EDITORIAL

Psychobiology of Eating Disorders – a Gateway to Precision Medicine

Eating disorders (anorexia nervosa, bulimia nervosa, binge eating disorder, and related syndromes) are highly distinctive psychiatric disorders. The peak age of onset is 15-25 years, a developmentally sensitive time [1]. The average illness duration is about 6 years. Young women make up the majority of people with anorexia and bulimia nervosa, with binge eating disorder, nearly equally common in both sexes. The prevalence of eating disorder behaviours is rising in high-income countries, especially in combination with obesity. One in every six or seven young women has an eating disorder and anorexia nervosa is one of the most common chronic disorders in adolescence [2]. Mortality rates are almost twice as high for people with eating disorders as in the general population, and nearly six times higher for people with anorexia nervosa.

To date there is a lack of basic, neurobiologically informed research on eating disorders. Alongside genetic research, brain imaging and investigations of the microbiome might help to elucidate mechanisms related to brain pathophysiology that drive eating disorder behaviours. There are also various endocrine alterations in eating disorders, especially when patients are underweight. However, such endocrine alterations frequently normalize with weight restoration, and whether they specifically affect the brains and behaviour of patients with an eating disorder is uncertain. Thus far pharmacotherapy has a secondary role in the treatment of eating disorders and should not be considered as a sole or primary intervention.

In this thematic issue on psychobiology of eating disorders, leading experts in the field aim to provide current and up-to-date knowledge with focused and cutting edge reviews of hot topics in eating disorders research to close the gap of bench to bedside and facilitate a more individualized and precision medicine therapy approach in the treatment of eating disorders for the future.

Breithaupt *et al.* review genome-wide association studies (GWAS) in anorexia nervosa and reflect the genomics-driven approach towards personalized intervention, a hot topic in the field of psychiatry and neurology [3].

Oxytocin as a hypothalamic neuropeptide regulates reproductive behaviour and mother-infant interaction. Recent findings in humans show that oxytocin is also a potent modulator of psychosocial function. In the field of eating disorder, first experiments have yielded initial evidence that this neuropeptide influences eating behaviour. Based on these findings, Hallschmid *et al.* [4] propose a framework of oxytocin's role and its therapeutic potential in eating disorders that aims to integrate social and metabolic aspects of its pharmacological profile.

Patients with eating disorders often demonstrate socio-emotional difficulties as either predisposing traits and/or comorbid difficulties. Cardi *et al.* [5] review the evidence of socio-emotional problems in people with eating disorders and describe how and why adjunctive treatments that focus on specific social difficulties, such as cognitive remediation and emotion skills training and cognitive bias modification have been shown to have a promising role.

Microbiome research is also a hot topic, starting in the field of nutritional medicine and obesity to the mental health field [6]. As a direct consequence, it is particularly of interest to investigate the impact of starvation on the gut microbiota in patients with anorexia nervosa (AN). Mack *et al*. demonstrate in their review [7] that gut microbiota differs in AN versus normal-weight individuals. However, they conclude that a deeper biological understanding is necessary to find promising approaches for the modulation of the AN gut microbiota to support established therapies.

The final three articles are all about CNS changes in patient groups with an eating disorder (ED). The group of Steward *et al*. [8] summarizes the current data and progress in fMRI studies in eating disorders and highlights the network alterations that are shared across EDs. Findings on reward processing in eating disorder patients point to the presence of altered sensitivity to salient food stimuli in striatal regions and to the possibility of hypothalamic inputs being overridden by top-down emotional-cognitive control regions.

Seitz *et al.* [9] review the literature regarding brain volume deficits of grey matter (GM) and white matter (WM) in AN patients. GM was reduced by 3.7% in adults and 7.6% in adolescents with AN. WM was reduced on average 2.2% in adult patients and 3.2% in adolescents. Most volume deficits in adults are reversible after long-term recovery. In addition the authors point to findings, demonstrating GABA receptor changes in GM and astrocyte loss in both GM and WM. Further, they claim a possible role of oestrogen deficit for this development and conclude that these CNS-alterations might at least partly explain core clinical symptoms.

Finally Dalton *et al*. [10] systematically reviewed the literature on neurostimulation in clinical as well as sub-clinical eating disorders. Due to clear limitations in the current treatment approaches, the authors suggest the need for the development of more targeted, brain-focused treatments. To date, a range of neuro-stimulation approaches, most prominently repetitive transcranial magnetic stimulation (rTMS), transcranial direct current stimulation (tDCS) and deep brain stimulation (DBS), is rapidly emerging as potential novel interventions. The authors conclude, that on the basis of 32 studies including 526 patients, neurostimulation approaches show promise as treatments for EDs.

1570-159X/18 $58.00+.00

In conclusion the aim of this thematic issue was to provide cutting-edge systematic overview and insight into the psychobiology of eating disorders - a prerequisite for the development of effective therapy programs, which are based on an individualized therapy approach and pave the way for an effective and thus precision therapy for the patients with eating disorders in the near future.

ACKNOWLEDGMENTS

We would like to express our appreciation to all the authors for their contributions and the reviewers for their support and constructive critiques. All of them have made this Special Issue possible.

REFERENCES

[1] Zipfel, S.; Giel, K. E.; Bulik, C. M.; Hay, P.; Schmidt, U. Anorexia nervosa: aetiology, assessment, and treatment. *Lancet Psychiatry,* **2015**, *2* (12), 1099-111.

[2] Schmidt, U.; Adan, R.; Bohm, I.; Campbell, I. C.; Dingemans, A.; Ehrlich, S.; Elzakkers, I.; Favaro, A.; Giel, K.; Harrison, A.; Himmerich, H.; Hoek, H. W.; Herpertz-Dahlmann, B.; Kas, M. J.; Seitz, J.; Smeets, P.; Sternheim, L.; Tenconi, E.; van Elburg, A.; van Furth, E.; Zipfel, S. Eating disorders: the big issue. *Lancet Psychiatry,* **2016**, *3* (4), 313-5.

[3] Breithaupt, L.; Hubel, C.; Bulik, C. M. Updates on genome-wide association findings in eating disorders and future application to precision medicine. *Curr. Neuropharmacol.,* **2018**, *16* (4),1102-1110.

[4] Giel, K.; Zipfel, S.; Hallschmid, M. Oxytocin and eating disorders: a narrative review on emerging findings and perspectives. *Curr .Neuropharmacol.,* **2018**, *16* (4), 1111-1121.

[5] Cardi, V.; Tchanturia, K.; Treasure, J. Premorbid and illness-related social difficulties in eating disorders: an overview of the literature and treatment developments. *Curr. Neuropharmacol.,* **2018**, *16*(4), 1122-1130.

[6] Bruce-Keller, A. J.; Salbaum, J. M.; Berthoud, H. R. Harnessing gut microbes for mental health: Getting from here to there. *Biol. Psychiatry,* **2018**, *83* (3), 214-223.

[7] Mack, I.; Penders, J.; Cook, J.; Dugmore, J.; Mazurak, N.; Enck, P. Is the impact of starvation on the gut microbiota specific or unspecific to anorexia nervosa? A narrative review based on a systematic literature search. *Curr. Neuropharmacol.,* **2018,** *16(4),* 1131-1149.

[8] Steward, T.; Menchon, J. M.; Jimenez-Murcia, S.; Soriano-Mas, C.; Fernandez-Aranda, F. Neural network alterations across eating disorders: a narrative review of fMRI studies. *Curr. Neuropharmacol.,* **2017**, *16*(4), 1150-1163.

[9] Seitz, J.; Konrad, K.; Herpertz-Dahlmann, B. Extend, pathomechanism and clinical consequences of brain volume changes in anorexia nervosa. *Curr. Neuropharmacol.,* **2018,** *16*(4), 1164-1173.

[10] Dalton, B.; Bartholdy, S.; Campbell, I. C.; Schmidt, U. Neurostimulation in clinical and sub-clinical eating disorders: a systematic update of the literature. *Curr. Neuropharmacol.,* **2018,** *16*(4), 1174-1192.

Stephan Zipfel
(Guest Editor)
Department of Psychosomatic Medicine
and Centre of Excellence in Eating Disorders
University of Tuebingen
Tuebingen
Germany
E-mail: Stephan.Zipfel@med.uni-tuebingen.de

Ulrike Schmidt
(Co-Guest Editor)
Department of Psychological Medicine
Section of Eating Disorders
King's College London
London
UK
E-mail: ulrike.schmidt@kcl.ac.uk

1570-159X/18 $58.00+.00