Multiple Sclerosis**

**Demyelinating Diseases of the CNS and PNS**

**Insulin-producing cells**

**Diabetes**

**Chondrocytes & Osteoblasts**

**Cartilage & Bone Repair**

**Blood vessels and tissue-specific cells**

**MSC**

**Neurons**

**Oligodendrocytes**
Therapeutic properties of mesenchymal stem cells for autism spectrum disorders

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Chronic autoimmune reactivity
Neurogenesis↓ (neuro-developmental disorder)

Autism

Pathogenesis of ASD (?)
- Auto-immune process
- Neurogenesis↓

MSC

Biological Properties of MSC
- Immune modulation
- Neurogenesis↑

MSCs suppress immune dysfunction while promoting neurogenesis → MSCs may be appropriate therapy for ASD in young children.

Synergistic Effect (1 + 1 ≥ 2)

1. Evaluation
- Clinical, Psychological
- Laboratory (serum, stool, urine)

<1 month Pre-treatment

2. Bone Marrow Aspiration
(3-5 mL/kg body weight) → separated in Operating Room

3. Administration
IV + IT

Mild sedation, < 1 hour, ambulatory

4. Evaluation
- Clinical, Psychological
- Laboratory
- serum, stool, urine)

1 + 3 + 6 months post-treatment

Treatment with Bone Marrow-Derived Stem Cells (BM-SC)
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## 1. Evaluation
- Clinical (ADOS...)
- Laboratory
- (serum, stool & urine)

**<1 month pre-treatment**

## 2. Bone Marrow Aspiration
(3-5 ml/kg body weight) → separated in Operating Room

## 3. Administration
IV + IT

Mild sedation, < 1 hour, ambulatory

## 4. Evaluation
- Clinical (ADOS...)
- Laboratory
- (serum, stool & urine)

**1 + 3 + 6 months post-treatment**

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## Cell El’s Preliminary Clinical Experience

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Serum, Urine, stool...
SUMMARY & CONCLUSIONS

• ASD = Autism *Spectrum* Disorder → D × T
  (no biological diagnosis)

• Diagnostic Immune Markers

• Therapeutic Effects from autologous Stem Cells