

P01.

EFFECTS OF MODERATE WINE CONSUMPTION ON HYPEROXIA-INDUCED CHANGES IN ARTERIAL STIFFNESS AND BLOOD PRESSURE

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Introduction: Oxygen is used in treatment of diverse medical conditions. Since it's often administered empirically, patients may be exposed to hyperoxia. As a result, vasoconstriction and acute increase of arterial stiffness occur. Several studies have shown that moderate wine consumption reduces risk of coronary heart disease, a disease related to vasoconstriction and oxidative stress.^{1,2} Our aim was to examine effects of 3weeks moderate consumption of wine on arterial stiffness and blood pressure before and after acute hyperoxia.

Materials and Methods: 14 apparently healthy male volunteers were recruited for consumption trial approved by the Ethics Committee, School of Medicine University of Split. After 2weeks of drive-in period, without consuming any alcoholic beverage, they consumed rosé wine (300ml/day) for 3weeks. At 2 time points, before and after wine intervention, subjects breathed 100% O₂ for 30min. Arterial stiffness (indicated by augmentation index, AIx), systolic, diastolic and mean arterial pressure (MAP) were measured before (control values, C), at the end (O₂) and 60min after the end of oxygen breathing period (postO₂).

Results: Wine consumption significantly lowered oxygen-induced elevation in AIx relative to drive-in (-28±4%, -16±4% and -25±6% in wine vs. -28±5%, -6±5% and -22±4% in non-alcohol period, for C, O₂ and postO₂, respectively). The increase in blood pressure was reduced after wine consumption (132±3 mmHg and 136±3 mmHg vs. 134±3 mmHg, and 143±4 mmHg for systolic, 81±2 mmHg and 85±2 mmHg vs. 81±2 mmHg and 91±3 mmHg, for diastolic and 98±2 mmHg and 102±3 mmHg vs. 99±2 mmHg and 108±3 mmHg, for MAP, in wine vs. non-alcohol period for C and O₂, respectively). 60min after the end of oxygen breathing period there were no changes of blood pressure between wine and non-alcohol period.

Conclusion: Acute changes in arterial stiffness and blood pressure induced by hyperoxia are favorably ameliorated by 3weeks of moderate wine consumption.

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P02.

ASSOCIATION OF MONOAMINO OXIDASE B AND CHILDHOOD TRAUMA WITH POST-TRAUMATIC STRESS DISORDER

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Introduction: Post-traumatic stress disorder (PTSD) is complex psychiatric disorder developing after traumatic experience, with unclear neurobiological background. Development and severity of PTSD symptoms include changes in neurotransmitter systems, partly due to certain gene variations, but also environmental factors such as childhood trauma. The role of monoamine oxidase (MAO) in the PTSD pathophysiology has been suggested. The aim of the study was to investigate the associations of *MAOB* gene polymorphisms, platelet MAO-B activity and childhood trauma, with development and severity of PTSD symptoms.

Material and methods: The study enrolled 87 control male subjects and 282 war veterans diagnosed with PTSD according to DSM-V criteria. Symptom severity was determined using Clinician-Administered PTSD Scale (CAPS), whereas abuse and neglect in childhood was assessed by Childhood Trauma Questionnaire (CTQ). After collection of blood samples, platelet MAO-B activity was determined spectrophotofluorometrically and *MAOB* gene polymorphisms (rs6651806, rs1799836, rs5905512) were genotyped using Real-time PCR. The study was approved by Ethical Committee of Vrapce Psychiatric Hospital.

Results and Discussion: Control subjects and PTSD patients differed in the distribution of rs6651806 alleles and *MAOB* gene haplotypes. Differences in platelet MAO-B activity were found between subjects with and without PTSD, and between patients with moderate and severe PTSD. Differences in scores on CTQ scale and subscales between patients with moderate and severe PTSD suggested that patients with severe PTSD were more likely the victims of physical, emotional and sexual abuse, and emotional neglect in childhood. The number of traumatic events, physical neglect and emotional abuse in childhood, are the main variables affecting the PTSD symptom severity expressed by CAPS scores, with significant interaction of *MAOB* rs1799836 polymorphism and physical neglect in childhood.

Conclusion: The results confirm the role of both genetic and environmental factors, as well as their interactions in PTSD; however, further research is needed to clarify them.

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P03.

PHARMACOGENOMIC PREDISPOSITION FOR DEVELOPING ADVERSE DRUG REACTIONS OF TYROSINE KINASE INHIBITORS APPROVED FOR NON SMALL LUNG CANCER

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Introduction: Lung cancer is the leading cause of cancer deaths worldwide. Non-small cell lung cancer (NSCLC) accounts for the majority (approximately 85 percent) of all lung cancers. Tyrosine kinase inhibitors (TKI) are important targeted therapy in NSCLC. Many adverse drug reactions (ADRs) of TKIs are off and on-target effects or are consequence of increased exposure to the drugs. These types of ADRs can be predicted by genotyping of target molecules or, enzymes and drug transporters involved in metabolism. The aim of this project was to identify biomarkers for developing ADRs of TKIs.

Materials and method: Literature review included TKIs approved by European Medicine Agency for treatment of NSCLC by 24.08.2018. Ovid, Scopus and PubMed were searched using following keywords: TKI, lung cancer and pharmacogenomics for period between January 2000 and August 2018.

Results and discussion: Most literature references describe pharmacogenomic predisposition for developing caused by erlotinib and gefitinib. Rudin et al. showed that the variants of the ABCG2 -15622C/T and 1143C/T polymorphisms were associated with higher erlotinib concentration (1) while Endo-Tsukude (2) identify ABCB1 genotype as biomarker of ADRs caused by erlotinib in Japanese population. Cusatis et al. reported a strong association between the ABCG2 421C/A polymorphism and diarrhoea with gefitinib (3). It was also demonstrated that reduced function of CYP2D6 was associated with an increased risk of rash of grade 2 or more with gefitinib (4). The EGFR -216 G/T variant was associated with a significantly higher risk of both rash and diarrhoea NSCLC patients treated with gefitinib (5).

Conclusion: There is need further studies to optimize personalized medicine for lung cancer patients.

Literature:

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P04.

DIFFERENTIAL EFFECT OF HORMONE REPLACEMENT THERAPY ON COGNITION IN POSTMENOPAUSAL WOMEN

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Introduction: Hormone replacement therapy (HRT) is prescribed to women for the treatment of postmenopausal symptoms, however, doubtful what kind of influence does it have on cognition. Previous studies in animal models and observational clinical data showed that estrogen could have a positive effect on aging brain¹ but large clinical trials like Women's Health Initiative Memory Studies (WHIMS) showed negative effect on cognition in older women.^{2,3} We aimed to explore possible reasons for such inconsistency based on the results of the clinical studies classified according to the patient age, duration and type of hormone replacement therapy.

Methods: We carried out a literature search for a period January 1995 to February 2018 in three databases (PubMed, Embase, Cochrane) using the following keywords; progesterone, estrogen, cognition. Inclusion criteria were the following: randomized controlled trial, cognition test(s), no additional pharmacological manipulations, no phytoestrogens/herbal preparations.

Results: After the application of inclusion criteria a total of 37 articles out of 1162 were included. Regarding the duration of therapy, 3 studies used acute (≤ 1 month), 21 subacute (1 month-1 year) and 13 used chronic therapy (≥ 1 year). Most of the studies, (21/37) showed that HRT had no effect on cognition, where as additional 7 showed positive influence on verbal cognition in younger women (medroxyprogesterone acetate was not the part of HRT). The rest 9 studies showed negative effect on cognition (7/9 done in older patients).

Conclusion: There is evidence of positive effect with the use of unopposed estrogen or estrogen/micronized progesterone in younger women with acute and subacute therapy. There is negative effect on cognition with the use of conjugated equine estrogen/medroxyprogesterone acetate in older postmenopausal women. The great majority of studies included in our research showed that HRT had no effect on cognition. Future studies should focus on the research effect of natural progesterone and estrogen in younger postmenopausal women.

Literature:

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P05.

EFFECT OF WIDELY USED DRUGS ON MORAL JUDGEMENT

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Introduction: Focusing on moral psychology, theoretical research was conducted in order to investigate the effects of currently used pharmaceuticals on patients' decisions and judgement. Moral psychology was defined through moral decision making and morally significant behaviour, which were measured using the norms underlying benefiting and harming others. Reviewed pharmaceuticals were among commonly prescribed drugs, acting as beta-blockers, selective serotonin reuptake inhibitors, precursors of neurotransmitters or neurotransmitters themselves.

Materials and Methods: Scientific articles were collected using large databases like PubMed. With no time or article type constraints applied, keywords "moral decision making", "moral psychology", "propranolol", "oxytocin", "SSRI" were searched. Additional articles were explored through reference lists. An extensive analysis was carried out and gained information were combined in a comprehensive overview.

Results and Discussion: Research showed that propranolol, a nonselective beta-blocker, inhibits emotional arousal and affects memory consolidation processes. Compared to placebo, propranolol group appeared to be more decisive when contemplating moral dilemmas and gravitated towards deontological decisions. Studies showed that increased levels of tryptophan, a serotonin precursor, positively influenced moral behaviour and social cooperation, resulting in participants having aversion to harming others and their higher rates of unfairness acceptance. The effects of oxytocin and dopamine-related drugs were inspected as well. Oxytocin-treated participants expressed higher emphatic concerns as third parties in unfair situations, and showed greater levels of trust with increased generosity towards unknown individuals. Regarding dopamine-boosting drugs, contradicting findings were observed. One appears to reduce hyper altruistic behavior with a promotion of selfishness, while others endorse selflessness.

Conclusion: It seems that certain groups of widely used pharmaceuticals affect moral psychology of an individual. Understanding of those additional effects obliges one to raise an awareness of possible drug-related judgement alterations. Furthermore, listed effects could be considered as potential treatment targets for psychiatric disorders resulting in social dysfunction (e.g. PTSD, autism, schizophrenia...).

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P06.

ANALYSIS OF FLUORIDE CONCENTRATION IN TOOTHPASTES

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Introduction: Fluoride compounds are used in dentistry primarily for caries prevention. Commercially available toothpastes contain a wide variety of remineralization compounds. Their effectiveness depends on the delivery of free or soluble fluoride. Besides them, there are non-fluoride remineralization systems, based on calcium and phosphate ions, which are added to toothpastes. The aim of this study was to determine the concentrations of fluoride ions in aqueous solutions of toothpastes and to compare them to the label amount of fluoride concentration.

Materials and methods: Eight commercially available toothpastes were chosen for the study. Six of them contained different fluoride compounds: sodium fluoride, amine fluoride, sodium monofluorophosphate, amine fluoride/stannous fluoride, calcium fluoride, sodium fluoride/casein phosphopeptide-amorphous calcium phosphate complex. Two of them were labeled as fluoride-free, containing hydroxyapatite as the remineralization agent. Two samples were prepared from each of the toothpastes. A single gram of the toothpaste was measured using the analytical scale and then dissolved in deionized water. Next, the amount of fluoride ion (F⁻) was determined by use of ion-selective electrode (ISO 19448:2018 standard).

Results and discussion: The amount of fluoride ions in amine fluoride toothpaste match the label concentration. The concentrations measured in the other toothpaste samples do not correspond with the label concentration. However, the amount of fluoride ions in sodium fluoride toothpaste almost matched the label concentration. It was confirmed that the fluoride-free toothpastes do not contain fluoride ions.

Conclusion: Fluoride ions are released from amine fluoride and sodium fluoride toothpastes in aqueous solutions. The other toothpastes do not release fluoride ions following dissolvment. They are based on the different fluoride delivery systems which have more complex mechanisms of action.

Literature:

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Approvals: The Ethics Committee of the School of Dental Medicine University of Zagreb, Croatia, approved the study protocol.

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P07.

THE EFFECT OF ENVIRONMENTAL ENRICHMENT ON INSULIN SIGNALING IN THE FRONTAL CORTEX OF A RAT MODEL OF SPORADIC ALZHEIMER'S DISEASE

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Introduction: Enriched environment (EH) and physical activity (PA) can ameliorate cognitive deficit in Alzheimer's disease (AD).¹ Several studies investigated different possible connection of insulin signaling and PA in STZ intracerebroventricularly (icv) treated rats but without investigation of EH effect². Aim of this study was to investigate possible connections between changes of insulin receptor (IR), insulin degrading enzyme (IDE), tau (t-tau), phosphorylated tau (p-tau), total glycogen synthase kinase 3beta (t-GSK3 β) and phosphorylated glycogen synthase kinase-3beta (p-GSK3 β) in frontal cortex (FC) and cognitive benefit from EH and PA in a rat model of AD.

Material and methods: Adult, male Wistar rats (N=24) were randomly divided in 2 groups, which, following the general anaesthesia, were given STZ-icv (3 mg/kg) injection or vehicle, respectively. Immediately after the STZ-icv treatment, one half of each group was rendered to EH and intensive weekly mental and physical training in the Morris Water Maze Test (MWM) and Rota-rod for 3 months, respectively. Changes in specific protein levels (IR;IDE;t-tau; p-tau;GSK-3 β ;pGSK-3 β) were detected in the FC by Western blot. Data were analyzed by Kruskal-Wallis followed by Mann-Whitney U-test, p<0.05 considered statistically significant.

Results: EH+PA prevented cognitive deficits in STZ-icv rat model as seen by the reduced entries into the incorrect compartments (number of mistakes) in the MWM training and probe trials, respectively, which reached the level of controls. EH+PA significantly increased IDE (+88%) in STZ-icv treated rat in comparison to the control. Expression of IR, ratio of p/t tau and p/tGSK-3 β were not affected either by STZ treatment or EH+PA.

Conclusion: Results of this study suggest that the mechanism responsible for the prevention of cognitive deficit in animals representing sAD model and subjected to EH and PA might be related to the changes in IDE expression in the FC. Further research is required for better understanding of the possible underlying mechanisms.

Literature:

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P08.

THE EFFECTS OF INSULIN AND GALACTOSE ACUTE TREATMENT IN HYPOTHALAMUS AND TEMPORAL CORTEX OF SPORADIC ALZHEIMER'S DISEASE RAT MODEL

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Introduction: Metabolic dysfunction has been recognized as one of the features that precedes pathology of Alzheimer's disease (AD). The aim of the study was to determine the effects of acute insulin and galactose (GAL) administration on cell activation and metabolic changes in hypothalamus (HPT) and temporal cortex (TC) of rats treated intracerebroventricularly with streptozotocin (STZ-icv).

Materials and Methods: Wistar rats were given STZ (3 mg/kg) or vehicle-icv (CTR) and sacrificed one month after the treatment. Two hours before sacrifice one CTR and one STZ group received intranasal rapid acting insulin (2U/20 μ l), while two STZ groups were treated with oral (STZ+poGAL) or intraperitoneal (STZ+ipGAL) galactose (200 mg/kg) 15 minutes before sacrifice. Expression of insulin receptor (IR), glucagon-like receptor-1 (GLP-1R), protein kinase B (Akt) and postsynaptic density marker-95 (PSD95) was measured by Western blot, whereas IGF1R expression was determined by ELISA in HPT and TC. Expression of c-fos, astrocyte (GFAP), neuronal (NeuN) and microglial (CD11b) markers was visualised by immunofluorescence. Data were analysed by Kruskal-Wallis followed by Mann-Whitney test.

Results: Expression of c-fos was found decreased in STZ animals and increased after intranasal insulin administration in both groups. In TC c-fos was only found in neurons, while in HPT predominantly in microglial cells. Acute galactose administration changed the expression of metabolic markers in HPT and TC of STZ treated rats. Both galactose treatments normalized activation of Akt in STZ animals. Furthermore, PSD95 and GLP-1R expressions were increased in both brain regions after ip galactose administration, whereas GLP-1R expression was increased in TC of STZ and STZ+poGAL groups. IGF-1R concentration was decreased in TC after ip and po GAL treatment.

Conclusion: Acute administration of intranasal insulin and peroral and intraperitoneal galactose induced various biochemical and metabolic changes in different brain regions of STZ-icv treated animals, dependently on route of administration of used pharmacological agents.

Literature:

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P09.

CENTRAL ANTINOCICEPTIVE EFFECT OF BOTULINUM TOXIN TYPE A: THE ROLE OF GLUTAMATE?

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Introduction: Recent studies suggest that botulinum toxin type A (BT-A) might inhibit the release of pain neurotransmitters from central primary afferent terminals, including glutamate. Previously we have demonstrated that peripheral BT-A and intrathecal NMDA antagonist (AP5) have an additive antinociceptive effect in combination. The aim of the present study was to investigate potential changes in the expression of spinal glutamate receptors and a membrane associated scaffolding protein in neural postsynaptic densities PSD-95, as markers of central sensitization involved in generation of pathological pain.

Materials and methods: Ipsilateral dorsal horns from naïve and 5% formalin (20 µL s.c. into the hind paw) treated male Wistar rats were collected and homogenized to analyze the expression of: a) NR1 and b) NR1 phospho-Ser897 subunits of NMDA receptor; c) GluR1 and d) GluR1 phospho-Ser845 subunits of AMPA receptor; and e) PSD-95 by western blot.

Formalin-treated groups received saline or BT-A (5 U/kg, s.c. into the hind paw) 5 days, and/or AP-5 (10 µg/10 µL, intrathecal) 10 min before the test. Experiments were approved by Croatian Ministry of Agriculture Veterinary and Food Safety Directorate (permit no. EP 03-2/2015).

Results and discussion: Compared to naïve animals, the expression of glutamate receptors and their phosphorylated forms was increased in formalin-treated rats, which is in line with the induction of inflammatory pain. However, no changes were observed following the application of BT-A, AP5 or their combination. PSD-95 expression was unchanged across all groups. Therefore, the antinociceptive effect of BT-A and/or AP-5 was not accompanied by the expected reduction in selected central sensitization markers' expression.

Conclusion: Considering that BT-A's mechanism of action includes the inhibition of neurotransmitters' release, the consequent reduction of glutamate receptors may not be visible in acute pain model and should be investigated further in chronic pain model, together with the more probable effect on spinal glutamate level.

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P10.

ANTI-INFLAMMATORY EFFECT OF BOTULINUM TOXIN TYPE A IN CFA-INDUCED KNEE INFLAMMATION

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Introduction: Botulinum neurotoxin type A (BoNT/A), selectively enters neurons and inhibits synaptic neurotransmitter exocytosis by proteolytic cleavage of synaptosomal-associated protein 25 (SNAP-25). The aim of this experiment was to evaluate anti-inflammatory and antinociceptive effect of botulinum neurotoxin type A in rats with CFA-induced pain and inflammation in the knee joint.

Materials and methods: Experimental procedures were reviewed and approved by the Ethics Committee of the Zagreb School of Medicine. In this experiment, 29 male Wistar rats were divided into four groups of animals. The first group was injected with saline solution inside the knee joint, while the second group received CFA. CFA was also administered to the remaining two groups, but, in addition, the third group received BoNT/A into the intrathecal space, while the fourth group was injected with BoNT/A into the inflamed joint.

Knee diameter of the inflamed joint was measured on the day CFA was injected and in the two following days using a caliper to evaluate the first parameter of the inflammation, edema. The second parameter, extravasation of Evans blue inside the synovial membrane of the knee, was measured with removed tissue, using spectrophotometry.

Results: Results showed that treatment with BoNT/A significantly reduced edema and extravasation. The diameter of the swollen joints in a group that received BoNT/A directly into the joint was lower by $22.60 \pm 2.99 \%$ ($p < 0.001$) compared to the group that was only injected with CFA, with the peak effect two days after the inflammation. On the other hand, the effect on reducing extravasation was significant only in a group administered with BoNT/A intrathecally ($p < 0.05$).

Conclusion: This experiment shows that anti-inflammatory activity of BoNT/A is dependent on the location it acts upon, having a significant effect on extravasation when delivered into the central nervous system, and higher effect on edema when injected directly into the inflamed joint.

P11.

CENTRAL EFFECTS OF BOTULINUM TOXIN TYPE A ON SPINAL CORD NEUROTRANSMITTERS AND NEURON MARKERS IN RATS WITH LOCAL MUSCULAR SPASTICITY

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Introduction: Botulinum toxin type A is one of the most widely used drugs in the treatment of local muscular hyperkinetic disorders. Recent studies have suggested possible therapeutic effect of BoNT/A on the central motoneurons. In this paper we want to examine this hypothesis by investigating the effects of BoNT/A on central neurotransmission and neuronal protein markers using a rat model of focal muscle hypertonia.

Materials and methods: Unilateral muscle spasm was induced by a low intramuscular dose of TeNT. Following intramuscular and intraneuronal BoNT/A, the rat spinal cord was analyzed on glutamate and GABA concentrations by ELISA. The expression of VAMP-2, cleaved SNAP-25, SV2C, CGRP and NeuN proteins was analyzed immunohistochemically.

Results: The behavioral tests have shown that BoNT/A applied by intraneural and intramuscular route reduces muscle hypertonia. By measuring the total concentration of GABA and glutamate in ventral horn, it was not possible to determine the potential effect of BoNT/A on the inhibitory and excitatory transmission mismatch. TeNT and BoNT/A do not alter the number of alpha motoneurons in ventral horn, which was shown with CGRP and NeuN immunohistochemistry analysis. The central effect of the toxins was found after their peripheral administration. Cleaved SNAP-25, the BoNT/A central protein target, was detected in the ventral horn. On the other hand, the concentration of the VAMP-2, TeNT target protein, was reduced in the area surrounding the alpha motoneurons, but the overall concentration stayed the same.

Conclusion: Decreased muscle hypertonia was seen after the intramuscular and intraneural administration of BoNT/A. Cleaved SNAP-25 was detected in the ventral horn, indicating its possible central activity. However, an explanation of the antispastic effect of BoNT/A in the central nervous system requires further research.

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P12.

SELECUMAB (SELUCO) - HIGH AFFINITY HUMANIZED ANTI IL-23 ANTIBODY IN THERAPY OF ULCERATIVE COLITIS - STUDENTS' APPROACH

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Introduction: Ulcerative colitis is an idiopathic, chronic, relapsing inflammatory bowel disease that causes long-lasting inflammation and ulcers in the digestive tract. Although its exact etiology remains uncertain, studies indicate that ulcerative colitis is a heterogeneous disease characterized by various genetic abnormalities that lead to overly aggressive T-cell responses to a subset of commensal enteric bacteria. The aim of this study was to create a new antibody which would be more selective and therefore have fewer side effects than existing therapy.

Materials and methods: IL-23 plays a crucial role in the induction and function of pathogenic effector Th17 cells. IL-23 is a heterodimeric cytokine composed of 2 disulfide-linked subunits: a soluble p40 subunit and a tetra-helical bundle p19 subunit. The p40 subunit also associates with a p35 subunit to form the pro-inflammatory molecule IL-12, and forms a homo-dimeric p40 subunit that acts as a natural antagonist to both IL-23 and IL-12. Our initial molecule was Ustekinumab, a human monoclonal antibody, which targets the p40 subunit shared by both IL-23 and IL-12. By adding 6-methyl-6-(3-ethylpentyl) groups to its triazine ring, steric hindrance is created in order to block its binding to the p40 subunit. The new molecule, **selecumab**, binds preferably to the p19 subunit of IL-23, IL-23A, preventing receptor activation and thereby disrupting the IL-23/IL-17 axis. The selectivity of **selecumab** to the p19 subunit was examined in preclinical analysis using Biolayer interferometry by measuring corresponding K_d and IC50. Pharmacodynamics was examined on mouse models using the DNBS model by measuring concentration of IL-23 in their bloodstream using ELISA. After ensuring the approval of the regulatory agency, clinical studies were conducted and included adults aged 18–85 years, resistant to conventional therapy, which had at least 15 cm of their bowel affected by UC and suffered from moderate to severe UC. In phase 3 of the clinical trial, the safety of **selecumab** was assessed in 1115 patients with moderately to severely active Crohn's disease in randomized, double-blind, placebo-controlled, parallel-group, and multicenter studies.

Results: In the preclinical analysis several antibodies with < 10 picomolar affinity and high potency to block IL23 induced IL17 production in mouse splenocytes assay were identified. To confirm specificity, the antibodies were screened for their ability to bind human IL-12. No antibody bound IL-12 at concentrations of 1.2 μ M, which was the highest concentration tested. In the DNBS experiment, our results were compared to the concentration of IL-23 measured after applying **ustekinumab** and demonstrated that **selecumab** is more efficient in the inhibition of IL-23 proliferation. **Selecumab** showed no acute, sub-chronic or chronic systemic toxicity, and the most common side effects included upper respiratory tract infections, nasopharyngitis, urticaria, and diarrhea. Phase 2 of the clinical trial showed that, regardless of whether a patient had prior exposure to an anti-TNF agent (conventional therapy), the rates of remission and response were

higher with the drug than with the placebo treatment, and the drug was effective in all tested groups. The highest dose of **selecumab** that was studied in the seULCO program was approximately 6 mg/kg, which was given as an intravenous (IV) loading dose.

Conclusion: **Selecumab** is a humanized monoclonal antibody that selectively binds the p19 subunit of IL-23 and therefore has fewer side effects caused by the suppression of immune system when compared to existing therapies.

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