Food hypersensitivity and dietary intervention in diagnosis and therapy during the treatment of infertility and coexisting diseases

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Presentation outline:

• A multifactorial approach to the chronic problem of infertility
• Role of diet and nutrients
• Food hypersensitivity and IgG-dependent immune reactions
• Clinical evaluation of elimination diet in chronic diseases
• Distribution of food-specific IgG in women with subfertility: aims, methodology, our results, conclusions
• Proposal of **Individual Dietetic Program** in the diagnostics and therapeutic management of patients with subfertility and coexisting disease
• Research in course of realization
# Health conditions:

<table>
<thead>
<tr>
<th>Acute</th>
<th>Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendicitis</td>
<td>Asthma</td>
</tr>
<tr>
<td>Respiratory viral infection</td>
<td>Diabetes</td>
</tr>
<tr>
<td>Fractured bone</td>
<td>Degenerative arthritis</td>
</tr>
</tbody>
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From: Dr. P. Boyle & Prof. J. Stanford, 2011
Infertility (subfertility) is a chronic health condition

From: Dr. P. Boyle & Prof. J. Stanford, 2011
A multifactorial approach to the chronic problem of infertility:

- Low Hormones
- Low Endorphins
- Surgical
- Male Factor
- Adrenal Fatigue
- Immunological
- Others
- To be discovered

From: Dr. P. Boyle & Prof. J. Stanford, 2011
A multifactorial approach to the chronic problem of infertility:

- Low Hormones
- Low Endorphins
- Limited Mucus
- Infection
- Male Factor
- Adrenal Fatigue
- Immunological
- Diet & Nutrition
- Surgical
- Fatigue
- Latent Hyperprolactinemia

From: Dr. P. Boyle & Prof. J. Stanford, 2011
**Role of diet and nutrients:**

<table>
<thead>
<tr>
<th>Increased consumption</th>
<th>Reduced consumption</th>
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<tbody>
<tr>
<td>vegetable proteins</td>
<td>animal proteins</td>
</tr>
<tr>
<td>fat dairy products</td>
<td>skim dairy products</td>
</tr>
<tr>
<td>monounsaturated fatty acids</td>
<td>unsaturated fatty acids with trans-configuration</td>
</tr>
<tr>
<td>nonheme iron from diet and supplements</td>
<td>caffeine beverages</td>
</tr>
<tr>
<td>multivitamin preparations</td>
<td>alcohol beverages</td>
</tr>
</tbody>
</table>

**Fertility diet** - nutritional standards supporting female fertility?

Chavarro & et al. *Diet and lifestyle in the prevention of ovulatory disoder infertility*, 2007 (NURSES’ HEALTH STUDY II, n=18,555); Chavarro & et al., 2006; Chavarro & et al., 2007; Chavarro & et al., 2008; Gaskons & et al., 2009 (BioCycle Study)
Food hypersensitivity and IgG-dependent immune reactions:

• No significant correlation between food hypersensitivity and subfertility

• **IgG-dependent allergy affects about 45% of USA and Europe population**, and is twice as common in women than in men

• **Immunotoxins**: immune complexes formed with IgG antibodies and fragments of dietary proteins cause systemic or local chronic inflammation at low intensity

• No specific symptoms, possible changes in the clinical picture in the course of the disease and localization of the lesions

• **Delayed reactions**: might occur 8-72 hours after the food consumption

Audit of York Nutritional Laboratory survey (n=1761), conducted by the Department of Health Studies, University of York, on behalf of the British Allergy Foundation. 2001, January
### IgG-dependent food hypersensitivity and chronic/autoimmune diseases:

**Food-specific IgG & immune reactions**
- Complement & anafilatoksyn generation (C3a, C5a)
- Immune cells & release of proinflammatory cytokines (IL-1, IL-6, TNF-a), proteases, ROS-mediated reactions
- Basophils and platelets & release of amines vasomotor

**Chronic /autoimmune diseases**
- Functional bowel disorders (e.g. Irritable bowel syndrome)
- Inflammatory bowel disease (e.g. Crohn’s Disease, Ulcerative colitis)
- Joint diseases (e.g. Rheumatoid arthritis)
- Respiratory disorders (e.g. Asthma, Chronic sinusitis)
- Dermatological disorders (e.g. Atopic dermatitis)
- Chronic medical conditions (e.g. Obesity, Atherosclerosis, Migraine headaches, Diabetes)

Sampson & McCaskill, 1985; Pelikan, 1988; Crowe & Perdue, 1992; Hzebons & et al., 1996; Aktinson & et al., 2004; Ress & et al., 2005; Harman & Hart, 2007; Zuo & et al., 2007; Wilders & et al., 2008; Bentz & et al., 2010; Aply & et al., 2010;
## Clinical evaluation of elimination diet in chronic diseases:

<table>
<thead>
<tr>
<th>Disease(s)</th>
<th>Conclusion</th>
<th>Author(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritable bowel syndrome (IBS)</td>
<td>“Food elimination based on IgG antibodies may be effective in reducing IBS symptoms (...).”</td>
<td>Atkinson &amp; et al., 2004*</td>
</tr>
<tr>
<td>(n=150)</td>
<td></td>
<td></td>
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<tr>
<td>Crohn’s Disease</td>
<td>“A nutritional intervention based on circulating IgG antibodies against food antigens showed effects with respect to stool frequency (...).”</td>
<td>Benz &amp; et al., 2010*</td>
</tr>
<tr>
<td>(n=40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migraine</td>
<td>“(...) diet restriction based on IgG antibodies is an effective strategy in reducing the frequency of migraine attacks.”</td>
<td>Aply &amp; et al., 2010*</td>
</tr>
<tr>
<td>(n=30)</td>
<td></td>
<td></td>
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<tr>
<td>Chronic medical conditions</td>
<td>“(...) use of elimination diet based on food-specific IgG blood test results as an aid to management of the symptoms of range of chronic medical conditions.”</td>
<td>Hardman &amp; Hart, 2007</td>
</tr>
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<td>(n=5,286)</td>
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*Randomized, double-blind, placebo-controlled study
Distribution of food-specific IgG in women with subfertility – aims:

- Identification and analysis of frequency of food-specific IgG antibodies in the serum of women with the diagnosed subfertility

- Comparison of the results of IgG distribution obtained using 2 types of commercially available diagnostics tests:
  - **classic enzyme linked immunosorbant assay** (ImuPro 50 test; Evomed/ R-Biopharm AG, Darmstadt, Germany)
  - **new assay system based on microarray technology** (Foodprint® 40 test; Cambridge Nutritional Sciences Ltd/ Genesis Diagnostics Ltd, UK)
Distribution of food-specific IgG\textsubscript{1-4} in women with subfertility – methodology:

All patients diagnosed with female subfertility who had taken commercially available diagnostics tests for serum food-specific IgG (isotypes 1-4) \( n=360 \)

- All patients who had taken ImuPro test \( n_1=168 \)
- All patients who had taken Foodprint\textsuperscript{®} test \( n_2=192 \)

- Patients who had taken ImuPro test \( n_1=100 \), age: 22-47 years, 34.6 (4.2)
- Patients who had taken Foodprint\textsuperscript{®} test \( n_2=100 \), age: 20-48 years, 33.9 (5.8)

Analysis of frequency of specific IgG (>7.5 µg/ml) against all 50 different food antigens

Identification and analysis of the most common food allergens

Comparison of the results of IgG distribution obtained using 2 types of diagnostics tests
Distribution of food-specific IgG\textsubscript{1-4} in women with subfertility – our results (1):

<table>
<thead>
<tr>
<th>Most common food allergens identified by tests for specific IgG*</th>
<th>ImuPro test</th>
<th>Foodprint\textsuperscript{®} test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk and dairy: cow and/or sheep</td>
<td>83 %</td>
<td>90%</td>
</tr>
<tr>
<td>Hen’s egg: protein and/or egg yolk</td>
<td>78 %</td>
<td>77%</td>
</tr>
<tr>
<td>Grain gluten: wheat and/or rye an/or barley and/or oats</td>
<td>95 %</td>
<td>89%</td>
</tr>
<tr>
<td>Yeast: baker's and/or brewing</td>
<td>80%</td>
<td>84%</td>
</tr>
<tr>
<td>Nuts: almond and/or peanut and/or cashew nut and/or pistachios and/or hazelnut and/or a walnut and/or Brazilian walnut</td>
<td>46 %</td>
<td>52%</td>
</tr>
</tbody>
</table>

*Multifactorial cause the formation of IgG-dependent food allergy, e.g. maturity of the gastrointestinal mucosa, gastrointestinal infections, digestive enzyme activity, acidity of gastric juice, mucosal barrier function to food allergens.
Distribution of food-specific IgG<sub>1-4</sub> in women with subfertility – our results (2):
Distribution of food-specific IgG\textsubscript{1-4} in women with subfertility – conclusions:

- In patients with a diagnosis of female subfertility and coexisting chronic diseases are elevated levels of food-specific IgG\textsubscript{1-4}.

- The most common “female subfertility” food allergens identified by the diagnostic tests for serum specific IgG\textsubscript{1-4} antibodies are: milk and dairy products, eggs, wheat gluten and yeast.

- New assay system based on microarray technology & Footprint\textsuperscript{®} tests constitute innovative diagnostic tool of IgG-dependent food hypersensitivity.
Proposal of *Individual Dietetic Program* in the diagnostics and therapeutic management of patients with subfertility and coexisting diseases
**Individual Dietetic Program** consists of (1):

- Quantitative and qualitative analysis of individual nutrition habits (on the basis of 3-days’ dietary monitoring)

- Optimization of nutritional program (balancing the previous nutritional habits in regard to macroelements’ proportions, compensation for vitamin and mineral deficiencies, providing the appropriate energy value of diet)

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### Individual analysis (selected nutrients) of the patient's daily average consumption

- Folate: 55%
- Vitamin D: 40%
- Calcium: 90%
- Magnesium: 60%
- Total carbohydrates: 107%
- Total fats: 30%
- Total protein: 183%

Percentage of daily dietary intake (in relation to normal)
**Individual Dietetic Program** consists of (2):

• **Recommendations for the preconception nutrition** (e.g. consumption of products rich in iron and folic acid, reducing the products with high doses of A vitamin, avoiding the contaminated products)

• **Recommendations for the anti-inflammatory diet** (e.g. consumption of the products decreasing the inflammatory reaction and increasing the natural antioxidant potential of the organism)

• **Recommendations for the elimination and/or rotation diet** (e.g. on the basis of the tests for: sIgG<sub>1-4</sub>, anti-tTG IgA, tIgE and/or sIgE,)
Individual Dietetic Program consists of (3):

• Recommendations for the nutrition in the coexisting diseases (on the basis of current scientific data, meta-analysis)

• Consideration of the possible interactions between nutrition and medicines taken by the patients

• Supplementation (in regard to accompanying diseases, and/or elimination diet)

• Recommendations for the healthy lifestyle (sport activity, appropriate sleeping time, sun exposition, avoiding the stress, prayer time)
The expected benefits of dietary intervention with *Individual Dietetic Program*

- Mute the allergic response and inflammation in the digestive system
- Improved gastrointestinal function and nutrient absorption
- Minimize the likelihood of pseudoallergic reactions
- Reduction and prevention of mucosal barrier dysfunction to food allergens
- Recovery of immune tolerance to the actually harmful food
Research in course of realisation:

1. Quantitative and qualitative analysis of the nutrition of the patients’ group with the subfertility and coexisting diseases:
   - autoimmune thyroiditis (Hashimoto’s disease)
   - polycystic ovary syndrome (PCOS)
   - endometriosis

2. Clinical evaluation of elimination diet based of the results of IgG-dependent food hypersensitivity test (in the group of patients with the subfertility and diagnosed coexisting autoimmune disease(s): autoimmune thyroiditis and/or endometriosis)
Research in course of realisation:

3. Analysis of the serum D₃ vitamin level (25-OH-D₃) (in the group of the women with subfertility)

4. Establishment of the *Dietary Standards* in the diagnostics and therapy of female subfertility and coexisting diseases

5. Development of *Educational Standards* regarding the dietary habits and life style in the preconception period of women with subfertility
“Maternity & Life” Diet

“NaPro Diet” Program ??
THE FOUNDATION OF JOHN PAUL II INSTITUTE FOR MARITAL INFERTILITY TREATMENT